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Regional Development Processes and Policies

CENTRE FOR REGIONAL STUDIES
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Regional Development Processes and Policies

EDITED BY
WILLIAM H. BERENTSEN, DARRICK R. DANTA AND ETA DARÓCZI

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PREFACE

The papers in this book are primarily those solicited for and subsequently presented at a joint U.S.-Hungarian conference on new directions in regional development and regional policy at Pécs and Budapest in September 1985. The conference was proposed and organized by the Centre for Regional Studies, Hungarian Academy of Sciences in order to investigate issues of concern in developed nations and, specifically, to promote greater interaction among geographers, planners, and regional economists in the USA and Hungary. The conference was sponsored by the Hungarian Academy of Sciences (HAS) and the National Science Foundation (NSF).

The 1985 conference was the third joint U.S.-Hungarian meeting of geographers/regional economists/planners, following earlier meetings in Budapest (1975) and Ann Arbor (1978). This most recent meeting focused on regional problems concerning slowed international economic growth and the associated regional consequences of economic restructuring in the world and national economies. The immediate goal of the conference was to establish a base for continued, collaborative research between U.S. and Hungarian regional scientists by introducing one another to representative theoretical, empirical, and methodological research approaches within the research community in each nation. The Centre for Regional Studies, HAS, enhanced the opportunities for interaction by organizing fieldtrips (e.g., to a state farm, an agro-industrial complex, and a lagging or 'drawback' agricultural region as well as to local planning agencies in the Pécs area) and informal banquets, which complemented the presentation and discussion of the papers included in this volume.

Joint work among conferees has evolved during the years following the meeting. Several participants have now undertaken research in the partner nation and continued bilateral collaboration is planned for the immediate future, both in the form of formal meetings and exchange agreements and by way of continued, direct contact between individuals.

The papers that follow represent the efforts of each delegation to inform the other of on-going research initiatives and perspectives in the field of regional development and regional policy and to search for common ground and an efficient means to investigate regional problems that are shared among developed nations. Any opinions, findings, and conclusions or recommendations expressed in this publication are those of the authors and do not necessarily reflect the views of the National Science Foundation or the Hungarian Academy of Sciences.

We express our thanks to the Academy and the Foundation for their support as well as to Darrick Danta and Eta Daróczi for their considerable efforts in preparing this book. The U.S. participants also express their gratitude to all the people in the Centre for Regional Studies, HAS, who worked so hard and well to organize the 1985 conference and who so graciously welcomed and introduced them to Hungary.

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INTRODUCTION

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Technologic change, increased international economic competition, and associated reorganization of goods and service producing entities are resulting in a restructuring of economies in the developed world.

In turn, this is causing changes in the interrelated socioeconomic and regional structures of nations' societies (Castells 1985; Harrison 1982), and creating new sets of social and regional problems (Bartels—van Duijn 1982; Carney et al. 1980; Enyedi 1984; Hudson—Lewis 1982; Spehl 1984; Stöhr 1984). Ironically, included among these problems are the need for some nations, whose restructuring has yet to begin in earnest (e.g., in Hungary), to hasten the restructuring process in order to remain competitive in the international market place. There is a clear need for regional planners to devise new types of policies to respond to the political, social, and economic challenges of the 1980s and 1990s (Knox 1984, 1985) and to implement these policies in an era of lessened support and funding from central governments.

This situation presents an opportunity for regional analysts to interpret pattern and process reflected in current trends in regional development in order to provide data and analysis for the policy debate. Increasingly, it would appear that despite the appeal of broad, relatively simple theoretical notions in regional development (e.g., Williamson's inverted U-curve of regional inequalities or the core-periphery or Sunbelt-Frostbelt dichotomies), greater complexity exists in the pattern and process of development than has generally heretofore been acknowledged. The regional consequences of a wide variety of ever changing social and economic processes must be analyzed simultaneously in order to better understand the causes of patterns of regional change in the developed world (Stöhr 1985).

Despite the relatively simple theoretical notions in regional development, there have evolved more sophisticated methodological and empirical approaches for the study of regions, so that a rather theory-poor, yet nonetheless often highly informative, tradition of 'regional analysis' has evolved (Berentsen 1987). Notable practitioners in this tradition include Beyers (e.g., 1979), Borchert (e.g., 1972), Erikson (e.g., 1976), Glickman (e.g., in this volume), and Rees (likewise in this volume). The attempts of these and many other authors to describe and (partially) explain the complexity of regional change have provided a much better position from which to understand (and, we hope, ultimately better predict) regional change and devise policies to deal with this change than, for example, the more descriptive 'regional geography' approach.

The regional analytic approach is exemplified by many of the papers in this volume. Themes that emerge are: (1) sectoral structure, enterprise organization, and regional change; (2) related issues of regional inequalities and policy responses to undesirable regional change (including inequality); (3) spatial patterns of population change in response to economic change; and (4) methodological approaches to regional analysis in complex environments.

Authors here and elsewhere convincingly illustrate that patterns of regional change are very much the product of interrelated and dynamically evolving relationships between multilocational firms' objectives and organizational structures, regional investment and employment patterns, and employee/consumer responses resulting from shifting costs of travel and housing. In turn, these relationships result in changing spatial patterns of population and socioeconomic well-being. The patterns of regional development, as exemplified by papers here, illustrate what is evident in the literature as a whole: that there is remarkable temporal and regional variation in the spatial expression of on-going socioeconomic change in the societies of the developed world. Relatively simple regional development 'theories' have not and probably will not be able to explain complex regional patterns emerging from complex socioeconomic processes.

Leading from this, policy responses cannot rely on simplified notions of regional development to devise resolutions to complex (and complexly dynamic) regional problems.

A good case in point is illustrated by the investigations of spatial population changes both here and elsewhere (e.g., Kontuly—Wiard—Vogelsang 1987; Vining—Pallone 1982). The contemporary pattern of regional population change is the product of, among other things, regional employment differences/changes, regional settlement patterns and preferences, spatial-temporal variations in age structures, and public policy. Factors affecting these latter causal agents are also themselves varied, complex, and complexly interrelated. At the moment, discussions about trends in population decentralization or re-centralization can only discuss pattern authoritatively; an explanation of process has yet to evolve.

Without much of a theoretical base to use to explain change in space, many authors here, as elsewhere in the emerging regional analytic literature, use their best judgement to infer process from pattern. Though fraught with hazard, this approach is the only choice at hand to help build theory (inductively) and provide reasoned, informed input for policy discussions. An ever broader base of case studies, though often bewildering in terms of variety of pattern and inferred process, provides an empirical base for both theory construction and practical application. At the same time, efforts to improve ways to analyze complex regional change and impacts of policy (see Isserman—Merrifield in this volume) or alternative, preferable regional development strategies (see Bolton), complement empirically-oriented, step by step efforts to unravel the complexity.

The papers here, as in any other collection of papers in regional science, are bound to disappoint. There are simply too few things as yet understood and too few things for which we can or do control in order to clearly describe pattern and explain process in regional change. To one extent or another the following papers reflect the status of regional analysis in the late 1980s: describing and analyzing patterns with available data and methods and explaining process with existing concepts and 'theories'. In addition, the papers by Hungarian colleagues provide one of the few collections of papers in English on the regional analysis of the European socialist bloc's most open society, but also one with rather severe economic problems.

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CITIES AND THE INTERNATIONAL DIVISION OF LABOR§

NORMAN J. GLICKMAN

KEY-WORDS: *balance-of-trade; cities; decentralization; deskilling; de-urbanization; high-technology* industry; *globalization; international* division of labor; *industrialization; newly* industrializing countries; *nonmetropolitan* growth; *periphery; polarization; public* policy; *stagflation; 'third* industrial revolution'; *transnational* corporations; *urban* policy; *world* economy.

Introduction

In this paper I will set out some working hypotheses about the role of cities in today's changing international division of labor (IDOL), within the context of more general structural change. In doing so, I will examine the complex ways in which cities have evolved over time, how they are centers for political and economic struggle, and how metropolises are affected by public policies. I will discuss the following four major points:

1. There has been a vast transformation of the world economy in that energy price increases, new investment and migration patterns, and the interpenetration of markets have had profound and uneven effects on national economies. In recent years, economic growth, profits, and wages have stagnated in most developed countries, while there have been diverse impacts on industries, occupations, and cities. There have been employment reductions in traditional manufacturing and shifts to the high-technology and service sectors.
2. The 'third industrial revolution' (involving electronics, biotechnology, and, significantly, information processing) has helped produce two contradictory urban trends. First, it has encouraged de-urbanization and the dispersion of population.
   This is so because technology and the maturation of product lines have promoted both standardized work and dispersed job sites, and because changing business strategies and organization have allowed firms to seek less urbanized locations. Hence, decline has occurred in traditional manufacturing regions and there has been a continuing decentralization of jobs and population. At the same time, an opposite tendency has produced agglomerations of corporate headquarter functions in a few large cities. These centers of administrative activities maintain control over regions that specialize in production processes that are lower in the urban hierarchy.

§ Reprinted with Premission from Michael P. Smith and Joe R. Feagin (Editors), *The Capitalist City* (Oxford: Basil Blackwell, 1987)

3. As a result of economic change, there have been pressures by groups and classes (e.g., income, race, regional, industrial, and occupational) who have lost out and who demand policies to cushion themselves from decline. In an era of slow growth, with many groups bringing simultaneous pressure on the State, fiscal problems result. For instance, firms petition the State to increase their profitability through tax cuts, deregulation of markets, decreased enforcement of health and safety regulations, and reduced social welfare benefits. Corporations have attempted to roll back previously won wage and working conditions directly through bargaining and indirectly through appeals to the State on the grounds that high wages are the prime cause of inflation and low productivity. Workers, on the other hand, fight to maintain their living standards and economic security through the extension of social legislation and urban programs. With slow economic growth, the State cannot meet all of these demands simultaneously. These problems are made more difficult to solve in a more internationalized economy, as external pressures add new dimensions to political conflict.
4. Economic programs trying to reestablish faster growth have geographical side effects that often aid growing areas and suburbs at the expense of declining regions and central cities. Urban policies, on the other hand, generally try to ameliorate the problems of large cities and declining areas. Therefore, a policy dilemma has resulted that the State cannot easily solve.

In what follows, I will expand on these points with emphasis on the situation in the United States.

Some phenomena

NATIONAL AND INTERNATIONAL ECONOMIC CHANGE

The worldwide economic picture has changed significantly in the last twenty-five years (Table 1). The 1970s saw sharp decreases in economic growth rates and increases in inflation. In non-socialist industrialized countries, for example, the average annual Gross Domestic Product (GDP) growth fell from 5.1% to 3.0% from the 1960s to the 1970s, while inflation rates more than doubled. There have been extraordinary increases in international trade, with the world's exports increasing more than twelve times between 1963 and 1981 (Deardorff—Stern 1983). The last two columns of Table 1 show the dramatic increase in trade as a proportion of GDP (e.g., from 12% to 20% for developed countries between 1960 and 1981).

To understand changes in the IDOL, it is useful to divide the world into three types of countries: 1) core countries that make up the leading industrial producers of the Organization of Economic Cooperation and Development (OECD) and that house most corporate centers; 2) *semi-periphery* nations, consisting of the middle-income OECD nations and newly industrializing countries (NICS) that are dependent on core-nation capital investment; and 3) the poor countries and oil exporters of the periphery (Wallerstein 1974).[2]

TABLE 1

MACROECONOMIC PERFORMANCE OF MAJOR COUNTRY GROUPS 1960—1981

Country Groups	Average Annual Growth Rate of GDP per Capita[w] (%)		Average Annual Rate of Inflation[m]		Average Annual Growth Rate of Foreign Trade Exports[m,a]		Average Annual Growth Rate of Foreign Trade Imports[m,a]		Exports of Goods and Non-factor Services as a % of GDP[w]	
	1960-70	1970-81	1960-70	1970-81	1960-70	1970-81	1960-70	1970-81	1960	1981
Low-income Countries	4.60	4.50	3.50	11.20	4.90	-0.70	5.30	2.40	7	9
Middle-income Countries	6.00	5.60	3.00	13.10	5.40	4.10	6.40	4.80	17	23
Lower Middle-income	5.00	5.60	2.80	11.10	5.20	3.00	6.50	4.10	15	23
Upper Middle-income	6.40	5.60	3.00	18.60	5.40	7.00	5.90	4.70	18	23
Industrialized Countries	5.10	3.00	4.30	9.90	8.50	5.40	9.50	4.40	12	20
Capital-surplus Oil Exporters	13.00	5.30	1.20	18.20	11.00	-1.50	11.00	20.80	—	69
Centrally Planned Economies	4.90	5.60	—	—	9.40	6.70	8.60	6.10	—	—

w = weighted average, nominal terms
m = median, nominal terms
a = real terms, measured from volume indices

Source: World Bank (1980—1983: Tables 1, 2, 5, and 9)

Two stages of international trade, capital investment, and migration patterns can be set out (Glickman—Petras 1981). During the 1950s and 1960s, labor was imported from the periphery and semi-periphery to the core, capital-intensive exports were sent from the core to the semi-periphery and periphery, most trade and foreign investment was intracore, and low-cost energy was imported into the core from the peripheral oil nations. After about 1974, however, new trends emerged. As economic growth declined, most labor importation was ended, direct foreign investment (DFI) increased from the core to a small number of NICs, more labor-intensive imports came into the core from the NICs, and high-priced energy was imported by the core countries. Although cut offs of labor importation into the core were accompanied by capital exports to NICs, DFI went to a largely different set of countries than those that were previously labor exporters. Thus, a *triangular* relationship of labor-capital exchange took place: labor had been imported from one set of semi-periphery and periphery countries, but capital exports went to NICs, few of which had been labor exporters.[3] The search for low-cost labor in the NICs was mostly in assembly operations, especially in the semiconductor, textile, clothing, and shoe industries. Relocation of auto, chemical, steel, and rubber operations from developed nations were often for marketing purposes or to supply other overseas operations.

Importantly, while assembly functions decentralized, control activity remained in the core.

A good example of worldwide industrial dispersion can be seen in the automobile industry. Hill (1983) describes the transition from a U.S.-dominated industry in the 1960s to one now characterized by massive foreign investment by American carmakers and increasing competition from Japanese and European producers. As a result, fierce global competition emerged and the U.S. share of sales dropped sharply. There has been integration of worldwide auto operations, efforts to penetrate European markets by American firms, and penetration of the U.S.

market by the Europeans and Japanese. The results have been dramatic: between 1978 and 1982, U.S. firms' auto sales declined by 32%; while imports rose from 19% to 28% of the domestic market. Employment fell by nearly 300 thousand workers.

Most recently, there has been massive foreign investment by American car companies (about 380 billion is expected between 1980 and 1985) and simultaneous demands for protectionism at home. Global integration of operations has come about, involving geographically separate engineering, design, production, assembly, and other operations. Ford's 'World Car' is an example of this strategy.

Nearly identical cars are assembled in a multitude of places using components produced in a variety of countries.[4] Firms are thus able to take advantage of local production conditions to maximize worldwide profits.

Castells (1984) shows a similar globalization of the semiconductor industry. Research and management functions, oriented as they are to intellectual labor, locate near universities and cities where 'quality of life' factors are high. But the other processes—mask making, wafer fabrication, assembly, and testing—each may have geographically distinct and separate patterns. Therefore, labor-intensive assembly functions have been locating in NICs such as Hong Kong, Singapore, and Korea, where wages are low. By 1976, 'offshore' assembly plants employed twice the number of people working in similar domestic operations. The same lines of geographic development can be seen in the assembly processes of many other industries.

These patterns emerged because of improvements in communications technology and changes in business organization, resulting in the establishment of a 'Global Factory' (Barnet 1980). A larger number of people have been brought into this internationalized system of production, exchange, and finance. For assembly activity, work can be done nearly anywhere in the world using interchangeable low-skilled workers. Thus, firms have looked for sites with low-wage, stable, and unorganized labor, both within developed nations and in 'safe' LDCs (usually those with totalitarian regimes).[5] Crucially, the speed of capital shifts increased as firms have become better able to disperse production worldwide because of the information revolution (Castells 1984; Bluestone—Harrison 1982).

Two spatial phenomena are connected directly to recent global economic change. First, the evolving IDOL has meant that cities have developed new functions. In particular, a few 'world cities' (Friedman—Wolff 1982) have evolved to organize and manage the far-flung operations of transnational corporations. Cities such as New York, Tokyo, London, and Paris house concentrations of corporate headquarters, high-level corporate services (accounting, law, etc.), banking, research, and government. Supervision of production facilities lower in the urban hierarchy takes place in these conurbations. Smaller cities assume roles as production, service, and consumer centers (Noyelle—Stanback 1984; Pred 1977; Cohen 1981). The higher a city is in the hierarchy, the more control it will have over its own economic destiny. Therefore, we see both a *spatial diffusion* of economic activity and a pronounced *territorial hierarchy* (Castells 1984).

Second, direct foreign investment has affected regional development. During the early postwar era, most investment was in the core regions of developed nations because of uncertainty about alternative sites and the desire to be near consumer markets. Later, transnational corporations (TNCs) decentralized investment, particularly in assembly operations (Glickman—Woodward 1984).[6]

INTERNATIONAL TRADE AND THE U.S. ECONOMY

Within these global patterns, the U.S. economy changed as well.

There evolved a stagnant economy, a fall in the rate of profit (Nordhaus 1974; Lovell 1978), more overseas investment (OECD 1981), slower productivity growth (Denison 1979), and stagflation. For example, the GNP growth rate fell from 4.7% per annum (1961-1965) to 2.2% (1973-1981). On a per capita basis, GNP growth plummeted from 3.1% (1960-1973) to only 0.9% (1973-1981) (Reich 1983). Inflation reached 13% in 1980, declining only under the deflationary monetarist measures of the early 1980s and the deepest postwar recession.

After-tax profits fell from 13.7% (1966) to 7.6% (1979).

U.S. investment abroad increased substantially, while direct foreign investment in the U.S. exploded in the 1970s.[7] U.S. assets abroad were 3226 billion at the end of 1983, three times the 1970 level. There was also a major shift toward investment in the NICs: 7% of U.S. DFI went to these countries in 1960-1968 compared to 19.4% between 1973 and 1978. By 1977, production by U.S. parent companies and majority-owned foreign affiliates overseas was 3652 billion, more than one-third of domestic GNP (Howenstine 1983).[8] Inward DFI grew from 313 billion in 1970 to 3134 billion in 1983; the annual growth rate was 8.4% from 1963 to 1973, increasing to 10.5% between 1974 and 1981 (Schoenberger 1983). Following Dunning (1981), Schoenberger (1983) argues that much inward DFI was by oligopolistic firms seeking access to the large U.S. market in order to exploit their 'ownership advantage'[9] in such high-technology sectors as machinery and chemicals.

Trade of U.S. goods and services grew rapidly, as exports increased from 329 billion in 1960 to 3348 billion in 1982 (Belli 1983). Imports and exports were both about 8% of production in 1969; however, exports rose to 16% and imports increased to nearly 20% of domestic output by 1982. Most significant has been the penetration of U.S. manufacturing goods markets and the decline of the U.S. as a world trade leader.[10] By 1980, nearly three-quarters of all goods produced in the U.S. were in active competition with imports from other countries (Reich 1983). The U.S. now exports some 'high tech' items,[11] corporate and financial services, and agricultural products. At the same time, imports are strong in traditional manufactured markets that were previously U.S. dominated. Major import industries are autos (21% of domestic consumption), consumer electronics (52%), calculators (43%), textile machinery (46%), and cutlery (90%) (Magaziner—Reich 1982). Significant balance-of-trade problems resulted from declining competitiveness and higher-priced oil.

Trade has had differential effects on occupations and segments of the labor force. Frank and Freeman (1979) show that about 85% of the job loss attributable to U.S. investment abroad has been in blue-collar occupations. Sectors affected adversely by imports have been more heavily unionized and have employed more blue-collar, female, and minority workers. At the same time, export industries tend to have more highly educated, young, and managerial employees.

Thus, increased imports and outward DFI have affected negatively lower-skilled workers.

IDOL AND U.S. SPATIAL CHANGE

Changes in the IDOL have produced a number of notable effects on American cities and regions. First, the decline in sales of heavy manufacturing goods in international markets (e.g., transportation equipment, nonelectrical and electrical machinery, chemicals) has exacerbated unemployment problems in the Industrial Heartland of the Northeast and Midwest. Simultaneously, other regions have gained from trade: agricultural sales abroad helped farming regions in the 1970s, and some of the large cities that lost manufacturing jobs have gained service positions (particularly in corporate headquarter functions).

These corporate service jobs are concentrated in the Northeast and other large metropolitan areas (Stanback—Novelle 1982).[12]

Second, there has been an uneven pattern of foreign direct investment among U.S. regions. In 1981, employment in nonbank U.S. affiliates of foreign firms was concentrated in the Mideast (23.4%), Southeast (24.9%), and the Great Lakes (16.2%).[13] But, the fastest employment growth between 1974 and 1981 was in the Southwest (20.1% per year compounded), the Rocky Mountains (16.1%), and Far West (12.8%) regions. McConnell (1980) argued that locations outside the Industrial Heartland are fast becoming the preference for foreign transnationals. In this sense, foreign affiliates are following the decentralization patterns of U.S. firms. Glickman and Woodward (1984) show that there was significant dispersion from regions with considerable inward DFI directed to those areas that had little in the early 1970s. Their analysis points out that the spatial distribution of foreign firms is becoming similar to that of domestic companies, increasingly favoring the South and West.

Third, international migration (illegal and legal) has had a distinct regional character. Most migrants come from the Caribbean Basin, Central America, and (more recently) Asia. Many Hispanic workers (often employed in secondary agricultural and service jobs) reside in the Southwest (e.g., California, Texas) and parts of the Northeast (New York, New Jersey). In all, the greater openness of the U.S. economy meant that international forces had more significant effects on urban and regional development than previously.

Returning to the automobile and semiconductor examples, the regional consequences of the industries' transformations have been important. Historically, car assembly and production have been regionally concentrated in Michigan. In 1963, for example, 36% of auto employment was in that State. With the globalization of the auto industry, that figure fell to 26% by 1977.[14] Semiconductors have been concentrated in California, Arizona, Texas, and Massachusetts, where three-fourths of employment is located. Areas such as 'Silicon Valley' near San Jose and the Route 128 area around Boston dominate research and management locations. Assembly operations that have not been located abroad are in low-wage areas of western states.

URBAN AND REGIONAL CHANGE IN THE UNITED STATES

Besides the effects of the IDOL, there have been other important spatial ramifications of structural change. On an interregional basis, sharp reversals of long-term regional patterns took place during the 1970s: the growth of jobs and population was greater in nonmetropolitan regions than in metropolitan areas for the first time. Cities with large manufacturing bases lost jobs and population[15] to the suburbs (first the inner suburbs, then the outer suburbs, and, finally, the exurbs and other nonmetropolitan areas) and to the Sunbelt.[16] These phenomena represent more than spillovers across metropolitan boundaries, but encompass growth far from metropolitan areas as well. Part of the nonmetropolitan change is due to energy and resource development, and a portion is a result of recreation- and retirement-related employment. However, much nonmetropolitan employment growth is also in assembly operations (often in branch plants of large companies) that have relocated from large cities. Most big cities have lost population, independent of region. There has been much continuing migration to the Sunbelt,[17] including the return flows of blacks who moved to the North two generations ago.[18]

The relative importance of industrial location factors has changed. With the decline of manufacturing (particularly heavy manufacturing), the traditional location determinants (transportation availability and cost, agglomeration economies, energy, and, to a lesser extent, labor) have less significance or have changed in character. Firms have become more communications- and technology-oriented. Both manufacturing and service firms, for example, are able to decentralize routine operations to low-wage regions (domestically and internationally) and need little unskilled labor near their home office locations. Technological advances in transportation and communication allow greater decentralization, as firms have become more footloose (Malecki 1979; Markusen 1982); at the same time, financial reorganization makes decentralization more feasible (Bluestone—Harrison 1982). Firms, particularly those that hire many white-collar workers, increasingly demand 'quality of life' factors. These reasons help explain why many small- and medium-sized cities with pleasant living conditions and low taxes have been growing rapidly.

There has been, as a result of these factors, a polarization of the urban system (Hanson 1983). Cities with concentrations of corporate command functions have a good deal of independence from the rest of the urban system. At the same time, areas that specialize in traditional production or provide consumer services are dependent upon corporate centers for investment and finance. Even within metropolitan areas, there is considerable economic segregation, what Friedmann and Wolff (1982) call the 'citadel and the ghetto.' The gleaming towers of Manhattan coexist with the poverty of nearby Harlem and Bedford-Stuyvesant, although there is little employment for these neighborhoods' residents on Wall Street. Economic and spatial segmentation also can be seen in Silicon Valley, where the homes of researchers and managers are located away from production-line workers (Saxenian 1984).

Some tentative explanations of economic and political change

Having discussed the IDOL and its effects on the U.S., we need to tie several things together: the economic slowdown and responses to it, the changing nature of the State, the role of people's movements and corporate initiatives, and fiscal problems at the local level. I provide some tentative explanations in this section.

Three elements of the international postwar corporate system that were put in place in the 1940s and 1950s came back, in a dialectical manner, to haunt the American economy in the

1960s. These were: 1) *Pax Americana*, consisting of the Bretton Woods Agreement and other economic and defense measures, aimed at maintaining American postwar hegemony; 2) a *limited capital-labor accord*, an informal agreement between 'Big Capital' and 'Big Labor,' to share productivity gains in key industries and to pass on higher costs to others; and 3) a limited capitalist-citizen accord to provide economic security through social legislation (social security, medical care, etc.) and the reduction of cyclical unemployment through demand management (Bowles—Gordon—Weisskopf 1983). All parts of this unwritten 'social contract' were confined to certain sectors, classes, and interest groups. The whole arrangement was predicated on the ability to reward those inside (and, to a lesser degree, outside) the accords by distributing the fruits of economic growth. Wolfe (1981, p. 10) described the early postwar political situation as "A bipartisan coalition was formed to pursue economic expansion at home through growth and overseas through empire.... Politics would concern itself with the means—growth—and the ends, or purpose, of social life would take care of themselves."

However, there were exogenous and endogenous forces at play that destroyed this very delicate set of arrangements. Significantly, there came the decline in U.S. economic dominance and the end of the *Pax Americana* in the 1960s. This occurred because of the drain put on the economy in the late-1960s by the support for the military in Vietnam and by competition with the countries that the U.S. had been trying to build up both for markets and for geopolitical purposes (e.g., FRG, Japan, and stable LDCs). The growth of social programs and the unwillingness to raise taxes to pay for both the war in Southeast Asia and the War on Poverty strained the U.S. fiscal and political capacity. The rise of OPEC and the greater strength of raw material producers also weakened U.S. hegemony. The U.S. economic leadership declined drastically as it was increasingly challenged in its own domestic markets as well as in world markets that it formerly dominated. As a result, stagflation set in, and latent problems in various strata of society surfaced—in production lines, welfare lines, and bottom lines. With fewer resources available to keep the accord together, the agreement came unglued.

Many of America's problems were reinforced by federal policies. For instance, by encouraging the outflow of DFI through the tax laws and by other means, domestic jobs were lost. In the 1970s, American firms were competing with their own foreign subsidiaries. Corporations began, as part of a conscious business strategy, to reduce (when practical) production in the United States in many processes and industries (e.g., the assembly operations in the auto industry). Tax and regulatory policy made these corporate strategies easier to carry out. Reagan-era monetary policy, in trying to battle inflation, created high real interest rates and many international trade problems. The resulting overvalued dollar has made foreign investment cheap and exports expensive for American firms.

The domestic 'growth coalitions' (Wolfe 1981; Mollenkopf 1983) aimed at increasing economic growth both nationally and locally fell into disarray. These alignments of corporate, labor, and community leaders failed partly because so many people were not in the coalition to begin with: secondary workers, women, minorities, consumer groups, environmentalists, and others had been largely powerless from the outset. During the 1960s, these groups put pressure on the state for a bigger piece of the pie. Wage bargaining by workers got much more aggressive, since the cost of being unemployed was very low (due to unemployment compensation and tight labor markets). Women and minorities also became more important economic and political forces. These internal factors, plus the U.S. decline in the international sphere, contributed to the fall in the profit rate and to some of the productivity growth rate decline. Also, even within the growth coalitions, primary workers began negotiating more aggressively on workplace issues (e.g., speedups, work safety), thereby putting further pressure on profits. Workers were less willing to put up with bad working conditions and began to revolt on the production line (Aronowitz 1973). Finally, there were additional costs placed on the system by the pressures of environmentalists, consumers, and others.

The profit squeeze of the late 1960s-early 1970s inevitably brought a counterattack by corporations. As a result, the 'people's movements' for greater social welfare (Piven—Cloward 1971) of the 1960s were superseded by what can be called 'corporate movements' in the 1970s.

Faced with poor earnings, businesses took the offensive at the negotiating table, mounted strong anti-union drives, and pushed for restrictive macroeconomic policy in order to reduce wage pressure. At the local level, fiscal limitation efforts (such as California's Proposition 13) received heavy corporate backing. Politically, the corporate movement reached its peak with Ronald Reagan's election in 1980 and the passage of the 1981 tax and domestic spending reductions. The deep recession of 1981-1982 served to discipline the work force and to gain wage and shop floor 'give backs'.

In light of the corporate offensive, much of the increased international and interregional mobility of capital can be seen both as a way to increase profits by relocating to lower cost areas (in the conventional, neoclassical economist's view) and as a way of combating labor's gains; in the latter sense, this is a way of 'zapping' the labor movement (Bluestone—Harrison 1982). Therefore, the movement of branch plants to nonmetropolitan areas in the 1970s can also be seen as part of an anti-labor strategy (since nonmetropolitan areas are generally non-union). Relocation to low-wage areas is not only national but international, as indicated earlier.

At the same time, the work process has been changed to reduce the demand for skilled and semi-skilled labor. This has been accomplished by automation, the reorganization of work, and other methods. A good deal of this 'deskilling' occurs when firms relocate operations to low-wage regions and take advantage of new (and non-union) employees to restructure work (Noble 1977). This reduces the necessity of employing high-skilled, expensive, and independent labor. It helps tip the bargaining scales in favor of management and to increase profits.

Challenges to the State

In response to some of the effects of structural change, the State has been called upon to do several, often contradictory, things: to take measures to increase profits and fight stagflation; to institute class-based social policies to aid displaced workers; to initiate urban and spatial measures to help depressed areas; and so forth (Friedland—Piven—Alford 1979; Glickman—Alford 1982). Since all of these could not be accomplished simultaneously in a slow-growth era, several kinds of conflict resulted.

On one level, the State has been subject increasingly to *external* pressures as trade relations grow more complicated. Assaults have come from other nations (e.g., trade wars, protectionist pressures), transnational corporations (who pressure for subsidies by threatening to relocate offshore), migrant workers and their employers, and international organizations (the Common Market, LAFTA, etc.). All of these groups petition the State to protect their interests.[19] Corporations seek to break down national boundaries and use their full power globally. National governments, as a result, find themselves bargaining with footloose TNCs and, as a result, are less able to formulate effective policy.[20] Pressures build to protect jobs and social services for workers displaced by global shifts. These tugs bring out ideological conflicts between free trade and protectionism. We find the U.S. government preaching free trade, yet engaging in protectionism (e.g., the 'voluntary quotas' for imported Japanese cars). International conflicts over a variety of products (e.g., steel, wine, pasta) give significant trouble to nation-states.

In addition to these external pressures, the State is faced with internal conflicts. These have taken several forms, mostly over distributive shares. For example, the corporate ascendancy of the last decade has resulted in sharply lower business tax rates, an increasingly regressive tax code, and real reductions in social spending. This has led to greater tax burdens placed on consumers and workers. Displaced auto, steel, and textile workers seek protectionism, training, and social benefits. Geographically, there are also built-in conflicts between economic policies (e.g., accelerated depreciation allowances) that help expanding areas and urban policies that try to cushion declining cities (Glickman 1984; Luger 1983). These conflicts are deepened by stagflation: as the economy performs poorly, there is more competition among interest groups and classes to try to fight for their shares of the pie. Fiscal strains result from these internal pressures on the State especially when the economic pie is growing slowly.[21]

In addition, region-based demands add another dimension to the problems of the State. That is, coalitions of capital and labor fight for preferences for localities; these groups often transcend class and other alignments, coming together for limited purposes under emergency situations. Examples include a coalition of the Chrysler Corporation, the United Auto Workers Union, and the City of Detroit, which brought pressure for the 1980 federal loan guarantee to Chrysler.

Just as firms put pressure on the State for tax breaks (accelerated depreciation allowances, etc.) to increase profitability at the national scale, they also do so to increase profitability at the local level. Ronald Reagan's New Federalism, the devolution of other federal programs to the states, enterprise zones, and cuts in social spending are ways of aiding corporate growth. For instance, dispersing the powers of the federal government to the states means that lobbyists for social causes must go to 50 state capitols, where their power is diluted and where corporate power is felt most strongly (Peterson 1982). Also, one can view tax revolts at the state and local level as corporate/wealthy-led attacks on the social wage; this weakens local tax bases and makes localities more vulnerable to further pressure from firms that induce cities to give greater tax breaks.

These international and domestic pressures result in an increasingly impotent State, since governments cannot deal effectively with internal pressures that often lead to fiscal stress. Nor can the State effectively make successful arrangements with the many pressure groups negotiating with it. The combination of internal and external pressures makes decision making very difficult.

Several elements are important to recall at this juncture: 1) the decline in profitability; 2) pressures by corporations on the State to do things to restore profitability (e.g., tax breaks, engineered recessions, deregulation); 3) corporate strategies to increase profits, including speedups, increases in supervision, less workplace autonomy, mergers, and, significantly, threats to relocate; and 4) pressures by labor, consumers, and environmentalists to maintain social and quality of life programs. These factors make the State (at both national and local levels) less able to operate effectively. The international dimension reduces even more the effectiveness of State policy because firms can withdraw capital investment. Capital mobility is a tool used by firms to gain advantage over labor and to extract concessions from the State. And, as we shall see next, it makes urban policy more difficult to carry out.

Urban policy

Urban policy (UP) is formulated to correct for market failure brought on by spatial imbalances and to spur economic development. For example, in order to provide space and funds for urban revitalization, UP has consisted of programs such as urban renewal (in the 1950s and 1960s, particularly) and housing. Other things have been done by national governments to reduce the cost of doing business in cities, including infrastructure grants, loans, small business development efforts, transportation, and water and sewer programs. An increasing number of programs are undertaken by localities themselves: write-downs of land, infrastructure provision for business, subsidized loans, and grants aimed at attracting firms in the spatially competitive environment noted earlier.

Another portion of urban policy consists of income transfers and public services, including AFDC (Aid to Families with Dependent Children), housing allowances for low-income people, Supplemental Social Insurance, and other income and service programs. These programs are often not place-targeted but people-oriented, and certainly have important urban effects. Some urban programs come about through categorical grants to localities and states, others through less restrictive block grants. The trend since the Nixon Administration has been toward the latter.[22]

Most of the money for these urban programs is targeted to social transfers rather than places. In fact, about 318 is spent on social transfers (including retirement) to every 31 expended on urban programs. Funds for place-targeted urban programs have been cut sharply, by 27% in real terms between 1978 and 1984 (Glickman 1984). Means-tested social programs for the poor were cut by one-sixth during the Reagan years—about 375 billion (Bawden—Palmer 1984).

But, in addition to these nominal urban programs, what I call 'the real urban policy' includes the indirect urban consequences of economic policy: accelerated depreciation allowances, investment tax credits and so forth (Glickman 1984). The incentives put in place by these programs are very powerful aids to industrial relocation even though they are not intended for these purposes. For instance, these tax programs try to increase investment by lowering the cost of capital and increasing cash flow. However, in doing so, they also encourage investment in new assets over the replacement of existing assets and favor equipment over structures. This has meant that the investment that results from these tax write-offs takes place in growing (often Sunbelt) areas, rather than declining regions. Moreover, there are other non-urban policies that affect the spatial division of labor: the allocation of R&D expenditures, defense appropriations and bases, and other spending to growing, non-union, low-wage areas (Luger 1983). These non-urban portions of UP constitute the most important part of the real urban policy.

Therefore, we have three parts of urban policy: 'place programs', 'people programs', and non-urban tax/expenditure policies. Most of these programs tilt toward growth areas that have low wages and 'good business climates'. Regions that have strong unionism, higher wages, and so forth are being left behind, especially for footloose, assembly operations. Therefore, economic policy aimed at increasing investment and production also aids corporations in a spatial sense since capital movements disrupt organizing efforts by workers. As a corollary, the efficiency of most local or national urban development programs is lessened by the mobility of capital. In effect, cities have far less leverage over local business activity because firms are so easily able to move. Therefore, municipalities find it more difficult to formulate and implement development policies because of the capital mobility and the conflict of urban policies with national economic programs.

For localities, slower economic growth and a more internationalized economy have led to frantic attempts to attract industry through local tax incentives, particularly tax abatements and industrial development bonds for new factories.[23] These local programs have become fundamentally 'defensive' in nature since local economic development officers say, "If we don't offer these benefits, our town will be perceived as having a bad business climate." This is a 'negative-sum' game for communities, as subsidy funds are transferred to the corporate sector. As soon as subsidies run out or depreciation allowances are taken, firms are free to move on, since they have not put much capital into their plants. Firms can then play off cities to get better tax deals and create a "reserve army of places" (Walker 1978). Increasingly, tax incentives are being given when there are threats by existing firms to move elsewhere.[24]

Related is the 'capital versus community' theme of Bluestone and Harrison (1982): firms are able to exert their power over communities and impose other social costs related to plant closings. The role of conglomerates (which have a 'portfolio of firms' to maximize overall profits) has become more important in the movement of capital as a way of opening new markets, disciplining labor, and taking external control of regional activity.

Fiscal problems have been occurring at the local level, not just in New York and Cleveland, but in growing areas since older areas are 'stuck' with old private capital or old public infrastructure and because of conscious disinvestment decisions on the part of corporations. The New York Municipal Assistance Corporation ('BIGMAC') and other (unelected) agencies are instituted to force reductions in services and wages on the public. However, fiscal problems in fast-growth areas (e.g., San Jose and Houston) are also due to the overextension of local capital infrastructure and the refusal of local firms to endorse public spending on infrastructure or services needed for social reproduction.

Conclusion

I want to close with a brief set of conclusions about the relationship between the IDOL and cities. Despite the rise of conscious and concerted efforts to control and direct growth, the ability of cities to determine their own economic destinies has been sharply limited by increases in capital mobility and by the changes in trade and foreign investment patterns. The ability of firms to rapidly shift productive activity globally makes cities' futures less secure than previously.[25] Moreover, cities continue to be the centers of political struggle over the distribution of income, as they house both modern corporate headquarters and wretched slums. The urban growth coalitions, as Mollenkopf (1983) tells us, have become weaker due to the splits between citizens groups and firms. A hypothesis put forward here is that firms have been using the possibility of international relocation to extract concessions from workers and cities. In doing so, they are able to tilt economic and political power in their favor.

In the end, cities find themselves less able to deal with their economic problems. Friedmann and Wolff (1982, p. 327) described the dilemma as follows:

A major loser is the local state. Small, isolated without financial power, and encapsulated within the world economy, it is barely able to provide for even the minimal services its population needs. And yet, instead of seeking alliances with neighbouring cities and organized labour, it leaves the real decisions to the higher powers on which it is itself dependent, or to the quasi-independent authorities created by state charter that manage the infrastructure of global capital-system-wide facilities such as ports, airports, rapid transit, water supply, communications, and electric power.

The internationalization of economies, then, provides a number of difficult questions for urban planners:

How can the economic restructuring taking place at the local level be controlled, when it is often directed by external forces?

How can local conflicts (over land use, job creation, and the environment) be mediated?

What new political strategies and institutions need to be developed to gain a measure of autonomy in this ever-changing environment?

These questions must be answered by planners and local activists if cities are to regain political power.

Notes

[1] Structural change (or economic restructuring) involves long-term shifts in the composition of demand, production, and occupational patterns; new technology; a changing international division of labor; shifts in relative prices; and evolving location patterns (both migration and industrial spatial restructuring).

[2] Core countries include Northwest Europe, North America, Japan, and Australia. The semi-periphery consists of lower-income OECD countries such as Ireland and the NICs (including the Republic of Korea, Taiwan, Brazil, and Singapore). The NICs have specialized in labor-intensive goods such as clothing, shoes, toys, and electronics; many, however, became more capital-intensive in the late 1970s, increasing exports of items such as steel to core nations. These categories do not correspond precisely to the World Bank data presented in Table 1 since official data do not differentiate within broad country groupings.

[3] Pre-1974 importation of labor to Northern Europe took place largely because of labor shortages in industries such as construction, textiles, metal working, health care, and consumer serv-

ices. The major labor exporters came from the southern tier of Europe and North Africa and from the Caribbean Basin. In Europe, a number of institutions were established to recruit and transport laborers for employers. After 1974, investment was directed to NICs such as Brazil, Hong Kong, Korea, and Singapore, none of whom had been a major labor exporter previously.

[4] For instance, by 1980, 12% of U.S. Big Three cars were produced by their Latin American affiliates, up from 5.5% only seven years earlier (Trachte—Ross 1983, as cited by Castells 1984).

[5] This industrialization of a few Third World countries has led to rapid urban growth in major cities of these NICs. Although this paper will concentrate on the developed world, the impact on NICs must be kept in mind.

[6] Among the studies of the regional location of direct foreign investment, see Blackbourn 1974, 1982; Dicken—Lloyd 1976; Howenstein 1983; McConnell 1980; McDermott 1977; and Little 1978.

[7] Although investment abroad by American firms increased, other countries' investment grew even more quickly. Between 1961 and 1967, the U.S. had 61% of all DFI made by 13 major investing countries (OECD 1981). By 1974-1978, the U.S. share dropped to 30%, while Japan and West Germany increased their combined shares from 9.6% to 29.9%. The share of direct foreign investment by the 13 countries made in the U.S. was only 1.4% in 1961-1967, but grew to 24.5% by 1974-1978. By 1983, inflows of capital to the U.S. (382 billion) were far greater than outflows (350 billion).

[8] Viewed in another way, foreign production was three times the value of exports in 1960; by 1977, it was more than five times exports. Twenty-five percent of outward DFI was in petroleum; other major industries in which U.S. firms had large foreign investments were paper, rubber, textiles, wholesale trade, and finance.

[9] 'Ownership advantage' refers to the ability to exploit superior technology, innovation, and product differentiation abroad.

[10] The U.S. share of exports of industrialized capitalist countries declined from 21% in 1965 to 16% in 1983. During the same period, the U.S. absorbed an increasing share of the world's imports (20% in 1983 compared to 17% in 1965).

[11] According to the 1977 Annual Survey of Manufacturers, the most export-intensive manufacturing sectors were electrical and nonelectrical machinery, instruments, transportation, and tobacco products. All but the last (which is small absolutely) have high-technology characteristics.

[12] Corporate headquarter activity has been greatest in New York, Los Angeles, Chicago, Cleveland, and San Francisco. Cities gaining Fortune 500 corporate headquarters between 1959 and 1976 were Houston and Minneapolis (Noyelle—Stanback 1984).

[13] About one-fourth of the book value of property, plant, and equipment was in the Southeast, with Louisiana, Florida, South Carolina, and Georgia being the largest in that region. Among the states, California, Texas, and Alaska had the largest foreign investments (Belli 1983).

[14] Auto production has been concentrated spatially in other countries as well. Regions such as the Piedmonte (Italy), Niedersachsen (FRG), Ile de France (France), and the West Midlands (U.K.) have been major centers of auto production (Hill 1983). The secondary effects of the decline in auto production have been felt in related industries such as steel and tires. This change

in location has been a major factor in serious fiscal problems in auto-dominated cities such as Detroit and Flint.

[15] For example, between 1970 and 1980, population declined by 18% in St. Louis, 24% in Cleveland, and 21% in Detroit (Tabb 1984).

[16] Garnick (1983) reports that metropolitan area population grew at nearly four times the rate of nonmetropolitan regions between 1959 and 1969. In the subsequent decade, nonmetropolitan areas grew faster. But this reversal of long-term trends was not uniform; in the more urbanized parts of the country (New England, the Mideast, the Great Lakes, and the Far West), nonmetropolitan areas grew faster in the 1960s and slower in the 1970s compared to metropolitan areas. For less urbanized regions, metropolitan areas grew faster in both decades.

[17] Houston and Phoenix grew by more than 25% during the 1970s, for instance.

[18] It is critical to understand that often-made 'Frostbelt-versus- Sunbelt' categorization is simplistic. There are sections of the Sunbelt that have continued to stagnate (e.g., Mississippi) at the same time that states such as Texas, Florida, and Arizona have boomed. Similarly, there has been good growth in parts of New England and other Frostbelt areas.

[19] Or, at least, not to interfere with their self-perceived prerogatives.

[20] Unions also cannot bargain effectively with TNCs because labor is rarely organized internationally. Therefore, firms can play off workers in different countries and reduce wage costs (Bluestone—Harrison 1982).

[21] Although states and localities in the aggregate have run budget surpluses (deficits are generally not permitted by law), there are fiscal problems in many large central cities, intensifying the battle among cities for jobs and tax bases. Fiscal stress is particularly severe in cities with traditional manufacturing bases and large minority populations. Infrastructure is decaying and services have been cut. Fiscal problems make attracting employment more difficult for cash-poor cities.

[22] Reasons given for devolution are the desire for greater local autonomy and an interest in reducing federal social expenditures. In actuality, the result has been considerably less money going to needy cities and poor.

[23] At the same time, there are moves to create a positive environment for research-based employment (e.g., ties with universities) in order to attract 'high-tech' firms.

[24] Essentially, location decisions that were formerly among the best-kept corporate secrets have become among the most public as firms await bids from hard-up cities. In recent years, International Harvester has played off Ohio and Indiana, the Microelectronic and Computer Technology Corporation considered bids from 57 cities, and there has been international bidding for auto plants (e.g., Austria vs. Spain). The implications of these tax losses for local fiscal crisis are obvious and serious (Harrison—Kanter 1978).

[25] This is not to say that cities ever had complete control over their own economic development. My argument is that increased capital mobility and internationalization of the economy result in more external influence.

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THE DEVELOPMENT OF SMALL AND MEDIUM-SIZE CITIES IN THE UNITED STATES AND WESTERN EUROPE*

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KEY-WORDS: *agglomeration,* ~ economies, diseconomies of ~; *central* place model; *centralization; concentration; counterurbanization; decentralization,* ~ policies; *deconcentration; hierarchical* diffusion model; *Industrial* Revolution; *innovation; medium*-size cities; *nonmetropolitan* growth; *public* policy; *regional* re-structuring; *spatial* division of labor; *spread*/trickle-down; *technological* change; *urban* system.

Introduction

The related central place and hierarchical diffusion models—which both treat urban systems as dominated by large metropolitan areas—may have had considerable validity in the past. However, it is argued here that they have lost much of their usefulness in explaining recent spatial-temporal development processes in developed countries. It is further argued that technological changes are the key to understanding the evolution of spatial systems of population and economic activity. The early Industrial Revolution appears increasingly to have been based on decentralized patterns of innovation. In contrast, from the late eighteenth century until well into the twentieth century, industrial and transportation technologies promoted business concentration as well as geographic centralization. More recently, however, technological developments have once again been favorable on balance to deconcentration and decentralization. Thus, small and medium-size cities and former 'peripheral' areas increasingly have opportunities for development, if they possess the internal dynamism to adapt to the newly evolving spatial division of labor.

City size and city functions: the hierarchical diffusion paradigm

During the 1960s and early 1970s, many countries adopted policy measures designed to achieve more 'balanced growth', a somewhat vague objective that nonetheless implied a more geographically equitable allocation of resources. Typically this involved subsidies to promote the decentralization of population and economic activities from large metropolitan areas in favor of regions—often relatively rural in character—that were lagging economically. Strategies in this regard gave a prominent role to small and medium-size cities in the context, sometimes

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explicit and sometimes implicit, of the hierarchical spatial diffusion paradigm. The latter essentially takes the classical central place network of Christaller (1933) as a kind of locational matrix or landscape, within which development-inducing innovations diffuse through time and over space from higher order centers (large metropolitan areas) to lower order places. The induced development of small and medium-size cities could thus be viewed as a 'filling-in' of the urban hierarchy so that diffusion could take place more rapidly and over larger geographic areas. More specifically, within this framework, small and medium-size cities could perform three functions. First, their own development would in itself represent decentralization. Second, their development would result in spread, or trickle-down, effects that would benefit their respective hinterlands. Finally, their increased ability to retain population and attract migrants would make them counter-magnets to the further expansion of large metropolitan areas.

As will be discussed in more detail, the decentralization objectives just outlined here have tended to be realized in many developed countries. However, the reasons have had more to do with spontaneous factors than with government decentralization policies, which typically were tentative in terms of the resources made available, as well as commitments to specific strategies. In addition, the hierarchical diffusion model, as it applies to developed countries, has been shown to rest on weak theoretical and empirical foundations. Von Böventer (1973), for example, has argued convincingly on theoretical grounds that particular rank-size distribution parameters with respect to urban hierarchies are no help in national planning decision processes, and that satisfactory economic growth and the personal well-being of a country's citizens are compatible with a wide range of differences in the degree of spatial concentration of population and economic activity. Pred's (1977) studies of the diffusion of growth-inducing innovations that affect city system development indicate that the intricate web of economic interdependence contradicts central place hierarchy depictions of city systems. Growth-inducing linkages run not only from large cities to smaller cities, but also from large cities to even larger cities, from smaller to larger cities, and between cities of comparable size. And the most important nonlocal linkages are not those between a city and its hinterland, but rather those between cities.

In a related vein, a key tenet of the hierarchical diffusion model is that large metropolitan areas are the places where development-inducing innovations are most likely to be adopted. Moreover, in the 1960s and early 1970s there was a clear consensus among urban economists that the external economies of agglomeration generated by large metropolitan areas made them the most efficient locations for a wide range of manufacturing and service activities. Although such areas might also generate external diseconomies, the net social product associated with further population growth was likely to be greater than it would be in alternative locations. Thus, policies designed to curb the growth of large cities would be inconsistent with efficient spatial resource allocation. The favorable view of large cities was buttressed by the results of empirical research suggesting that productivity increases with urban size. For example, Sveikauskas (1975) found that wages in manufacturing increased by about five percent with each doubling of metropolitan population, and that productivity in manufacturing was six percent greater in a metropolitan area of two million population than in one of one million population. Segal (1976) similarly found that metropolitan areas of two million population and larger had a return to factors that was eight percent higher than in other metropolitan areas, a result he attributed to agglomeration economies that more than offset congestion costs. Yet even while the advantages of large urban size were being 'confirmed' by expert theory and research, many large U.S. metropolitan areas were in fact losing population and economic activity as a result of market forces. Employment declines were especially evident in the manufacturing sectors of major northern industrial centers. The data in Table 2 indicate that between 1970 and 1980, northern metropolitan areas with over 2.5 million population, as a group, experienced absolute population decline. Northern metropolitan areas in the 1-2.5 million population-size class had a growth rate less than one-third the national average during this period. For the United States as a whole, the overall average annual metropolitan growth rate was 1.00 percent between 1970 and 1980, well below the corresponding nonmetropolitan rate of 1.34 percent. Nor was this a peculiarly American phenomenon. Evidence indicated that similar tendencies were being experienced in many European countries (Berg et al. 1982; Hall—Hay 1980; Vining—Pallone 1982).

As evidence became increasingly available that all was not well with many large metropolitan areas, a major shift of emphasis occurred in the relevant scholarly literature. For example, Moomaw (1981) re-interpreted the empirical studies by Sveikauskas and by Segal to show that both had exaggerated the productivity advantages of large cities. Hoch (1976) argued that the benefits of large city size seemed to be outweighed by the costs. The higher per capita incomes observed in large cities represent a wage premium that must be paid to compensate workers for higher living costs and net disamenities in large cities. In more broadly regional terms, by the late 1970s there was a large and growing literature contrasting an inevitably rising Sunbelt and a declining Frostbelt, which had previously been regarded as the Industrial Heartland of the United States. Although many studies in this regard exaggerated Sunbelt-Frostbelt differences or overlooked the considerable heterogeneity within these broad regions, it was nonetheless evident that a great deal of fundamental regional re-structuring was taking place.

Various explanations have been given for the relatively recent changes in the spatial division of labor. In the U.S. context they have included improved transportation and communications accessibility, changing life styles, climatic differences, air conditioning, a growing number of footloose retirees, changing energy relationships, differing 'business climates', and regional differences in federal taxation and spending policies. Evaluation of the relative importance of these factors is beyond our scope here, but it does seem clear that the hierarchical diffusion paradigm—whatever its validity in the past—does not provide an adequate frame of reference for analyzing current changes in the distribution of population and economic activities. Before giving further attention to the significance of recent spatial-temporal development processes, it is necessary to examine the evolution of small and medium-size cities more closely.

Patterns of urban change

The absolute population declines experienced by numerous large U.S. metropolitan areas in the 1970s suggested to some observers that "counterurbanization has replaced urbanization as the dominant force shaping the nation's settlement patterns" (Berry 1978, p. 42). The data in Table 2 do not support this contention. It is true that all population-size classes of northern metropolitan areas either declined in population or grew less rapidly than the national rate of

TABLE 2

POPULATION CHANGE BY REGION AND BY SIZE OF METROPOLITAN AREA

	United States				North				South and West			
	Population (thousands)		Annual Average Percent Change		Population (thousands)		Annual Average Percent Change		Population (thousands)		Annual Average Percent Change	
	Total 1982	Change 1980-82	1980-82	1970-80	Total 1982	Change 1980-82	1980-82	1970-80	Total 1982	Change 1980-82	1980-82	1970-80
Total	231,663	5,117	0.99	1.08	108,266	265	0.11	0.22	123,396	4,851	1.78	1.94
Metropolitan	176,207	4,089	1.04	1.00	85,287	177	0.09	0.08	90,920	3,912	1.95	2.00
Over 5 million	47,772	683	0.64	0.33	29,863	98	0.15	-0.20	17,909	585	1.48	1.32
2,5 — 5	23,838	661	1.25	1.01	11,107	-143	-0.57	-0.22	12,731	804	2.90	2.33
1 — 2,5	36,182	955	1.19	1.15	16,129	89	0.25	0.07	20,053	866	1.96	2.15
500,000 — 1 million	26,609	642	1.08	1.20	11,535	49	0.19	0.26	15,074	593	1.78	2.02
250,000 — 500,000	20,684	544	1.18	1.50	8,577	50	0.26	0.69	12,107	494	1.85	2.13
100,000 — 250,000	18,875	517	1.23	1.63	7,109	23	0.14	0.65	11,766	495	1.91	2.31
less than 100,000	2,247	87	1.75	1.43	967	10	0.48	0.92	1,281	76	2.74	1.86
Nonmetropolitan	55,456	1,027	0.83	1.34	22,979	88	0.17	0.77	32,477	939	1.30	1.79
Counties (261) with more than 15 percent commuting to metropolitan cores	5,577	118	0.95	1.72	2,530	10	0.18	1.21	3,048	108	1.61	2.18

Source: U. S. Department of Commerce (1984) population increase. However, northern nonmetropolitan areas also grew less rapidly than did the national population. In contrast, in the South and West all size classes of metropolitan areas grew at more rapid rates than did the national population; and metropolitan areas as a whole grew more rapidly than nonmetropolitan areas. The highest rate of population increase in the South and West was in fact registered in large metropolitan areas in the 2.5-5 million class.

Considering the United States as a whole, the most rapid rates of population growth between 1970 and 1980 were in small and medium-size metropolitan areas—those in the three metropolitan classes below the 500,000 population level—and in nonmetropolitan areas with relatively high commuting rates to metropolitan cores.

Data for the 1980-82 period indicate that at the national scale, metropolitan areas were again growing more rapidly than nonmetropolitan areas; but that this trend was attributable largely to rapid metropolitan growth in the South and West, which accounted for 96 percent of U.S. metropolitan growth. In the South and West, the average annual growth rate in each of the three metropolitan-size classes below 500,000 population exceeded the overall growth rate of 1.78 percent. However, it would be imprudent to draw firm conclusions from so short a period, especially in view of the fact that it was a time of marked economic recession, which could make it atypical.

A study of 35 comparable metropolitan regions in 12 European countries and Japan found that there was an inverse relationship between the rate of population growth and urban size (Korcelli 1982). In the mid-1970s, 13 of these regions were experiencing absolute population decline; the number was projected to increase to 21 by the year 2020. During the 1970s, traditional rural-to-urban migration streams became reoriented largely toward smaller cities and peripheral regions. The higher growth rates observed in the smaller metropolitan areas resulted from migration from still smaller urban and rural communities, rather than from moves away from the larger metropolitan regions.

The case of France is particularly interesting because of the remarkable reversal of regional development patterns in recent years (Aydalot 1984). The higher ranking regions in terms of total employment change between 1968 and 1975 were the lower ranking regions in terms of total employment change between 1975 and 1981. For 15 out of 21 regions, the change in rank was at least eight ranks. The eight regions where the rate of employment growth increased between the two periods were precisely those that had been regarded as the least well-off economically: Brittany, Lower Normandy, and six regions in the southwest. With certain exceptions in the Paris suburbs, newer high technology activities have been locating in the South in small and medium-size cities (Aix, Toulouse, Grenoble, Montpellier, La Gaude, Antibes, etc.) that previously had little industry.

Technology and decentralization

What accounts for the decentralization tendencies that are occurring in so many industrialized nations? A number of possible factors already have been mentioned in the context of the U.S. sunbelt. However, these may be regarded best as particular manifestations of technological change, the sine qua non for understanding changes in spatial organization in broad historical perspective. Theoretical considerations of cores, peripheries, and hierarchies have tended to overlook the prominent role of small and medium-size cities in the development of modern Europe. Jones (1981) argues convincingly that in the later Middle Ages market activity was greatest in areas of half-hearted political control, such as borderlands between feudal units. The principal means by which the expanding market system broke up or bypassed the guild system in Europe as a whole probably was the rise of decentralized domestic industry, which created an elaborate trade network among regions and across frontiers. Throughout Eastern Europe small towns offered considerable scope for individual and local solutions to administrative, scientific, and technological problems, whereas in Asia, absolutist centralized empires stifled significant economic progress. In seventeenth and eighteenth century England, for example, small cities were the places where a host of small but economically efficient changes were being made in business organization, technology, and marketing operations. Braudel (1979a, p. 491) similarly points out that the unique experience of the British Industrial Revolution was made possible by a host of transformations going back to the sixteenth century. Moreover, the fundamental innovations were not launched in London, but rather in Manchester, Birmingham, Leeds, Glasgow, and countless small cities. London did not play a prominent role in the British economic development process until around 1830. France's later industrial revolution was similar in that the development of Paris lagged well behind the decentralized activities initiated in the North, in Alsace, and in Lorraine. Braudel (1979b, p. 153) also maintains that decentralized economic innovations in such towns as Leyden, Haarlem, Delft, Brill, Rotterdam, and Dordrecht provided the basis for the international prominence of Amsterdam in the seventeenth century.

Jones (1981, pp. 61-69) speculates that because of the economic and technological progress made possible by decentralization, a recognizable and prosperous modern Europe might have evolved without the worst aspects of the Industrial Revolution—if population had grown more slowly as real wages increased. As more is learned about Western development, especially in its early industrial phase, the clearer it becomes that top-down strategies may be neither appropriate for newly-developing countries today nor an accurate reflection of what actually happened in Europe. In any case, changing technologies eventually did result in new patterns of economically-efficient spatial organization that were not conducive to decentralization.

From the late eighteenth century until well into the twentieth century, technological developments provided a strong impetus toward greater concentration and centralizaton of economic activity (Blair 1972, pp. 87-151). The substitution of the steam engine for water power was particularly instrumental in fostering the growth of large industrial plants. Steam power and the substitution of steel for wood made possible the development of continuous mass production techniques using highly specialized machines and processes. A host of mechanical improvements raised the number of stages of production that could be carried out in a single plant, requiring large-scale operations and large capital outlays. Meanwhile, a revolution in transportation was also promoting concentrated, centralized industrial structures. Railroads brought materials from a few major deposit sources to a relatively few terminal centers that increasingly became congested with population and manufacturing enterprises. The advent of the steamship greatly increased the quantities of raw materials that could be brought economically to major manufacturing centers, and made possible world distribution of finished goods. Although concentration of ownership was often well beyond that required by technology, the fact that control over the market was moving in the same direction as the consequences of technological change gave the trend toward greater concentration and centralization an aura of inevitability.

The impact of these phenomena created a conceptual dilemma for classical economists, who observed a correlation between size and efficiency but also believed in the virtues of competition. No such dilemma troubled Marx, who regarded competition as a passing phase in the evolution of capitalism. Marx not only observed that the new technologies brought with them a larger scale of operations, but went further and elevated a transient phase into an inevitable 'law of concentration' that would steadily diminish the number of capitalists and prepare the way for a social revolution by which the expropriators would be expropriated (Taylor 1960, p. 308). Lenin similarly believed that huge enterprises had brought mass production technique to its highest level of development, and that socialism is simply capitalist monopoly applied for the benefit of all the people (Blair 1972, pp. 111-112). Belief in the superiority of size also has been evident even more recently in the West, as can be seen in Galbraith's (1967) notion of the new industrial state, and in the application of France's indicative planning, which assumes the superior efficiency of large organizations (Hansen 1968).

At least until the 1930s, the general direction of technological change was toward a larger scale of operations, but since then newer technologies have made possible efficient production with smaller capital outlays, have lowered barriers to entry, and have brought about a major geographic decentralization of production. The early decentralization technologies occurred in the same areas as the improvements associated with the Industrial Revolution; namely, power, machines, and transportation. Steam power was replaced by electrification, the essential prerequisite to industrial decentralization. Independently operated, multipurpose machinery powered by electricity allowed the small plant to adapt its output to changes in demand; and because electricity can be transmitted over great distances, industrial use of electric power is feasible in areas lacking adequate supplies of low-cost fuels. The advent of the motor truck tended to transform the inflow of materials and the outflow of finished products from a giant national pattern into smaller regional and local patterns. In addition, mass automobile ownership meant that it was no longer necessary for a plant to be located within a large industrial center in order to be assured of an adequate labor supply.

It is now evident that electricity, the multipurpose machine, and the truck and automobile were merely the precursors of a whole host of new technologies whose effect on economic structures is in the same direction. As Blair (1972, p. 152) has pointed out:

"With plastics, fiberglass, and high-performance composites, providing high-strength and easily processed materials suitable for an infinite variety of applications; with energy provided by such simple and efficient devices as high-energy batteries, fuel cells, turbine engines, and rotary piston engines; with computers providing a means of instantaneously retrieving, sorting, and aggregating vast bodies of information; and with other new electronic devices harnassing the flow of electrons for other uses, there appears to be aborning a second industrial revolution, which, among its other features, contains within itself the seeds of destruction for concentrated industrial structures."

Adaptation to a changing spatial division of labor

Although newer technologies are making industries more footloose, this does not mean that the relevant decision makers are indifferent with respect to location. For example, when products enter the highly-standardized, mass-production phase of the product cycle, competitive pressures make cheap, non-union labor the critical factor in location decisions. At this point, plants typically are established in small towns and rural areas within industrial countries, or, as is increasingly the case, in such newly industrializing places as Hong Kong, Singapore, Taiwan, South Korea, and various Caribbean islands. Or production may be taken over by indigenous firms in the newly industrializing countries. Similar considerations apply to office work. It was once axiomatic that office operations could be carried out by concentrating them spatially. Now the economics of real estate and the revolution in communications have undermined the need for many centralized operations. Sales, accounting, data processing, billing, and other 'back office' functions increasingly are being relocated to smaller towns and the countryside. Moreover, given satellite data transmission facilities, the logic behind using inexpensive overseas labor to perform essentially repetitive tasks (e.g., keyboard labor) is just as applicable to office work as to manufacturing.

The new international division of labor does not imply that manufacturing or other decentralizing activities will disappear from older industrial nations, because new products and processes continually arise to replace older ones. Even in the severe recession of 1983, U.S. manufacturing activities employed 20 million persons, about the same number as in 1970. When it was still fashionable to emphasize the advantages of large cities, their internally generated renewal was regarded as virtually guaranteed by the 'breadth' provided by sectoral diversification and the 'depth' provided by external economies of agglomeration (Thompson 1968, p. 53). Although Boston, New York, and other large cities in the frostbelt have adapted to changing economic circumstances, the decline of other old industrial areas in Europe as well as the United States has demonstrated that adaptability is not an automatic phenomenon. Olson (1982) has argued that the decline of older industrial areas is a consequence of collusive, rent-seeking 'distributional coalitions' that retard adjustment to change and reduce economic growth. Tichy (1984) similarly maintains that these areas are the victims of 'indigenous blockage' brought about by barriers to entry and to exit, which may include ties to a local raw materials base, excessively high wages, unadaptable infrastructure and worker skills, union labor-hoarding practices, lack of entrepreneurship, and government subsidies. Where such conditions exist, a region is likely to experience a cycle analogous to the product cycle. Thus, even Silicon Valley eventually could become a stagnant old industrial area in the absence of a more diverse industrial structure.

As for small and medium-size cities, they clearly are no longer condemned to be mere 'lower order' central places or passive recipients of older technologies that have filtered down from large metropolitan centers of innovation. The development opportunities represented by the new decentralizing technologies are there to be seized, though this requires sufficient indigenous adaptability. For example, in central and northeast Italy—in the vicinity of Bologna, Florence, Ancona, and Venice—a decentralized network of small firms located in small and medium-size cities has managed to innovate and develop products that compete successfully with those of northern European producers. The economic dynamism of this Third Italy (in contrast with the old Milan-Turin-Genoa industrial area and the less developed South) ranges across a wide number of sectors, from shoes and textiles to auto parts and machine tools. The machinery used is both technologically advanced and adapted to small-scale production. In part, the success of the small firms is due to the fact that they are not covered by the restrictive tax and labor legislation that applies to large firms. Also, the hierarchical rigidities that characterize interpersonal relations in large plants have been replaced here by more cooperative interactions among owners, technical personnel, and production workers. Entrepreneurship and effective innovation and development strategies are encouraged by the nature of the information and feedback mechanisms that exist among firms. As each firm grows, it finds itself more dependent on the help of other firms with complementary activities. Because each firm realizes that it is likely to need help from others, it in turn extends help to others (Piore—Sabel 1983). The whole process corresponds to a balanced growth strategy wherein all firms benefit from the expansion of external industrial and regional economies. Similar developments also are taking place in 'peripheral' areas of Portugal and Tunisia (Aydalot 1983, p. 103). In France, the relatively recent economic vitality of small and medium-size cities has been largely a result of vastly improved transportation and communications networks (Planque 1983) and of adaptable local technical, social, and organizational structures (Perrin 1984).

Recent U.S. and European experience thus suggests that in an age of decentralizing technologies, peripheral areas are no longer condemned to economic stagnation and may even have advantages over old industrial areas. But genuine long-term regional development cannot be based on a model of diffusion from above. What is required is a model of internal dynamism based on regional, social, technical, organizational, and industrial structures and their adaptation to a changing national and international division of labor.

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REGIONAL POLICY AND PLANNING IN HUNGARY

GYÖRGY ENYEDI

KEY-WORDS: *Budapest; centralized* planning; *collectivization; counter*-poles; *decentralization,* industrial ~; *industrialization; local* decision making; *National* Settlement Development Concept; *New* Economic Mechanism; *organizational* centralization; *regional* disparities, ~ planning in socialist countries, ~ policy; *rural* public services; *second* economy; *stages* of post-war economic development; *structural* changes; *urban* policies, ~/rural dichotomy.

Comprehensive economic planning was introduced first in the Soviet Union in the 1920s, which was and remains an enormously differentiated and multinational state. The Soviet government has attempted to establish social solidarity over regional loyalties as a planning objective. Regional planning was integrated within a strongly centralized planning system, with regional development targets—e.g., industrial and mining development in Siberia—being formulated according to sectoral interests or strategic viewpoints rather than satisfying local (regional) desires (Lappo 1976; Nyekraszov 1978).

Historically, socio-economic planning in Western economies has been based explicitly on regional level strategies. These attempts were especially evident in the 1929/32 economic crisis, when planned government interventions tried to develop the economy of the regions hit seriously by the crisis, such as Black Country in England or the Appalachia Region in the U.S.A. (Kuklinski 1975). Some sporadic governmental efforts for influencing regional development (e.g., by the optimal location of agriculture) also occurred in pre-war Hungary (Beke 1941)[1].

Regional plans have many similar goals in market and centrally planned economies. Generally speaking, regional policies seek to level regional disparities. The list of disparities differs from country to country, and depends on the size, economic maturity, historical traditions, etc., of the given states. Some special features of regional planning in socialist countries are as follows:

—regional plans cover all aspects of socio-economic life, from production to public services. Given the prevailing view that industrial growth would lead automatically to the improvement of living conditions, production goals long have been stressed unilaterally;

—regional plans cover *all* regions of the country and give a framework for regional distribution of national (comprehensive) planning targets and development funds. Special planning regions, e.g., tourist regions, though, do exist;

—regional development—in most socialist countries—is centrally designated. Central decisions are channelled to local levels through different government agencies and through public administration, so local initiations have a rather limited impact on the plans.

Different stages of post-war economic development were characterized by distinct regional and urban policies (Enyedi 1979). These stages were as follows[2]:

(1) Immediately after the war—as discussed earlier—the non-agricultural sector of the economy was passed almost completely into state ownership. Comprehensive planning was

introduced parallel to this. The first post-war economic plan (1946-1948) aimed at the reconstruction of the economy, which had suffered heavy damage during the war. The First Five Year Plan (1949-1954) contained a very ambitious program of rapid industrialization; Hungarian leadership adopted totally the Soviet economic model, including the priority of heavy industry and a strongly centralized economic management system. Central planning authorities prescribed detailed directives to the enterprises as well as to those in the non-productive sector.

No room for regional planning was allowed in this strongly centralized planning system, since the economy was directed by sectoral plans. The First Five Year Plan did have some regional targets (e.g., industrial location on the rural Great Plain), but neither organization nor decision-making systems for regional development existed. In 1950, the council (soviet) system replaced earlier local authorities, which were given the mere task of conveying central government directives to the local level. Self-government—which was traditionally poorly developed in Hungary—was practically abolished. The new system inherited important territorial inequalities from pre-war Hungary. Manufacturing industry was excessively concentrated in the capital city, Budapest: this single city employed 60 per cent of the total industrial workforce in 1930. The mining and heavy industrial regions were removed from the country by the new borders established after the collapse of Austria-Hungary (1920), leaving Budapest and Győr the only sizeable, developed manufacturing centers, along with a number of small company towns or mining communities in the Hungarian Highlands that bore the marks of industrialization. The great majority of the country's area was a poorly developed rural zone, where traditional agriculture offered neither capital accumulation nor market for industry.

Uneven industrial development was reflected also in the urban network. By 1941 Budapest had a population of 1.8 million and only two cities—Szeged and Debrecen—qualified as provincial centers with slightly over 100,000 inhabitants. These cities, along with the majority of other urban places, had a pre-industrial character from the point of view of social structure as well as regarding their functions and limited attraction zone.

Extensive industrial growth—executed at the expense of living standard and agriculture—had important regional effects. Budapest's dominance in industrial employment diminished somewhat and new industrial regions grew in the Hungarian Highlands near the coal-fields and the ore (mostly bauxite) deposits. As a whole, the first wave of post-war industrialization sharpened further regional differences between industrialized and rural regions. Heavy industry has a concentrated locational behaviour; consequently, most of the rural areas remained untouched by industrialization. Manpower migrated massively out of the over-populated rural areas to Budapest and to the freshly industrialized NE-SW 'energy axis' of the country. This phenomenon, though, was normal: industrial take-off has always had a polarizing effect on regional structure. Thus, no possibility existed for formulating the usual regional planning targets of improving general welfare characteristics and of contributing to regional levelling.

(2) The decade 1957 to 1968 can be called 'transitory'; it was a transition from the rigidly centralized politico-economic system to substantial reforms. Collective ownership of the means of production became dominant in 1961 when the collectivization of agriculture was completed. Consolidation of new, large scale farms was accomplished within a relatively short time because of large investments devoted to agricultural development. Compulsory delivery of produce and sowing plans were discontinued at the beginning of 1957; afterwards, efforts were

made to introduce more elastic forms of collective farming than the 'classical' kolkhoz model for making them more responsive to the interests of the peasants.[3] So the rigidity of central planning eased first in agriculture.

In 1959, at the 7th Congress of the Hungarian Socialist Workers' Party, the first comprehensive regional policy was formulated. Industrial decentralization was the key element to this regional policy. For this purpose, the following measures were taken:

—five regional centres were designated as 'counter-poles', thus gaining priority in industrial location and urban development for the purpose of counter-balancing the overwhelming economic role of Budapest, the capital city. Growth was stimulated mostly by direct government investments into local industry, since infrastructure usually remained neglected. Boudeville's well-known growth pole theory was viewed with doubt, though, as in many other countries, since growing centres often develop at the expense of their region, making small scale regional imbalances sharper.

—stimulus was provided for industrial enterprises in Budapest to establish new plants in provincial cities;

—the establishment of new industrial plants in Budapest (later in the whole metropolitan area of the city) was prohibited;

—a number of industrial plants (with 20,000 employees) were designated for mandatory relocation from Budapest to the provinces, mostly for physical planning reasons (Tatai 1984).

This strategy proved to be basically successful. The main results were as follows:

—Population growth of Budapest slowed remarkably. The number of industrial workers and employees reached its maximum in 1964 (700,000 people), but since then the number has diminished to 420,000. Industrial relocation from Budapest, though, played a minor role in this decline. Industrial decentralization caused a high proportion of the young people entering the labour market to become fixed in the countryside, so the continuous 'hunger' for manpower in Budapest firms remained unsatisfied.

—Modern industry was located in a number of provincial cities (Borai 1978), which, at that time, was the main impetus to urban development. Industrial decentralization contributed to the formation of a modern urban system, helped to level the activity rate among different regions, and diminished inter-regional migration.

—Industry moved into the agricultural regions, too, thus absorbing an important part of the surplus agricultural manpower. The rapid technical modernization of agriculture, plus the abolition of rigid centralization in planning and management, led to a substantial growth in cooperative farmers' income. Average industrial and agricultural incomes became equalized by 1968. Consequently, regional income disparities have diminished greatly.

Although a number of changes were made after 1957, many elements of rigidly centralized planning have survived. Because of locational decisions, the provincial cities *received* certain new investments from the central government; local authorities, though, had neither possibilities nor interest in either the most efficient utilization of local resources or in the coordination of different sectoral decisions. Even the improved forms of central planning directives were not able to assure the efficient development of the rapidly modernizing Hungarian society.

(3) In 1968, a new system of economic management was introduced. This system, called the New Economic Mechanism, made economic units interested in efficient and profitable

production and enabled them to make decisions on their own by analyzing their own economic situation. Central planning directives were almost totally abolished; the main economic regulators became taxes, credit, state subsidies, partially fixed prices, and the like. Government investments continued in large new projects, though, such as building a nuclear power plant or national highways.

Briefly, the central government plans the *economic conditions* instead of production itself (Nyers 1969; Robinson 1973). This decentralized decision-making model has functioned satisfactorily since its introduction. In 1971, however, the government adopted *three* fundamental resolutions that reformulated the aims and methods of regional planning. The *first* defined two basic aims for regional policy and planning:
(i) "it should ensure the efficient utilization of the resources of the national economy and the individual regions and the modernization and rationalization of the settlement network";
(ii) "by the levelling of employment and productivity levels in the regions and the supply levels of settlements, it should reduce the differences existing in the material and cultural levels of the population of the individual regions." (Lackó 1984, p. 150).

In the new regional policy, besides economic levelling, the reduction of differences in living conditions also became an important target. Earlier, economic development was supposed to lead automatically to the improvement of living conditions. This was not the case, however: the development of rural infrastructure and rural services lagged behind the growth of agricultural output and the improvement of rural incomes.

The *second* government resolution was the 'National Settlement Network Development Concept'. This long-term development concept designated the central places of different hierarchical levels (130 towns and large rural communities). Each hierarchical level was defined by its population size and the size of the attraction zone, the infrastructural level, the variety of public services, etc. County councils then designated local centres (about 800 in the country) for assuring basic services in each region and to channel the central development funds towards the planned urban network.

The *third* resolution prescribed the system of regional planning that will be reviewed later. It enlarged remarkably the decision making power of local and county authorities (councils).

Economic growth continued in the early 1970s. More and more industry moved to rural areas for manpower. Half of the new manufacturing industrial plants were located in rural communities between 1968 and 1973 (Barta 1982). Migration from rural to urban areas thus has diminished. The second half of the 1970s—as everywhere in the world—was characterized by a remarkable economic slow-down, even stagnation, in the industrial sector. The government was able to assure full employment, but diminished subsidies for backward regions, and, generally, for the non-productive sector (infrastructure, public services).

The 1970s were contradictory for regional development, too. The economic levelling continued: the difference between the most industrialized and the least industrialized counties was fourfold in 1970 and only twofold in 1980 (in the number of industrial employees per 1,000 inhabitants). Due to the successful performance of Hungarian agriculture, rural areas also advanced economically. Regional tensions shifted from the macro-regional to micro-regional level. The urban/rural dichotomy still exists, due partly to the urban-centered regional policy and partly to the general neglect of the development of infrastructure. Settlement development remained centralized, although the government shared its redistributive role with county councils. Local financial resources remained insignificant and the central (i.e., government and county council) development funds were invested almost totally in the cities. In 1980, only 10% of the central settlement development fund was devoted to rural communities where 47% of the country's population lived (this share reached 23% in 1984, and a further increase is expected).

The implementation of the National Settlement Network Development Concept was certainly successful in developing the urban network: the population of Budapest started to decline and the medium and small city network expanded. Efforts to re-centralize also had influence in regional development. For instance, territorial decentralization of industry was accompanied by organizational centralization: small, local enterprises were absorbed by great enterprises, so that forty per cent of industrial plants now have their firm headquarters in Budapest. This ratio is over 70% of large (over 3,000 employees) manufacturing enterprises.

The 1970s were characterized by strong centralization processes in rural public services (public administration, public health, public education, retail trade). Key-words in this centralization were 'modern' and 'efficient'. This time 'the developed Western' pattern had to be followed, although, under the given level of the Hungarian communication system, these service models are disadvantageous for the rural population.

Finally, local authorities had only symbolic power, despite the declared principles of settlements' self-government. Local resources became strongly centralized, and their redistribution among counties and settlements again became strictly controlled by central (government) agencies.

(4) The 1980s have been characterized by important changes both in economic and regional policies. In economic policy, the basic aim is to make the Hungarian economy more competitive in the world market, which necessitates substantial modernization and restructuring of production, mostly in industry. The short-run aim is to keep the financial liquidity of the country on the international monetary market, which necessitates very strict control in government expenditures. Emergency measures probably will be temporary; nevertheless, regional policy needs to be changed dramatically. It became clear—as it was stated by Hudson and Lewis—that "the problems of uneven regional development in the 1980s requires much more than a simple comparison of the relative efficiency of the different techniques of intervention employed during the 1960s and 1970s" (Hudson—Lewis 1984).

The fundamental questions for the 1980s—or for a longer period—are as follows:

— how to replace growth-stimulation in regional policy? A growing number of studies have dealt with the role of technology change or the propagation of innovations in regional policy (Ewers—Wettman 1980; Enyedi 1981; Malecki 1983). Nevertheless, due to the lack of empirical studies, we are still uncertain whether technological impact will have a new, concentrating effect or not. Another question that has never been analysed from the point of view of regional development is the future importance and location of the 'second economy'.

Two principles were adopted for government interventions:

(1) to assure full employment in the traditional areas of heavy industry rather than in the

rural zones; and (2) to continue the regional levelling at least in two basic services; namely, in education and public health.

—how should the National Settlement Network Development Concept be remodelled? A new redistribution system of government funds, a growing financial and decision making independence of local authorities, growing citizen participation and, generally, more regionalism in settlement development are planned.

Between 1981 and 1983, three expert groups worked out guidelines for a new settlement and regional development policy, based on the trends of urban transformation, the new system of local councils financing, and the decentralization of public administrative power. By the end of 1984, the government accepted the suggested new settlement and regional policy, which was discussed by Parliament in 1985. The proposals contain substantial changes in the decision making system of regional development. The most important new elements are as follows:

—the new regional policy does not intend to intervene directly in the economic sphere. One presumption is that structural changes will be characteristic in economic activity. We have not had such a clear strategy for structural changes yet as we had for the quantitative changes (i.e., for economic growth).

Structural changes in industry of a given region or city will certainly influence the need for local central resources and manpower, the nature of intra- and interregional relations, commodity flows, etc. The magnitude and the direction of these changes are still uncertain.

The Hungarian government intends to keep full employment in the future, too. Structural changes certainly will disturb the local (regional) labour market, but the responses to this problem are uncertain.

Structural changes focus on the development of 'high-tech' industries. Will it lead to a geographical concentration or further decentralization of Hungarian industry? Both possibilities exist. In many Western countries, high-tech industry developed in a dispersed manner. In this country, although there is a general trend of decentralization, 40% of all industrial enterprises' headquarters are located in Budapest, with a good 2/3 of the R&D capacity. The capital city thus will certainly try to seize high-tech development.

Former regional policies in Hungary formulated economic targets and tried to intervene in the economy. New regional policy has to prepare alternative responses for economic changes that are in many respects still uncertain.

—fundamental changes in financing settlement development, with new measures introduced as of January 1, 1986. First of all, since the importance of centralized redistribution will diminish, local financial resources (local taxes) will gain importance. Next, distribution of resources from the central budget will follow clear norms and rules, instead of the frequent 'informal bargaining' between local and central authorities that was typical earlier. Local authorities will decide freely about the utilization of their financial resources (earlier, the share of new investments and the proportion of expenditures for housing, public health, and public education were fixed).

Local councils are expected to express and follow local interests. This represents an important change in a socialist country; earlier, the existence of valid local interests were denied. Attempts were made to find forms for citizens' participation in local decision making.

—the importance of regional and urban planning has been stressed by the general political atmosphere in the country. 'Decentralization' has been a key-word to further political and economic development of the country.

Decentralization came first from the economic reform—mentioned earlier—that has been a continuous process for more than 15 years. This reform incorporates different types of decentralization of economic power (from government agencies to the enterprise or plant level). In a certain way, the re-establishment of a private economy and the great importance of its special form, the so-called second economy (Gábor—Galasi 1981), means also an organizational decentralization in the economy. The economic decentralization made economic management more interested in settlement development; it also created a closer relationship between managers and local authorities.

Earlier the central government accepted welfare tasks, from cheap government housing to subsidizing cultural events. It became impossible to continue these expenditures during the long years of economic restrictions. Consequently, the government is drawing back from some of its earlier commitments (e.g., the share of government housing dropped to less than 20% of the total new housing units built in a year), leaving some tasks for individuals or to the local communities. This process gave more duties and responsibilities but, logically, also more rights to local communities.

The above mentioned decentralization means the transfer of power to regions and to local communities. Will it lead to the formation of real local governments? How are the local communities and local authorities prepared for their new possibilities? How will it be possible to develop horizontal connections among different institutions, agencies, and firms functioning within the same settlement? Through which organizations can local societies and different interest groups express their interest? The long list of questions suggests how deeply changes will have to be made in order to successfully implement the new regional and settlement policy.

Notes

[1] These development projects were connected with the preparation for World War II. Enyedi, Gy. (1979).

[2] 'Regional and urban' policy and planning means in this paper
—planning the socio-economic development of regions;
—planning the territorial distribution of certain activities (e.g., industrial location);
—planning the transformation of the settlement network.
We do not incorporate physical planning into regional planning.

[3] Successively, the 'working day' (trudoden) remuneration was replaced by monthly salaries and yearly profit-sharing; limitations on household livestock were abolished, etc.

[4] We are witnessing a similar phenomenon in the People's Republic of China, where the economic reform—e.g., the 'responsibility system'—was introduced first in agriculture.

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CHANGES IN THE REGIONAL POLICY IN HUNGARY

LÁSZLÓ LACKÓ

KEY-WORDS: *decentralization; development,* extensive ~, intensive stage of ~; *disproportionalities; environmental* protection; *housing; industrialization; NE-SW* industrial axis; *planning; priorities; regional policy,* characteristic periods in ~, new ~; *urban* reconstruction.

Introduction

The contents, objectives, and, naturally, the changes of regional policy are in close relation to regional, social, and economic development. In the complex system of direct and reciprocal effects prevailing between them, regional development is considered as a consequence in many aspects. If this were true, regional policy also would be characterized by a subsequent and adaptive nature. This, however, cannot be proven in every case, all the less because the general economic or social policies or their important aspects are formulated and published frequently without considering their regional political objectives and interrelations. Though regional interrelations can be shown in some social or economic development periods, it cannot be stated that periods of regional policy correspond exactly to those of other policies.

A more simple and perhaps more frequent case of illustration of changes is when we trace, for example, what regional policy prevailed in successive economic political periods. In order to give concrete information about Hungarian policy in the frame of this paper, the latter solution has been chosen.

The past

The spatial structure of the country—as is well known—was characterized by heavy disproportionalities, mainly as a consequence of its historical development: great differences between the development of the individual parts of the country occurred; the level of urbanization was generally low; there were inner disproportionalities in the town network; there was no other real city beside Budapest (the second biggest town had a population of less than one tenth of the capital); the great majority of villages were strongly underdeveloped; etc. In the reconstruction period after the Second World War, regional policy could not be thought of. Understandably, in that period the main intention was to reconstruct the annihilated or broken productive capacities and the infrastructure in order to make it operative. Therefore the disproportionalities of the former period were preserved.

At the same time—as the latest research has discovered—the leadership in the early fifties was conscious of the necessity of developing regional plans in order to create new industrial plants, town quarters, and towns. Some concerns were initiated, but in practice regional aspects took a backseat to the absolute priority given to quick realization of sectoral targets. The 1950s were characterized by industrialization and its consequences have left a strong mark on the map of the country: more than ten new towns have been established, but at the same time the concentration of industry and infrastructure continued in the traditional NE-SW industrial axis and in the older industrial centres. With this, naturally, the migration of population in this direction towards these settlements prevailed.

The first high level political statements connected with regional development concerned the regional distribution of industry. In 1958, the Political Committee adopted a resolution on the allocation of industry that declared the necessity of industrializing the Great Hungarian Plain and reducing the industrial weight of Budapest.

In the 1960s other governmental measures were put forth concerning industrialization and limiting development of the capital city. Regional development problems revealed more and more questions, urging scientific answers and political-governmental reactions. In the second half of the 1960s, an expansion of regional issues took place in which the rapid industrial development and social transformation played an important part. Regional conditions and measures taken in connection with economic reform also had a strong influence on this process.

In 1970 a decisive change took place that led to the birth of the first comprehensive regional policy in Hungary. The resolution of the Political Committee in March 1970 and the following governmental measures (in 1971), which comprised the essential questions of regional development and the system of planning and regulation, and initiated a long-term national programme. The main characteristics of the regional policy established in 1970 and 1971 are as follows:

(1) The dual objectives of regional policy are: the effective utilization of resources of the national economy and of the individual territories making the settlement network more modern and reasonable; moderating the differences between the material and cultural level of the population living in different areas by approximating the levels of employment and productivity and services of the settlements.
(2) Recognition of the necessity of thinking in terms of development centres and designating them.
(3) Recognition of territorial-settlement concentration as an objective process.
(4) Declaration of the objective character of uneven regional development within the country.
(5) Recognition of regional backwardness and developing measures for its reduction.
(6) Formulation of the requirement of planned development of the settlement system, projection of a further strong urban development, earmarking development centres for solving the expected problems of rural regions, and putting the determination of the criteria for declaring a settlement as a town on the agenda.
(7) Determination of the special development problems of Budapest and the surrounding agglomeration and initiating the use of several limiting measures.
(8) Economic and administrative regulation of regional development: introducing a central fund for regional development and central site turnover (central land market for new state and co-op investments).

(9) Assigning economic planning regions.
(10) Assigning a governmental body to coordinate the solution of these tasks.

The conception, objectives, and estimated time frame of this policy reflected well the climate of the 'golden period' of the 1960s, together with the continuation of the long-term rapid and extensive development of concentration in space and of urbanization. The execution of the documents containing actual goals and regulation principles, which were based in most respects on correct recognition of problems, were implemented in a much shorter period than was estimated in advance. Beside the drastic changes in the conditions of economic development, especially with regard to the too rapid spatial concentration, the changes in the demand structure of society and the sharpening of some contradictions of regional development also played a part in this process. Because of the rapid transformation of conditions, the policy formulated in 1970-1971 corresponded less and less to the new processes, conditions, and requirements that developed from the second half of the 1970s. So the new, intensive stage of development required a new regional policy.

The present

The elaboration of the new regional policy began in 1980-81 with the contribution of researchers, administrative specialists, and planners. The Political Committee made a resolution on the long-term guidelines of regional and settlement development in July of 1983. On its basis, the work was continued in order to determine more concrete objectives and tools. In April 1985, Parliament resolved the long-term tasks of regional and settlement development, thus taking the first ever stand on regional policy by the supreme legislative body in Hungary.

The objectives and priorities of the new regional policy are the following:

Territorial and settlement development should facilitate the more effective and coordinated realization of economic tasks; it should moderate further existing territorial disproportionalities and contribute to the development of a more proportional spatial structure of the country.

During the period over which the main objectives of the regional and settlement development plan are realized, it is necessary to create facilities for adjustment to changing conditions and to assign regional, temporal, and sectoral priorities. When selecting them, socio-political aspects, as well as material and personal conditions, are to be considered. The various alternative paths of economic development that arise due to external conditions, too, are connected with the tasks of regional development planning in terms of accelerating or slowing down their realization. On the basis of this, the following main objectives and priorities can be selected:

—The spatial structure of the country should become more decentralized; the concentration processes of the productive forces and of population should be moderated. The division of labour, the cooperation between the individual parts of the country, and minor regions and settlements are to be strengthened, along with the spatial attitudes of the decision makers at the central, county, and local levels.

—A territorially differentiated development of productive forces, the adaptation of production to the possibilities of the given structure of the economy based on the effectiveness, innovation, and selection and strengthening of connections with local organizations should be realized. The increasingly valuable natural resources, and the different potentials of the individual regions of the country, are to be better utilized. The infrastructural conditions and intellectual background to production are to be improved essentially.

—The conditions of the entire and effective workforce are to be improved in light of the territorially differentiated demographic circumstances. The approximation of jobs and living places, and the reduction of long distance commuting should be facilitated. The creation of greater labor mobility, along with the planned re-grouping and re-training of labor to more effectively adapt itself to changing conditions, is justified.

—The unjustified regional differences in living conditions of the population should be further reduced in order to preserve social and living security and enhance public feeling of equity. This should be accomplished by approximating the basic infrastructural services within individual districts and settlements and by improving access to secondary services. The wide-spread, general use of more healthy ways of living and an awakening of the demand of the population in this direction should be facilitated.

An urgent task in the first half of this period is to reduce the quantitative housing shortage; to improve the availability of healthy drinking-water supply and the education of a large age group, to develop more rapidly the supply of telephones to settlements and to the population; and to improve the basic health and social supply of the aged. When qualitatively developing supply, the improvement of machine and instrument supply of public health and the continuation of housing and urban reconstruction programmes are to be given first priority.

In the second half of the given period, the wide-spread improvement of basic supply and the moderation in the level of qualitative differences between towns and villages can take place. An important task in the beginning of the 1990s will be to create the necessary conditions for assisting a large birth cohort entering jobs and starting families. The conditions of the middle and high level supply can be widened and modernized in more settlements, and the reconstruction of towns and urban districts also can be accelerated. The more proportionate location of intellectual life should be facilitated by improving the infrastructural supply of small towns and villages along with the conditions of transport and communication.

—The requirement of environmental and natural preservation should be enforced consistently when developing production and infrastructure. An important task is the conservation and restoration of the ecological equilibrium in areas and settlements that are critical from the point of view of environmental protection. The resources and tools should be focussed on protecting surface and ground water supplies, draining and cleaning sewage, alleviating the adverse conditions of strongly contaminated settlements, utilizing wastes and placing them in damage-free places, and reducing environmental noise levels.

In the first half of the period, an urgent task of environmental protection is the reduction of the disproportionalities between sewage draining and cleaning; the prevention of deterioration and, later, its qualitative imporvement, of water quality in the southern part of the

Great Hungarian Plain, at Lake Balaton, and the karstic districts; and the improvement of conditions of the harmless disposal of dangerous wastes.

In the second half of the period, the more wide-spread improvement of environmental quality and the essential reduction of backwardness in sewage draining and treatment can be accelerated. In most villages the placing of solid and fluid wastes by rendering them harmless will be possible.

—The settlement system should be developed proportionally in accordance with economic requirements and the development of local independence, while stress should be laid upon the medium and small towns and villages. The urbanization and the modernization of living conditions should comprise an ever increasing circle of settlements. Disadvantages with respect to employment, career selection, and social mobility currently associated with type of settlement should be reduced gradually. The population retaining capacity of suitable rural areas and/or villages should be strengthened and at the same time the flow into towns should be reduced. The towns and villages acting as centres of attraction should be developed on the basis of dependence and coordination, taking the strengthening of demand of moving out from towns into account as well.

—The development of special regions—terrirories with small villages, scattered farms, agglomerations, areas with unfavourable conditions, those in the proximity of borders, and the recreational districts—should be treated as a very important task. The moderation of the relative social and economic backwardness of areas with small villages of unfavourable conditions is a continuous task demanding state support as well. The experiences gained in regions of more favourable conditions—like the Budapest agglomeration and similar complexes of settlements—should be utilized to a maximum extent.

—In order to meet the demands occurring in the field of social and economical conditions, as well as qualitative development, regional and settlement development should pay more attention to the safeguard of already existing values, to the harmonious development of settlements and their surroundings, to the reconstruction of settlements, houses and institutions, and to the modernization and reasonable utilization of this network.

—Both the management and scientific basis of settlement and regional development should be improved; the system of planning, administration, and structure should be adapted to the new tasks and requirements. In accordance with the modernization of economic management and public administration systems, the harmony between economic and physical planning, the role of local councils, bodies, and citizens should be strengthened. Hence the necessity of introducing the new system of management of councils.

Summary

The questions of regional policy grew to high priority in the activities of the supreme political and state organs in the beginning of the 1980s. This reflects an increased interest in the different layers of society and of the public in regional problems, and the great importance of the tasks to be confronted. Several signs indicate that the principal and practical issues of regional policy

will play a continuous and prime role in the field of political, social, and state life, which will cause the earlier experienced fluctuations to disappear.

In the past three decades, regional policy was enforced with a strongly varying intensity. The characteristic periods were the following:

(a) formally:

—up to 1970: no explicit regional policy existed

—in 1970-1971: declaration of the first regional policy

—in 1983-1985: formulation and declaration of the new regional policy;

(b) essentially:

—until the beginning of the 1950s: conservation of the old structure without setting new regional objectives

—until the beginning of the 60's: increase in regional disproportionalities, appearance of the individual components of a regional policy

—from the middle 1970s until the second half of the 1970s: formulation of the first comprehensive regional policy and its declaration, reduction of regional disproportion- alities, appearance of new problems

—from the beginning of the 1980s on: formulation of a new policy, its declaration, and the inclusion of regional issues into the main flow of political, social, and economic life.

NEW TECHNOLOGY AND REGIONAL DEVELOPMENT: TRENDS AND IMPLICATIONS IN THE UNITED STATES*

JOHN REES

KEY-WORDS: *computerized* numerical control systems; *industry,* high technology ~, new technology ~; *innovation,* ~ diffusion; *invention; regional* convergence, ~ development; *research* and development; *robotics; technological* change; *urban* planning.

Introduction

Not until Joseph Schumpeter's (1942) seminal work on the process of creative destruction was technology recognized as an important factor of production resulting in economic growth. Indeed, the study of technological change and its impact remained among the 'terra incognita' of modern economics and geography until quite recently. Solow (1957) found that nearly 85 percent of American economic growth between 1909 and 1949 was a function of technical change, while Rosenberg (1972, p. 8) noted that "the productivity-increasing impact of technological change has had major effects on the structure and organization of our modern economic system." This paper contends that in the same way technological change results in productivity increases and real economic growth at the national level, regional differences in the propensity to create and use new technologies can result in major differences in regional economic growth rates. To date, however, a lack of empirical evidence has been available linking changes in technology to a region's economic health.

Over the last several years the pangs of decline in the nation's industrial heartland as well as increasing growth rates in other parts of the country have given rise to a number of 'new' strategies designed to enhance the economic performance of states and localities. Some of these new economic development strategies have focused on a region's capacity to attract high-technology industries, though many of these may appear as either new wine in old bottles or old wine in new bottles. High technology industries (or, more appropriately, new technology industries) have been posited as a panacea for both the salvation of older industrial areas and the continued growth of the newer areas of the South and West. Some have argued that more policies of the federal government should be aimed at encouraging the growth of high technology companies, while other policy makers and scientists have become more concerned about the social and economic impacts that technological change can bring to different localities. While the high anxiety over high-technology continues into the 1980s, there is much we still

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do not understand about the development of high-technology complexes, the spread of innovations, the impact of technological change on labor creation, and the role of public policy in stimulating innovation and economic growth. The goal of this chapter is to shed more light on these relatively undefined relationships.

Conceptual and operational issues pertaining to 'high-technology'

In studying the link between technological change and regional development, one quickly becomes cognizant of the many conceptual and operational difficulties in defining the relationships between innovation, diffusion, and economic growth. Some of the more constructive work on the relationships between technological change and economic growth has been undertaken by economists at the sector and company level (see Mansfield 1968, 1972; Gold 1977; Nelson—Winter 1977; Utterback 1979). The focus of many of these studies has been the creation of new technology through the process of patenting, invention, and imitation. Research and Development funding (hereafter referred to as R&D) has been examined primarily in terms of aggregate inter-industry and inter-firm differences. In addition, problems of measuring innovation output and productivity have been analyzed and the relationship between firm size and innovation has been examined (see Kamien—Schwartz 1976). The last topic, the relationship between market structure and innovation, has resulted in a number of different findings, including definitive relationships between R&D expenditures and firm/industry growth rates. R&D spending is higher within growth industries where technological change tends to be rapid. Larger firms, however, have not always led their industries in their propensity to innovate (Mansfield 1968). Therefore, independent entrepreneurs and small firms are prominent contributors to the development of new technology (National Science Board 1976).

One of the major problems with research on technological change is the incrementalism or continuity problem implicit in the definition of innovation, i.e., the way an innovation itself can change during the process of diffusion and adoption. A related problem is that an imitation rather than innovation strategy may be quicker, cheaper, and less risky for potential innovators. Levitt (1966) reminded us that "by far the greatest flow of newness is not innovation at all. Rather it is imitation...IBM got into computers as an imitator; Texas Instruments into transistors as an imitator. We often mistake innovation for what is really imitation." Levitt's work and that of others suggests that imitation is epidemic, and can be viewed as a form of 'reverse R&D' where firms work back from what others have done and in many cases come up with better products. The real difference between an innovation and imitation strategy then is one of the more difficult operational issues that surround research on technological change and its impacts.

Most of the work by economists inevitably has been non-spatial in nature. More recently, geographers and regional scientists increasingly have become concerned with the conceptual and empirical issues relating technological change and regional development. The roots of such work can be traced to the early work of growth pole theorists and the premise that the propulsive nature of key growth sectors would have a major impact on both the generation and spread or diffusion of innovations (Malecki 1983; Thomas 1969, 1975). More empirically based research in Britain has suggested that many of the factors influencing the innovation adoption process vary among regions in a systematic manner (Oakey 1980). Such factors include the location of company headquarters and R&D facilities relative to branch plants. There is also evidence that inter-regional contrasts in manufacturing productivity may be related to the failure of plants in some areas to adopt the latest production techniques. Because the propensity to innovate varies between industries, it follows that the industrial structure of a region can have a major impact on innovation generation and diffusion. One of the reasons why a paucity of empirical research exists on the link between technology and regional change in the United States lies in the plethora of ways that new or 'high' technology can be defined.

On defining new and high technology

Most discussions of this topic start with the premise that there is no single, generally accepted definition of 'high-technology'. One definition of high-technology used by Congress' Office of Technology Assessment (1984, p. 2) includes "companies that are engaged in the design, development and introduction of new products and/or innovative manufacturing processes through the systematic application of scientific and technical knowledge..." Such companies use state-of-the-art techniques, have a high proportion of R&D costs, employ a high proportion of scientific, technical, and engineering personnel, and serve small specialized markets. Nevertheless, the popular image of the term 'high-technology' refers mostly to high *product* technology and not high *process* technology industries, a category that also needs to be included because of the use of advanced production methods.

Most studies agree, however, that a number of variables should influence the definition of new or high-technology industries. Two variables in particular stand out: the use of research and development spending relative to company sales; and the number of technical workers as a proportion of total employment. This latter indicator usually implies the proportion of scientists, engineers, and other technical personnel in the workforce (see Armington—Harris—Odle 1983; Glasmeier—Hall—Markusen 1983). While information on labor content is important in defining high-technology industries, any definition that relies solely on the human capital component should be open to question.

A recent study by the Bureau of Labor Statistics (Riche—Hecker—Burgan 1983) comes up with a comprehensive definition of high-technology industries made up of 47 sectors at the 3 digit level of the Standard Industrial Classification (SIC) and one 4 digit sector. Most of the industries listed (Table 3) also appear in other classifications. This typology was based on the use of three criteria:

(i) R&D expenditures, where the ratio of R&D expenditures to net sales was at least twice the average for all industries;

(ii) the use of scientific and technical personnel, where the number of technology-oriented workers accounted for a proportion of total employment that was at least one and a half times the average for all industries; and

(iii) the degree of product sophistication relative to the utilization of technology-oriented workers and R&D expenditures.

TABLE 3

DEFINITIONS OF HIGH TECHNOLOGY INDUSTRIES

SIC	Industry	High-tech group[1] I	II	III
131	Crude petroleum and natural gas	X		
162	Heavy construction, except highway and street	X		
281	Industrial inorganic chemicals	X		X
282	Plastic materials and synthetics	X		X
283	Drugs	X	X	X
284	Soaps, cleaners, and toilet preparations	X		X
285	Paints and allied products	X		X
286	Industrial organic chemicals	X		X
287	Agricultural chemicals	X		X
289	Miscellaneous chemical products	X		X
291	Petroleum refining	X		X
301	Tires and inner tubes	X		
324	Crement, hydraulic	X		
348	Ordnance and accessories	X		X
351	Engines and turbines	X		X
352	Farm and garden machinery	X		
353	Construction, mining, and material handing machinery	X		
354	Metalworking machinery	X		
355	Special industry machinery, except metalworking	X		X
356	General industrial apparatus	X		
357	Office, computing and accouting machines	X	X	X
358	Refrigeration and service industry machinery	X		
361	Electric transmission and distribution equipment	X		X
362	Electrical industrial apparatus	X		X
363	Household appliances	X		
364	Electric lightning and wiring equipment	X		
365	Radio and TV receiving equipment	X		X
366	Communication equipment	X	X	X
367	Electronic components and accessories	X	X	X
369	Miscellaneous electrical machinery	X		X
371	Motor vehicles and equipment	X		
372	Aircraft and parts	X	X	X
376	Guided missiles and space vehicles	X	X	X
381	Engineering, laboratory, scientific and research instruments	X		X
382	Measuring and controlling instruments	X		X
383	Optical instruments and lenses	X		X
384	Surgical, medical, and dental instruments	X		X
386	Photographic equipment and supplies	X		X
483	Radio and TV broadcasting	X		
489	Communication services, n. e. c.	X		

SIC	Industry	High-tech group[1] I	II	III
491	Electric services	X		
493	Combination electric, gas and other utility services	X		
506	Wholesale trade, electrical goods	X		
508	Wholesale trade machinery, equipment and supplies	X		
737	Computer and data processing services	X		X
739	Research and development laboratories	X		X
891	Engineering, architectural, and surveying services	X		
892	Noncommercial educational, scientific and research organizations	X		

[1]Group I includes industries with a proportion of technology-oriented wirkers (engineers, life and physical scientists, mathematical scientists, engineering and science technicians and computer specialits) at least 1,5 times the average for all industries. Group II includes industries with a ratio of R&D expenditures to net sales at least twice the average for all industries. Group III includes manufacturing industries with a proportion of technology-oriented workers equal to or greater than the average for all manufacturing industries, and a ratrio of R&D expendituresds to sales close to or above the average for all industries. Two nonmanufacturing industries that provide technical support to high tech manufacturing industries also are included.

Source: Monthly Labor Review, Nov. 1983.

The BLS study produced a list of 3 digit SIC sectors because appropriate data were not available at the 4 digit level. However, studies using variations on this methodology tend to come up with a definition of high-technology industry that includes 4 digit sectors that are part of the sectors identified in Table 3. The BLS study also goes one step further than most studies in recognizing the propulsive nature of certain industries within the service sector. The production of computer software, for example, is a highly innovative, high growth industry. Yet this highly propulsive industry remains hidden in SIC 737 and tends to be excluded from studies of high technology t hat focus only on the manufacturing sector. Indeed, studies that focus on high-technology industries generally tend to underestimate the innovative potential of other business or producer service industries.

Table 3 does not suffer as much as other typologies. While these problems have been touched upon before, they can be summarized as:

(i) the exclusion of key business service sectors like software development;
(ii) the exclusion of production processes; and
(iii) the assumption that all high-technology industries are growth industries.

On this last point, many high-technology products, particularly in small sompanies, involve high front-end costs for research, development, and marketing. This implies a high degree of risk that will cause high mortality rates among new technology-based birms as exists among small businesses in general. When cities and localities search for high-technology firms, most are interested in the high growth potential more than the high-technology potential per se. In this regard it is dangerous to equate high-technology with high growth, particularly in an employment context, when the conventional definition of technological change has been the substitution of capital for labor. According to the BLS study referred to earlier, high-technology industries are expected to provide only a small proportion of the jobs created between 1982 and 1995.

The impact of high-technology industries on employment is discussed later in this chapter. First we turn to the question of the geographical incidence of high technology industries.

The geography of high-technology industries

Until the recent upsurge of interest in attracting high-technology industries into particular states and localities, little was known about the geographical patterns of high-technology development. Indeed, until the recent release of two studies by researchers at Brookings and Berkeley, we knew more about the spatial incidence of R&D than high-technology industries per se.

THE GEOGRAPHY OF RESEARCH AND DEVELOPMENT IN THE UNITED STATES

Clearly, understanding the research and development process is a major step towards understanding the generation of new technology. Since federal R&D spending has accounted for over 50 percent of total spending on R&D in the United States in the past 25 years, it is not surprising that governmental funding of R&D, like other types of federal spending, has a strong impact on urban and regional development processes. While the National Science Foundation has monitored changes in R&D spending in the post World War II period on an annual basis, their analysis of geographic distributions has been sketchy at best and limited to the state level. Differences in R&D spending at the metropolitan scale in the United States has only been monitored recently and this has been restricted largely to the work of Malecki (1980, 1981).

The geographical distribution of total federal R&D spending by state for 1970 and 1980 is shown in Table 4, based on the annual surveys of science resources carried out by the National Science Foundation. Predictably, perhaps, in 1980 California received the most R&D support, $7.1 billion out of a total national budget of $30.5 billion (a 23 percent share). A further eight states—Maryland, Massachusetts, New York, Florida, Texas, Pennsylvania, Ohio, and Virginia—each showed more than $1 billion in federal obligations.

The 20 leading states together received 87 percent of total federal R&D funds in 1980, and roughly the same pattern persisted throughout the 1970-80 period. California's share of the total federal R&D budget indeed has fluctuated over time, from 35 percent in 1963 to 21 percent in 1972 to 23 percent in 1980. Maryland's increased share of federal R&D funds can be attributed directly to the overspill of federal R&D installations from Washington, D.C., mostly intramural installations. These include the National Institute of Health, the Naval Air Test Center, the Army Arsenal Labs, the National Bureau of Standards, and the NASA Goddard Space Flight Center. New York State, on the other hand, as might be expected from other indicators of regional economic change, has shown a decline in its share of the total federal R&D pie since

TABLE 4

FEDERAL R&D OBLIGATIONS BY GEOGRAPHIC DIVISION AND STATE FOR SELECTED YEARS

(Dollars in millions)

Division and State	1970	1979	Average annual percent change 1970–79	1980
Total, all States	$14,980.6	$27,916.8	7.2%	$30,477.8
Pacific	4,404.1	7,855.6	6.6	8,272.8
Alaska	43.2	45.9	0.7	42.5
California	3,871.1	6,804.0	6.5	7,138.0
Hawaii	43.8	40.8	–0.8	42.6
Oregon	33.8	100.1	12.8	97.9
Washington	412.2	864.8	8.6	951.8
South Atlantic	2,899.3	5,727.0	7.9	6,430.4
Delaware	16.3	14.4	–1.4	20.8
District of Columbia	468.5	768.4	5.7	807.0
Florida	824.8	1,017.3	2.4	1,323.5
Georgia	72.3	184.4	11.0	169.8
Maryland	1,063.4	2,359.8	9.3	2,595.0
North Carolina	63.9	220.9	14.8	227.7
South Carolina	17.8	114.3	22.9	87.5
Virginia	352.7	940.3	11.5	1,047.1
West Virginia	19.6	107.2	20.7	152.0
Middle Atlantic	2,516.1	3,112.3	2.4	3,260.0
New Jersey	741.7	649.3	–1.5	729.4
New York	1,235.6	1,363.1	1.1	1,471.2
Pennsylvania	538.8	1,099.9	8.3	1,059.4
New England	1,000.9	2,685.1	11.6	2,814.3
Connecticut	160.0	328.4	8.3	470.3
Maine	13.3	23.1	6.4	25.9
Massachusetts	760.9	2,062.3	11.7	2,066.7
New Hampshire	27.3	94.1	14.8	50.2
Rhode Island	29.9	140.7	18.8	149.9
Vermont	9.5	36.5	16.2	51.3
Mountain	1,137.7	2,262.5	7.9	2,568.2
Arizona	72.8	201.4	12.0	334.6
Colorado	274.1	442.2	5.5	573.7
Idaho	75.0	147.1	7.8	147.7
Montana	11.6	41.6	15.2	45.7
Nevada	190.9	222.1	1.7	214.5
New Mexico	445.0	955.5	8.9	954.2
Utah	61.1	211.6	14.8	243.9
Wyoming	7.2	41.0	21.4	53.9

Division and State	1970	1979	Average annual percent change 1970—79	1980
East North Central	1,038.4	2,097.8	8.1	2,316.2
Illinois	239.6	547.2	9.6	599.9
Indiana	91.6	122.0	3.2	162.4
Michigan	162.8	264.4	5.5	377.5
Ohio	457.3	1,053.2	9.7	1,054.7
Wisconsin	87.1	111.0	2.7	121.7
West North Central	475.4	1,277.8	11.6	1,618.7
Iowa	32.7	84.9	11.2	121.7
Kansas	16.6	136.3	26.3	353.6
Minnesota	109.3	202.8	7.1	261.6
Missouri	291.2	778.9	11.6	801.6
Nebraska	10.6	31.3	12.7	31.6
North Dakota	8.9	33.4	15.9	38.7
South Dakota	6.1	10.2	5.9	9.9
West South Central	834.9	1,454.2	6.4	1.585.6
Arkansas	9.8	37.3	16.0	30.0
Louisiana	146.5	209.1	4.0	269.8
Oklahoma	29.5	70.1	10.1	94.5
Texas	649.1	1,137.7	6.4	1,191.8
East South Central	599.7	1,347.4	9.4	1,492.8
Alabama	357.2	559.6	5.1	552.7
Kentucky	20.4	43.0	8.6	107.9
Mississippi	28.3	100.7	15.2	109.3
Tennessee	193.8	644.1	14.3	722.9
Outlying areas	17.3	39.4	9.6	45.3
Offices abroad	56.8	57.7	0.2	73.3

Source: National Science Foundation, *Research and Development by Industry.* Washington, D.C.: Science Resources Series, 1982.

the early 1960's. Most of New York's share, however, flows directly into the private sector. "Federal agencies seeking specific kinds of research or development competence to implement their missions have turned to existing organizations with specialized characteristics within certain states. These states contain aircraft, aerospace and electronics industries, concentrations of university research talent, including modern medical research teams and/or geographic areas safe for testing missiles, aircraft, spacecraft and explosives." (National Science Foundation 1982).

Federal R&D allocations are ranked by state for fiscal year 1980 in Table 5, along with the rankings of these states in terms of population and total personal income. The data indicate that most of the top recipient R&D states in 1980 also had the larger share of population and income. A major exception is New Mexico, which ranked tenth in federal R&D obligations in 1980 largely due to the presence of Los Alamos national lab, yet the state ranked very low in terms of population and personal income.

TABLE 5

DISTRIBUTION OF FEDERAL R&D OBLIGATIONS BY STATE COMPARED WITH OTHER NATIONAL INDICATORS BY STATE: FISCAL YEAR 1980

	Total Federal R&D obligations		Population		Total personal income*	
State	Rank	Percent of total	Rank	Percent of total	Rank	Percent of total
United States total	$30,477 million		227 million**		$2,162,936 million	
California	1	23.42	1	10.45	1	12.00
Maryland	2	8.51	18	1.86	16	2.04
Massachusetts	3	6.78	11	2.53	10	2.69
New York	4	4.83	2	7.75	2	8.35
Florida	5	4.34	7	4.34	8	4.10
Texas	6	3.91	3	6.28	3	6.29
Pennsylvania	7	3.48	4	5.24	5	5.19
Ohio	8	3.46	6	4.76	6	4.73
Virginia	9	3.44	14	2.36	11	2.33
New Mexico	10	3.13	37	.57	37	.47
Washington	11	3.12	20	1.82	18	1.97
District of Columbia	12	2.65	47	.28	43	.36
Missouri	13	2.63	15	2.17	14	2.05
New Yersey	14	2.39	9	3.25	9	3.73
Tennessee	15	2.37	17	2.03	22	1.64
Illinois	16	1.97	5	5.04	4	5.57
Colorado	17	1.88	28	1.27	24	1.34
Alabama	18	1.81	22	1.72	23	1.35
Connecticut	19	1.54	25	1.37	20	1.69
Michigan	20	1.24	8	4.09	7	4.27
Kansas	21	1.16	32	1.04	30	1.09
Arizona	22	1.10	29	1.20	29	1.11
Louisiana	23	.89	19	1.86	21	1.65
Minnesota	24	.86	21	1.80	19	1.84
Utah	25	.80	36	.64	36	.52
North Carolina	26	.75	10	2.59	13	2.13
Nevada	27	.70	43	.35	41	.40
Georgia	28	.56	13	2.41	15	2.04
Indiana	29	.53	12	2.42	12	2.27
West Virginia	30					

State	Total Federal R&D obligations Rank	Percent of total	Population Rank	Percent of total	Total personal income* Rank	Percent of total
Rhode Island	31	.49	40	.42	39	.41
Idaho	32	.48	41	.42	44	.35
Iowa	33	.40	27	1.29	27	1.26
Wisconsin	34	.40	16	2.08	17	2.04
Mississippi	35	.36	31	1.11	33	.77
Kentucky	36	.35	23	1.62	25	1.29
Oregon	37	.32	30	1.16	28	1.14
Oklahoma	38	.31	26	1.34	26	1.28
South Carolina	39	.29	24	1.38	31	1.05
Wyoming	40	.18	50	.21	49	.24
Vermont	41	.17	49	.23	51	.19
New Hampshire	42	.16	42	.41	42	.39
Montana	43	.15	44	.35	45	.31
Hawaii	44	.14	39	.32	38	.45
Alaska	45	.14	51	.18	50	.24
North Dakota	46	.13	46	.29	47	.26
Nebraska	47	.10	35	.69	35	.68
Arkansas	48	.10	33	1.01	32	.77
Maine	49	.09	38	.50	40	.41
Delaware	50	.07	48	.26	46	.29
South Dakota	51	.03	45	.31	48	.25
Outlying areas and offices abroad	—	.39	—	—	—	—

*Data shown as of December 31, 1980. See Department of Commerce, Bureau of Economic Analysis, *U.S. Department of Commerce News,* August 9, 1981 (BEA 81—45).
**Provisional estimate of resident population as of July 1, 1980. See Department of Commerce, Bureau of the Census, *Current Population Reports,* series P—25.

Sources: Department of Commerce, Department of the Treasury, and the National Science Foundation.

Malecki's (1980, 1981) work on R&D activities at the metropolitan scale brings out even more evidence of geographical concentration. For the United States, as in other countries, R&D was found to be much more concentrated geographically than either population or industrial activity. This results in a form of breeder reaction in which the agglomeration of R&D personnel fosters further local spinoffs of innovation activity that in turn attract more research-oriented companies and funding to an area.

Of the nearly 6000 industrial R&D labs in the U.S. in 1975, Malecki found 88 percent to be located in 177 SMSA's; urban areas with more than 40 labs were generally found within the Manufacturing Belt. Urban areas in the South and Southwest, on the other hand, contained only a few concentrations of industrial R&D. The urban locations of the greatest R&D agglomerations among major R&D performing firms in 1965 and 1977 together with the number of R&D labs are shown in Table 6.

TABLE 6

LOCATIONS OF GREATEST R&D AGGLOMERATIONS AMONG MAJOR R&D-PERFORMING FIRMS 1965 AND 1977

1965			1977		
Rank	SMSA	Number of laboratories	Rank	SMSA	Number of laboratories
1.	New York-Newark-Jersey City	161	1.	New York-Newark-Jersey City	147
2.	Los Angeles-Long Beach-Anaheim	78	2.	Los Angeles-Long Beach-Anaheim	108
3.	Chicago-Gary	67	3.	Chicago-Gary	81
4.	Philadelphia-Wilmington-Trenton	62	4.	Philadelphia-Wilmington-Trenton	72
5.	Boston-Lawrence-Lowell	51	5.	San Francisco-Oakland-San Jose	64
6.	San Francisco-Oakland-San Jose	45	6.	Boston-Lawrence-Lowell	58
7.	Detroit-Ann Arbor	40	7.	Cleveland-Akron-Lorain	53
8.	Cleveland-Akron-Lorain	33	8.	Detroit-Ann Arbor	52
9.	Pittsburg	30	9.	Pittsburg	31
10.	Houston-Galveston	21	10.	Houston-Galveston	30
11.	Baltimore	20	11.	Milwaukee-Racine	23
12.	Hartford-Springfield	18	11.	Hartford-Springfield	23
13.	Albany-Schenectady-Troy	16	13.	St. Louis	22
13.	Washington	16	13.	Washington	22
15.	Minneapolis-St. Paul	16	15.	Minneapolis-St. Paul	19
16.	Buffalo	14	16.	Dayton	18
17.	St. Louis	12	17.	Cincinnatti-Hamilton	17
18.	Milwaukee-Racine	11	17.	San Diego	17
19.	Dayton	10	17.	Bridgeport-New Haven	17
19.	Denver-Boulder	10	20.	Albany-Schenactady-Troy	16
20.	Indianapolis	10			

Source: Edward J. Malecki, "Recent Trends in the Location of Industrial Research and Development: Regional Development Implications for the United States," in J. Rees, A. J. D. Hewings and H. A. Stafford, *Industrial Location and Regional Systems,* J. F. Bergin, New York (1981) p. 226.

In a series of regression analyses, Malecki found that the number of R&D labs per capita and the number of R&D employees relative to total urban population were associated significantly with the proportion of the workforce employed in manufacturing and the number of research universities in the various SMSA's as well as the dollar amounts of R&D spent at those universities. These two factors in particular, together with the proximity of R&D labs to corporate headquarters, help explain the continued predominance of the Northeastern United States as tehe area of greatest R&D concentration during the 1960's and 1970's. "That region, despite its recent apparent decline in 'other economic' indicators, appears to be maintaining its traditional importance in industrial R&D. Outside the Northeast, the characteristics favorable to industrial R&D are found in relatively few urban areas". (Malecki 1980, p. 19). In a related study, evidence is shown that industrial R&D is evolving away from its dependence on some large city regions, especially New York, though R&D still remains basically a large city activity (Malecki 1981). This apparent decentralization of R&D away from large urban areas like New York, Boston, and Los Angeles to other large cities in the Midwest and the Sunbelt suggests that a critical threshold of indigenous technological capacity required by high-technology industries may by now be available in a greater number of urban areas across the United States. A recent report by the Federal Reserve Bank of Boston (Brown 1983) suggests, however, that increased employment in high-tech industries in the Great Lakes states at least will be only a small part of the answer to that region's economic problems.

GEOGRAPHICAL VARIATIONS IN HIGH TECHNOLOGY INDUSTRIES

Comprehensive analyses of the geography of high technology industries in the United States have been conducted only very recently. Using a large data set on individual plants and companies, Armington and her colleagues (1983) at the Brookings Institution have examined regional differences in the formation and growth of high-technology businesses. Adopting a broad definition of high-technology industries comparable to that included in Table 3 (based on technical employment and R&D expenditures per 4 digit SIC sector), they have found that the distribution of high-technology jobs across the four major Census regions of the U.S. corresponds closely to that of employment in all industries, i.e., high-technology industry was found to be dispersed across the country in rough proportion to the distribution of all industries. This is very different from the pattern for R&D, which does not include the dispersed pattern of branch plants implicit in high-technology industrial production.

Table 7 summarizes the employment growth trends by region over the 1976-80 period for both the high-technology sectors and total industrial activity. The Northeast has 29 percent, North Central 28 percent, South 24 percent, and the West 19 percent of high-technology industry. Since the Brookings study could relate branch plants to their headquarters, they also found that high-technology plants in the southern Census region were owned by out-of-state companies to a far higher degree than such plants in other regions. This tends to confirm the high incidence of branch plants in the South, as suggested by other work, and hence the de jure external control of employment levels in these plants by decision makers in distant locations (Hansen 1980). Table 7 also shows that the two regions with the lowest shares of high-technology industry in 1976 experienced the largest growth rate during the 1976-80 period, disclosing a tendency towards regional convergence. While the South had only a 24 percent share of high-technology employment, its share of growth in these sectors was 42 percent.

The Brookings study also shows that while the Northeast region used to have a large enough share of high growth industries to offset its higher share of low growth manufacturing, the region's advantage in industrial mix had decreased further by 1980, confirming a trend discussed earlier by Rees (1979). Despite its general economic health, the South continued to show only a small share of the high growth industries, in contrast to the western region that displayed a much more favorable industrial mix. The rates of formation of new high-technology firms were also found to be inversely related to regional shares of high-technology in 1976. The North-

TABLE 7

EMPLOYMENT GROWTH SHARES BY REGION 1976—1980

Region	High-Technology Share of Employment	High-Technology Share of Growth	All Industries Share of Employment	All Industries Share of Growth
U.S.	100%	100%	100%	100%
NE	29	11	25	10
NC	28	18	28	22
S	24	42	31	38
W	19	29	17	30

Source: C. Armington, C. Harris, and M. Odle *Formation and Growth in High Technology Industries: A Regional Assesment,* Washington, D.C.: Brookings Institution, 1983.

east and North Central regions had formation rates below the national average, while the South and West had above average rates of business establishments and job creation.

The Brookings study also included a more disaggregated analysis of high-technology development at the metropolitan scale for a sample of 35 SMSA's. Business formations and job creations were related to a number of contextual variables that included the pool of potential entrepreneurs, the costs of doing business (wage rates, utility costs, and local taxes), industrial activity levels, the labor force, the general attractiveness of a city, as well as other regional economic conditions. In their regression analyses, the relative attractiveness of the city both to people and to business (as measured by the rate of population growth in the first half of the 1970's) was the factor most strongly related to urban differences in business formation rates. Though it is generally assumed that a large agglomeration effect exists in the formation of high technology businesses, the Brookings study found no measurable association of high technology business formations with the local employment share in high-tech industries. Indeed, negative relationships were found between growth rates and sector shares, i.e., in areas where the high-technology sector had a relatively large share of total local employment, its growth rate was generally lower than average. As might be expected, however, employment growth in large high-technology firms was seen to be highly responsive to variations in the strength of the local economy and in the supply of technically skilled labor.

Another study undertaken to examine differences in the location of high technology industries also highlights the diverse nature of the high-technology sector (Glasmeier—Hall—Markusen 1983). This study (referred to hereafter as the Berkeley study) uses a different data source than the Brookings study, specifically the 1972 and 1977 Census of Manufactures. The data set does not allow one to address headquarters—branch plant relationships, nor does it include some critical business service sectors discussed earlier. But the Census of Manufactures is generally regarded as the most accurate secondary data set on manufacturing industry.

The Berkeley study uses an entropy index to measure the spatial dispersion of high-technology industries for 100 four digit sectors across all 3,140 counties of the U.S. between 1972 and 1977. Individual high-tech industries show a large degree of dispersion across the U.S., with missiles and space vehicle parts being the most concentrated industry in 1977 and fertilizers the most dispersed. "In the middle range lie many of those high-tech industries which are most innovative and fastest growing. Computers, semi-conductors, biological products, measuring devices, industrial controls, optical instruments and machine tools are all only moderately dispersed compared to the average for all high-tech industries." (Glasmeier—Hall—Markusen 1983, p. 13).

In analyzing the distribution of high-tech industries at the metropolitan scale, the Berkeley study identifies a set of winners and losers of high-tech jobs and plants between 1972 and 1977 using a three-fold division of urban areas: big city SMSA's, adjacent or suburban SMSA's, and independent non-contiguous SMSA's. The middle category of adjacent suburban SMSA's along with the newer big-city SMSA's were more prominent generators of absolute job gain. The top ten net employment winners and losers of high-tech industry between 1972 and 1977 are shown in Table 8, which includes such inevitable SMSA's as San Jose, California (largely synonymous with Silicon Valley) and Anaheim together with Worcester, Mass. Many of the most technology intensive places (with a high proportion of the labor force in high-tech activities) are also among the smallest and medium-sized SMSA's, and are more likely to be found in the Midwest and South than other parts of the country. While most of the top ten metro areas with the highest absolute change in high-tech employment are predictable from popular conceptions (Table 8), some, like Oklahoma City and Lakeland, Florida, may not be. Many of the largest losers in Table 8 may also be predictable: New York City, Cleveland, Baltimore, and Jersey City. But the big losers are not all Frostbelt cities, since Table 8 includes Miami, Florida, and Los Angeles. Furthermore, many of the totals in the list of losers are so small that they could be unduly influenced by recessionary cutbacks in one or two large plants, a factor that could be identified if the data from the Brookings study could be merged with that from Berkeley. The findings of the Berkeley study also suggest that the popularized high-tech war between the states might break down on an east-west rather than north-south axis across the country.

The Berkeley study also attempts the massive task of explaining the location factors behind the complex, dispersed pattern of high-tech jobs around the country using a large number of variables in a series of regression analyses. The variables include labor supply (wage rates, unionization, and unemployment rates), business climate (as measured by the presence of specialized business services, research facilities, and defense spending), infrastructure factors (transportation networks and utility rates), amenity features (cultural amenities, housing prices, pollution levels, mild climates, and good schools) as well as a number of other socioeconomic variables (including minority populations and conservative voting patterns). While regression analyses based on such a large number of variables (19) are always open to question, the complexity of the location patterns is confirmed by the fact that only two variables are related consistently and significantly to various measures of high-tech location patterns, i.e., per capita defense spending and percent black population. The labor force factor plus unionization rates were also found to be significant in some of the analyses. The study therefore reaches an appropriate conclusion that: "these results offer strong support for our view that individual

TABLE 8

THE TOP TEN NET EMPLOYMENT WINNERS AND LOSERS IN HIGH TECHNOLOGY 1972—77

Winners		Losers	
San Jose, CA	31909	New York, NY	-8975
Anaheim, CA	30612	Philadelphia, PA	-8586
Houston, TX	18932	Clevland, OH	-8170
San Diego, CA	16782	Miami, FL	-6584
Boston, MA	15173	Syracuse, NY	-5521
Dallas, TX	12067	Baltimore, MD	-4245
Worcester, MA	9893	Jersey City, NJ	-4062
Oklahoma City, OK	8363	Parkersburg, WV-OH	-3664
Lakeland, FL	8132	Los Angeles, CA	-3220
Phoenix, AZ	7976	Decatur, IL	-3130
Median gain	248	Median loss	-740

Source: A. Glasmeier, P. Hall, and A. Markusen, *Recent Evidence on High Technology Industries' Spatial Tendencies: A Preliminary Investigation,* University of California, Berkeley, 1983.

high-tech industries are highly heterogeneous and display quite disparate spatial tendencies *which can only be understood by analyzing disaggregated sector.*" (Glasmeier—Hall—Markusen 1983, p. 46). Hence a major round of research needs to be done to ascertain the real determinants of the various kinds of high-tech industries.

While the Berkeley study can be criticized for excluding the service sectors and not addressing 1972-77 recessionary job losses that were experienced in over one third of the industries, this type of national study, like its Brookings counterpart, is extremely useful in sorting out some of the realities from the myths surrounding the current attention given to the development of high-technology industries. We need to know more about specific industries and specific areas of high-tech concentration. Despite the fact that the media and other groups keep citing the extraordinary success of Silicon Valley and Route 128, we know very little of the precise historical development of these areas. Recent studies by Dorfman (1983) on Route 128 and Saxenian (1981) are steps in the right direction, though the Saxenian study is more concerned with the dual labor market and other 'contradictions' of Silicon Valley. Documentation and mapping of electronics companies in that study relies on articles in the Los Angeles Times more than other reputable business directories like Dun and Bradstreet and the Economic Census.

TABLE 9

LOCATION FACTORS INFLUENCING NEW MANUFACTURING PLANTS

A. High-Technology and Non-High-Technology Plants

Rank Plants	High-Technology Plants	Non-High-Technology
1	Labor	Labor
2	Transportation Availability	Market Access
3	Quality of Life	Transportation Availability
4	Markets Access	Materials Access
5	Utilities	Utilities
6	Site Characteristics	Regulatory Practice
7	Community Characteristics	Quality of Life
8	Business Climate	Business Climate
9	Taxes	Site Characteristics
10	Development Organizations	Taxes

Source: H.A. Stafford, *The Effects of Environmental Regulations on Industrial Location: Survey of 104 Plants,* Working Paper, University of Cincinnati, 1983.

B. High-Technology Plants According to the JEC Ouestionnaire (1982)

Rank	Selection of Region	Selection Within Region
1	Labor Skills/Availability	Land Availability
2	Labor Costs	State/Local Tax Structure
3	Tax Climate Within Region	Business Climate
4	Academic Institutions	Cost if Property Construction
5	Cost of Living	Transport Availability for People
6	Transportation	Ample Area for Expansion
7	Markets Access	Proximity to Good Schools
8	Regional Regulatory Practices	Proximity to Amenities
9	Energy Costs/Availability	Transport Facilities for Goods
10	Cultural Amenities	Proximity to Customers

Source: John Rees and Howard Stafford, *A Review of Regional Growth and Industrial Location Theory: Towards Understanding the Development of High-Technology Complexes in the U.S.*, Washington, DC: U.S. Congress, Office of Technology Assessment, 1983.

In a background paper for the on-going study by the Congressional Office of Technology Assessment on Innovation and Regional Economic Development, Rees and Stafford (1983) examine the location factors that influence high-technology industries. Locational variables include those related to the friction of distance as well as those related to the attributes of areas: labor availability and cost (considered the most important determining factor in many studies); access to and quality of academic institutions; quality of life and other amenity variables; access to markets, materials, and various transportation networks; taxes and access to development capital. Table 9 shows the relative importance of the ten most important factors that influence the location decisions of high-tech plants, compiled from two different primary data sources. The sources include an open-ended survey by Stafford (1980) of factors influencing decision makers in their choice of high-tech and non high-tech plant sites as well as a survey by Congress' Joint Economic Committee (JEC) (1982) that asked respondents to rank specific location factors. Despite differences in the methodologies of the two studies and regardless of the scale of the location decision, labor stands out in both studies as the most important industrial location determinate. While no issue is more debated than the influence of local taxation on site selection, the JEC survey (contrary to most other studies) indicates that taxes are the second most important locational determinant of high technology firms. Stafford's survey, on the other hand, places taxes as a minor locational variable; a difference that may be attributable to differences in the survey design. While the JEC study asked an explicit question about taxes, Stafford simply asked respondents to list relevant factors. Stafford contends that taxes are perhaps as much an emotional issue as a financial issue influencing decision makers.

TABLE 10

CHANGES IN HIGH-TECH JOBS FOR SELECTED STATES 1975–79
(IN THOUSANDS)

State	Employment 1979	Employment Change 1975–79	% Change 1975–79
California	574.9	154.3	36.7
Massachusetts	222.0	54.4	32.5
Texas	143.6	48.0	50.2
Florida	98.3	37.4	61.4
New York	375.0	32.7	9.6
Minnesota	104.8	29.0	38.3
North Carolina	83.7	28.7	52.2
Arizona	57.8	20.5	55.0
Colorado	53.1	20.1	61.0
Michigan	92.3	18.6	25.2
New Hampshire	36.5	16.1	79.0
New Jersey	182.2	15.2	9.1
Connecticut	94.4	14.4	18.0
Pennsylvania	209.9	13.3	6.8
Ohio	161.9	13.0	8.7
Illinois	242.5	12.6	5.5

Source: U. S. Congress, Joint Economic Committee, *Location of High Technology Firms and Regional Economic Development,* Washington, D. C.: U. S. Government Printing Office, 1982.

The JEC study also looked at changes in high-tech jobs between 1975 and 1979, and, at the state level, arrives at conclusions similar to the more recent Brookings study. The JEC study defined high-tech in a highly aggregated manner, including five 2 digit SIC sectors but excluding any service sector.[1] Inter-state comparison is included in Table 10, the order of the states reflecting their absolute job gains between 1975 and 1979. Keeping in mind that this was generally a time of economic recovery from the Great Recession of 1975, some striking patterns emerge. California experienced an absolute growth in high-tech jobs three times the size of its nearest rival, Massachusetts. The seven leading SMSA's listed in the Berkeley study as high-tech winners (Table 6) are also located in the top three states in the JEC study. Table 10 also shows that though the growth rate in high-tech jobs is low in many of the older states of the Northeast and Midwest (New York, New Jersey, Pennsylvania, Ohio, and Illinois), the absolute amount of high-tech jobs in these states in 1979 was higher than for any other state but three (California, Massachusetts, and Texas). The fact that these older industrial states have a large number of high-tech jobs already shows that they should by no means be written off as having no potential for further high-tech development.

THE SPREAD OF NEW TECHNOLOGY IN AMERICAN INDUSTRY

If we know very little until recently about the incidence of high-technology industries in the U.S., we know even less about the spread of new technology across various industries and regions of the country. Though economists like Mansfield (1972, 1977) and Gold (1977) have undertaken numerous studies of the adoption and diffusion of industrial innovations over time, they have ignored the geographical dimension to this diffusion process. Likewise, though geographers have a long tradition of concern for the innovation diffusion process, their research has focused on consumer rather than industrial innovations (see Hägerstrand 1952; Brown 1980).

As a step towards understanding more about regional differences in innovation potential in the United States, a recent study of the spread of new computerized production processes in the machinery industries by Rees, Briggs and Oakey (1984; see also Rees—Briggs—Hicks 1984) relates the adoption of these innovations to a number of variables: sectoral, organizational, and geographical. A detailed survey of over 600 manufacturing plants in the machinery and electronics industries (SIC 35 and 36) shows some interesting differences in the adoption rates of these new technologies, which included computerized numerical control (CNC) systems, the use of computers in commercial, design, and manufacturing activities, programmable handling systems, and the use of microprocessors in final products. Many of the patterns are intuitively predictable from conventional economic theory; but some are not.

Plants belonging to multi-plant firms, with their increased economies of scale and financial flexibility, were much more likely to adopt these new production technologies than plants that represented single plant firms. For NC machines, e.g., the use of computers in design and manufacturing and for programmable handling systems, adoption rates among multi-plant firms were double those for single plant firms. Such a finding was contrary to the popularized notion that small, single plant firms are relatively more innovative than their larger counterparts for all kinds of technologies; and also points out the importance of distinguishing between product and process innovations, particularly since small firms specialize more in new product technology. Similarly, larger plants had much higher adoption rates than smaller ones, and plants with R&D capability on site or at some other site within the firm had much higher adoption rates than plants with no R&D on site. In fact, 505 plants or 80 percent of the total performed some kind of R&D on site, a proportion higher than expected.

The findings on age of plant (summarized in Table 11) showed the least expected and perhaps the most provocative findings to come out of the study. Table 11 illustrates that in plants built in or before 1939, 57 percent had adopted CNC by 1982, whereas in plants built between 1970 and 1981 only 27 percent adopted CNC. The statistical significance refers to a chi square analysis performed on the absolute counts per cell. Non-programmable handling systems show no statistically significant differences by age of plant because they include a variety of conventional, mechanical handling systems that tend to be used in most manufacturing plants. On the whole, however, Table 11 shows that older plants are more likely to adopt new process technologies than newer ones. Indeed, a progressive inverse relationship exists between the age of plants and their propensity to adopt new technologies. Such results indicate that for a key part of the durable good sector, the older manufacturing plants across the country have been retooling to remain competitive. Much of this retooling can be explained by the fact that most of the new technologies are discrete units that can be introduced into a plant in an incremental fashion without a massive reorganization of total plant layout.

TABLE 11

ADOPTION RATES BY AGE OF PLANT

	1939 or before	1940—49	1950—59	1960—69	1970—81	Sig.
NC	59	52	41	33	28	.0001
CNC	57	46	45	37	27	.0001
Computer for commercial	79	70	67	62	58	.009
Comp. for design	41	30	23	18	14	.0001
Comp. for Mfg.	58	57	45	40	30	.0001
Prog. handling	9	16	6	5	2	.003
Non-prog. handling	34	49	49	48	46	.150
Micro. proc. in product	31	28	21	28	19	.183
Total number of respondents	111	63	109	181	150	

Source: John Rees, Ronald Briggs, and Raymond Oakey, "The Adoption of New Technology in the American Machinery Industry," *Regional Studies,* Dec. 1984.

The results clearly imply that older plants in the United States cannot be written off as users of out-dated technology, and suggest the inherent potential such firms have to increase their technological sophistication. One other explanation for the results of Table 11 may lie in consolidation or rationalization procedures among multi-plant companies. During recessionary periods in particular, this process does go on, but it is doubtful whether such processes could go on with such magnitude to influence the results shown in Table 11.

When adoption rates are compared by region of the country, statistically significant differences only appear for two of the eight technologies studied. Yet there are some important regional differences in the adoption rates for various innovations. Regional differences in the adoption of CNC are indeed statistically significant, with the North Central region showing an adoption rate of 47 percent, the Northeastern region 41 percent, the West 37 percent, and the South 28 percent. The high rate for the North Central region is not surprising, given its historic role as the center of the machine tools industry. It is the older industrial regions of the North Central and Northeastern parts of the Manufacturing Belt that display the highest propensity to use new production technology, not the growth regions of the South and West. Thus, the innovation capacity of the older industrial heartland should not be overlooked in any attempt at reindustrialization or economic recovery that may be initiated at the federal or state level. These findings also gain support from a study by the Urban Institute on the age structure of regional plant and equipment. "Data on the age of machine tools provides a different picture of the regional distribution of old capital... The Frostbelt maintained a lead in the percentage of the technologically-superior machine tools (CNC)... The evidence thus suggests that at least for this one important category of equipment the Frostbelt is at least as modern as the Sunbelt... This strong bias in the distribution of NC tools in favor of the Frostbelt is important in assessing the relative competitiveness of the various regions." (Hetten 1982).

In this diffusion study, Rees and his colleagues (1984) examine differences in the adoption rates for the new technologies among regions, controlling for differences in industry size, organizational status, R&D intensity, age, and size of plants. Regional adoption rates by organizational status of plants are shown in Table 12, and statistically significant differences between regions are evident among single plant firms adopting these key technologies: numerical control, CNC, and microprocessors in the final product. It is no coincidence that in the case of NC and CNC, most of the early development work was spawned in the Manufacturing Belt; whereas for the use of microprocessors in products, Massachusetts and California firms appear to have been the most progressive in the development of mini and micro computers. For smaller single plant firms, therefore, the pattern of Table 12 suggests a distance decay or local spread effect in adoption patterns, i.e., adoption rates are lower in regions furthest removed from the spawning grounds of these leading edge technologies. The same type of regional differences in adoption rates among the larger multi-plant firms do not show up in Table 12, reflecting the ability of these organizations to spread new production technologies throughout a regionally dispersed corporate system. The results of Table 12 do suggest however that policy makers at the state or federal level who are interested in nurturing small businesses should give some consideration to a technical assistance or technology transfer program that encourages the spread of new technologies among small firms.

TABLE 12

REGIONAL ADOPTION RATES BY ORGANIZATIONAL STATUS

		NE	NC	S	W	Prob.
NC	SPF[1]	27	31	11	17	.02*
	MPF[2]	55	60	49	53	.47
CNC	SPF	37	37	16	13	.004*
	MPF	47	56	38	60	.06
Computer for commercial	SPF	54	58	47	43	.36
	MPF	70	80	76	80	.52
Comp. for design	SPF	17	9	10	15	.49
	MPF	31	36	32	34	.93
Comp. for Mfg.	SPF	38	32	20	15	.07
	MPF	57	60	52	55	.76
Prog. handling	SPF	3	2	0	3	.37**
	MPF	10	12	7	19	.35
Non-prog. handling	SPF	37	35	47	47	.30
	MPF	43	49	61	55	.22
Micro. proc. in product	SPF	33	16	11	20	.01*
	MPF	29	38	27	27	.33

[1]Single-plant firm
[2]Multiplant firm
*Statistically significant (using chi square).
**More than 20 percent of cells have expected counts less than 5.

Source: J. Rees, R. Briggs and R. Oakey, *op. cit.*

The labor and policy implications of new technology

At a time of cyclical stress and structural change in the economy, it is inevitable that attention be given in policy and media circles to issues of job potential for the future. Given the traditional definition of tecnological change as the substitution of capital for labor, it is also inevitable that job displacement be a central focus of attention at this time. Congress' Office of Technology Assessment, for example, recently launched a study of "Technology and Structural Unemployment: Retraining Adult Displaced Workers." The costs and benefits of employment policy are destined to be of central concern to government at least for the rest of the decade.

Recent projections by the Bureau of Labor Statistics (Riche—Hecker—Burgan 1983) suggest that the high technology industries will account for only a small proportion of new jobs through 1995. Employment in the high-tech sectors increased faster than all wage and salary employment between 1972 and 1982, and BLS projections indicate this will continue to be the case through 1995. Between 23 and 29 million new jobs will be created between 1982 and 1995, and between 1 and 4.6 million of these jobs are projected to be in the high-tech industries, i.e., most new jobs will be in non high-tech sectors. "Displaced workers and others seeking jobs, and governmental and community organizations seeking to attract jobs to their regions, would be well advised not to limit their search to high-tech industries only." (Riche—Hecker—Burgan 1983, p. 54).

One major factor that is destined to hamper the ability of high-tech industries to provide jobs for displaced workers is the occupational composition of many high-tech industries. They are significantly different from other manufacturing industries that have suffered in recent years, resulting in a 'mismatch' problem between the supply and demand for labor. Furthermore, workers in the technology oriented occupations generally need specialized post-high school education in some field of technology, with a rigorous high school preparation in science and mathematics as a prerequisite. BLS also examined the distribution of high-technology employment in three key states—California, Michigan, and Texas—and found that most jobs were located in the largest metropolitan areas: Los Angeles, San Jose, Dallas, Houston, and Detroit in these particular states.

Another issue getting considerable attention is the impact of factory automation, particularly robotics, on the labor market. Many believe that the 'steel-collar worker' will have a major impact on the American labor force, leading to the elimination of around one million factory jobs by 1990 according to one estimate by researchers at Carnegie Mellon University. A study on "Robotics and the Economy" by the staff of the Joint Economic Committee (1982) has a more optimistic outlook. They estimate the number of jobs that could be performed by robots in 1990 at less than 10 percent and probably less than 5 percent of all jobs. For workers displaced by robots, the JEC study suggests that almost all would be spared unemployment because of retraining and retirement. They also see robot production as having a positive effect on real economic growth, and hence total employment, in the long run. In this regard it is fairly easy to ignore the jobs creation potential of the robotics industry, leading to a positive job multiplier in computing equipment, electronics, and particularly service sectors like software.

Regional differentials in the process of job creation and displacement due to factory automation are not known to date, though undoubtedly some will exist. The concentration of the machinery industries in the industrial Midwest and the Great Lakes states makes it feasible to suggest that this area in particular will be prone to a high degree of structural unemployment in the future. The continued introduction of computerized numerical control of machinery (CNC) in the Midwest (see Table 12) is one factor that will effect jobs displacement in that region. Indeed it has been suggested that the critical shortage of skilled labor even in the industrial Midwest will serve as an incentive for companies to continue their automation plans during expansionary phases of the economy.

A study of federal options towards displaced workers by the Congressional Budget Office (1982) examines two alternative forms of federal aid: readjustment services to help workers adapt to changed labor markets; and income assistance. Readjustment services would include job-search assistance, training, and relocation aid. Policy options also were examined recently by the National Academy of Sciences' Committee on National Urban Policy in their initiative to rethink urban policy (Hansen 1983). In its review of various strategies for increasing worker mobility, the National Academy Committee looked at the need to establish a national job information system and a displaced worker relocation program. The Canadian Job Bank System was viewed as one example of a well-designed mobility assistance program. A national policy on labor mobility that facilitates the matching of workers and jobs and reduces barriers to worker mobility was therefore one major recommendation of the National Academy Committee on Urban Policy. Other recommendations include:

—sectoral policies or strategies that encourage capital to flow to the more efficient economic sectors;
—policies that promote the maintenance of urban infrastructure;
—policies that encourage private investment in activities that accelerate transitions in local economies; and
—policies that promote investments in urban education systems to improve both basic skills and continuing education to maintain a labor force that can adapt more readily to continuing changes in the economy.

In this regard the National Academy Committee took a broad definition of urban policy: "Ultimately, urban policy should not be a discrete package of programs—a shopping list of federal grants and loans—but rather a long term strategic perspective on a wide range of public policies at each level of government." (Hansen 1983, p. 3). This also seems to be the appropriate policy context in which to monitor the links between technological change and urban-regional development as the national economy continues to change in coming years.

Notes

[1] The sectors were SIC 35 machinery, 36 electric and electronic equipment, 37 transportation, 38 instruments, and 28 chemicals. Most of the 3 digit sectors in Table 3 are included in these five sectors.

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REGIONAL INDUSTRIAL DEVELOPMENT IN THE USA: EMPIRICAL TRENDS, GEOGRAPHIC PROCESS, AND GOVERNMENT POLICY*

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KEY-WORDS: *development,* geographic expansion of ~, hierarchical ~, industrial ~, peripheral ~, regional ~; *employment* trends; *functional* restructuring; *geographic* redistribution; *government* policies; *manufacturing* locational shifts, ~ decentralization; *technology* adoption.

Introduction

Paradigms that describe the evolving geographic pattern of economic development within nations postulate a leading core, lagging periphery stage of growth that is followed by a stage of expansion to the periphery as the nations achieve a high level of development (Friedman 1963; Hirschman 1958; Myrdal 1957). As the more equitable geographic distribution of development takes place during this expansion stage, core regions tend to experience decreasing per capita growth rates in several economic indicators while peripheral areas experience increasing rates. The different growth rates are a normal phase in the economic development of a nation and can be explained by the process that accounts for the geographic expansion of development. Thus, a period of stagnating growth in core areas is a necessary condition to achieve the more equitable distribution of economic development in peripheral areas and eventually the nation as a whole.

The process by which the geographic expansion of development takes place to cause the final integration of national economies, however, has been the subject of speculation and debate. Some theorists propose that it occurs as a consequence of the growth of a nation's hierarchical system of cities through which development-inducing impulses are diffused both spatially and temporally from the major metropolitan center in the core to regional metropolitan centers, down the urban hierarchy within each region and then outward from the individual urban centers into their surrounding fields of influence eventually to integrate the most peripheral locations (Berry 1972; Berry—Kasarda 1977; Friedman 1972; Pederson 1970). Other theorists propose that the expansion stage results from hinterland spread effects that eventually counterbalance and overcome the polarizaton effects created by the cumulative agglomeration economies that produced the core-periphery structure in the first place (Hirschman 1958; Myrdal 1957; Richardson 1973; Vining 1982). Economic development spreads out from the core into the surrounding hinterland, slowly at first and then at an increasing rate before leveling off as the national space economy becomes fully integrated.

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Advocates of both processes agree that economic development is primarily transmitted by the dispersal or decentralization of manufacturing from core to peripheral areas. Both groups of theorists also agree that government policies can speed the development of backward, underprivileged and problem regions. It is clear, however, that more effective policies could be derived from a more accurate specification of the actual development expansion process.

That the United States and many other industrial nations have passed into a different stage of development is hardly contested by most researchers dealing with the topic. Industrial production in many countries has been undergoing a geographic redistribution at both interregional and intraregional scales for several decades. In the United States, manufacturing has been decentralizing from the Northeast and North Central regions to the South and West and from metropolitan centers to suburban sites, small cities, towns, and rural areas (Berry—Kasarda 1977; Cromley—Leinbach 1981; Erickson 1976a, 1976b, 1981; Erickson—Leinbach 1979; Erickson—Wasylenko 1980; Fuguitt—Beale 1984; Garnick 1983, 1985; Hansen 1979; Heaton—Fuguitt 1979; McCarthy—Morrison 1977; Moriarty 1980, 1981, 1983, 1986; Norton—Rees 1979; Park—Wheeler 1983; Rees 1979; Schmenner 1982; Struyk—James 1975; Till 1973; Zelinsky 1962). Decentralization has been observed in other countries as well (Barta 1984; Dennis 1978; Dicken—Lloyd 1978; Holmes 1983; Keeble 1978, 1980; Level 1975; Massey 1982; Massey—Meeghan 1978; Schroder—deSmidt—Staring 1984; Watts 1982). While there is general agreement that significant decentralization of industrial production has taken place, there is disagreement concerning the relative importance of the different factors responsible for the decentralization. Some researchers stress the state of technological progress in different industrial sectors. Others stress the reduction of factor costs, particularly labor costs. Still others stress firm reorganization to improve or maintain market share under conditions of growing international competition and uncertainty. A way of dealing with the problem is to consider industrial decentralization in the context of an ongoing process in which all three forces are not only related, but, in turn, are influenced by changing economic conditions and government policy.

The first section of this paper will review the interregional and intraregional shifts in the location of U.S. manufacturing employment. The next section will examine capital investment trends involved in the restructuring of manufacturing firms' functional operations and the adoption of new process technology. The following section will present a conceptual model interrelating manufacturing locational shifts, firm functional restructuring, and technology adoption. The final section of the paper will review government policies that have contributed to the decentralization of manufacturing and outline a policy designed to direct the location of industry to promote balanced growth and economic development.

Manufacturing locational trends

INTERREGIONAL LOCATIONAL TRENDS

As a region progresses through the stages of development, one of the most noted transformations that takes place is the change in the major employment sectors for the economy: from a high dependence on employment in the primary sector (mainly agriculture) to a steadily increasing dependence on employment in the tertiary sector (Table 13). Fifty years ago nearly 25 percent of the U.S. labor force was engaged in primary activities while 53 percent was engaged in tertiary activities. One hundred years ago nearly 50 percent was engaged in primary activities while less than 30 percent was engaged in tertiary activities. More recently, in 1980, only 4 percent of the labor force was employed in the primary sector while 74 percent was engaged in the tertiary sector (including construction in this analysis). Throughout the past 50 years the number of manufacturing workers fluctuated between 21 and 28 percent of the labor force. The growth in tertiary employment closely coincided with the decline in primary employment until the past decade, when primary employment stabilized and tertiary growth became associated with a decline in manufacturing growth.

The U.S. Manufacturing Belt (New England, Middle Atlantic, and East North Central regions), in comparison with the more peripheral southern and western regions of the country, exhibited considerable differences over the past half century in the composition of their labor forces (Figure 1). Primary activities accounted for a greater share of employment in the southern and western regions taken together than in the Manufacturing Belt. The Manufacturing Belt, on the other hand, always has had a considerably greater share of its work force employed in manufacturing than the rest of the country: 28 percent in the Manufacturing Belt and 16 percent in the rest of the country in 1930, for example. The Manufacturing Belt also maintained a greater share of employment in tertiary activities until the 1940s, when a structural change occurred there resulting in the southern and western regions having a higher proportion of workers engaged in tertiary employment. And, while the gap between the share of manufacturing workers in each region's labor force has been narrowing over the decades, 27 percent of the Manufacturing Belt's workforce was still engaged in manufacturing activities in 1980 compared to 19 percent in the rest of the country.

The geographic distribution of manufacturing employment in the U.S. by 1980 could still be characterized as spatially concentrated in the Manufacturing Belt even though slightly less than half of the manufacturing labor force reported being located there. The dominance of the Manufacturing Belt, however, has been on the wane for decades as new manufacturing growth has dispersed more equitably throughout the country. Whereas 64 percent of the nation's manufacturing labor force was located there a half century ago, it contained 49 percent in 1980, representing a decline of 15 percentage points.

When manufacturing employment changes are compared to population changes in each census region of the country, the relative declines in manufacturing employment in the Manufacturing Belt census regions have been considerably greater than the relative declines in their populations. The most important trend shown by this comparison is the equalization of manufacturing

TABLE 13

LABOR FORCE IN U. S. REGIONS: 1930—1980
(in Thousands)

Region	1930	1940	1950	1960	1970	1980
			Primary Sector			
New England	236	180	152	97	77	80
Middle Atlantic	949	710	529	344	247	291
East North Central	1,607	1,391	1,167	746	491	516
Manufacturing Belt	*2,729*	*2,281*	*1,911*	*1,187*	*815*	*887*
South Atlantic	2,138	1,821	1,528	823	518	545
East South Central	1,872	1,583	1,227	581	284	296
West North Central	1,723	1,542	1,381	946	618	611
West South Central	1,917	1,622	1,183	721	534	716
Mountain	525	441	399	313	263	374
Pacifice	623	561	556	413	380	474
Periphery	*8,798*	*7,570*	*6,274*	*3,801*	*2,597*	*3,016*
Total U. S.	11,590	9,851	8,185	4,988	3,412	3,903
			Manufacturing Sector			
New England	1,099	1,158	1,381	1,479	1,541	1,606
Middle Atlantic	2,950	2,995	3,902	4,235	4,274	3,814
East North Central	2,682	2,909	4,167	4,664	5,361	5,120
Manufacturing Belt	*6,731*	*7,062*	*9,450*	*10,378*	*11,176*	*10,540*
South Atlantic	1,087	1,248	1,623	2,134	2,789	3,222
East South Central	470	489	685	930	1,277	1,437
West North Central	745	550	818	1,035	1,250	1,450
West South Central	566	399	644	915	1,286	1,770
Mountain	187	101	161	295	385	597
Pacific	692	586	1,019	1,788	1,172	2,722
Periphery	*3,747*	*3,373*	*4,950*	*7,097*	*9,159*	*11,198*
Total U. S.	10,478	10,435	14,400	17,475	20,335	21,738
			Tertiary Sector			
New England	1,996	2,043	2,359	2,459	3,171	4,019
Middle Atlantic	6,736	7,393	8,122	8,494	10,065	11,528
East North Central	5,524	5,773	7,129	7,907	9,749	12,109
Manufacturing Belt	*14,256*	*15,209*	*17,610*	*18,859*	*22,985*	*27,656*
South Atlantic	2,663	3,566	5,151	6,075	8,088	12,132
East South Central	1,275	1,623	2,187	2,395	2,888	3,913
Wesr North Central	2,437	2,791	3,352	3,604	4,326	5,628
West South Central	1,907	2,514	3,555	4,041	5,026	7,678
Mountain	639	864	1,341	1,736	2,324	3,937
Pacific	2,155	2,772	4,422	5,201	7,197	10,362
Periphery	*11,076*	*14,130*	*20,008*	*23,052*	*29849*	*43,650*
Total U.S.	25,332	29,339	37,618	41,911	52,834	71,306
Toltal All Workers	47,400	49,625	60,203	64,374	76,581	96,947

The tertiary sector labor force includes the remainder of the labor force exclusive of primary and manufacturing workers. Date are for the continental U. S. only.

Source: Compiled by author from U. S. *Census of Population.*

FIGURE 1 *Census regions and geographic divisions of the United States*

employment and population in every region of the country. The relationship suggests a growing tendency for industrialists to locate their plants close to their markets. Such a conclusion may be correct for some industries and firms but premature in the case of others.

A substantial portion of the employment shifts that occurred in the major sectors of the economy over the past decades was caused by changes in the nature of the demand for each sector's products and services and changes in the relative productivity of each sector (Moriarty 1981, 1986). Manufacturing employment is likely to grow or wane in a region compared to other major employment sectors because of changes in the level of affluence of the region's consumers and industry's success in achieving productivity gains or new product innovations.

INTRAREGIONAL LOCATIONAL TRENDS

Not only has the dispersement of manufacturing occurred between regions of the country, but it has occurred within regions as well. In 1947, 11.5 million manufacturing workers were employed in the 245 metropolitan centers of the country existing in 1980 (75 percent of the total number of manufacturing workers). Of the total number of manufacturing workers in the country, 7.4 million (48 percent) were employed in metropolitan central cities while 4.1 million (27 percent) were employed in suburban locations. In 1967, 7.1 million workers (36 percent) were employed in the central cities and 8 million workers (41 percent) were employed in the suburbs. The remaining workers were employed in smaller urban centers and rural communities. While the central cities declined slightly in their total amount of manufacturing employment, the suburban areas nearly doubled their number of workers to overtake central cities as the main source area for manufacturing jobs. The Manufacturing Belt and the remainder of the country differred considerably in the employment shifts that took place between their central cities and suburbs. While metropolitan areas in both regions grew considerably in their number of manufacturing jobs, the 110 central cities in the Manufacturing Belt declined by a total of 809,000 workers, while the 135 central cities in the rest of the country grew by a total of 516,000 workers. The suburbs grew by 2,045,000 in the Manufacturing Belt and 1,857,000 workers in the rest of the country. Between 1967 and 1977, the central cities of the Manufacturing Belt lost an additional 1,300,000 manufacturing workers, while those in the peripheral regions gained 222,000. Over 80 percent of the job losses occurred in the 33 metropolitan areas of the country with 1970 populations in excess of one million people. The data reveal that manufacturing, at one time, was primarily a metropolitan central city function, but that is has been dispersing outward into the suburbs for some time, more so in the Manufacturing Belt than in the rest of the country.

The average percetage of the total labor force residing in nonmetropolitan areass that were employed in manufacturing has been increasing for some time also—from an average of 13.7 percent in 1950 to 20.6 percent in 1970. The portion of the labor force residing in nonmetropolitan areas employed in industrial sectors paying above average wage rates for the nation as a whole nearly doubled between 1950 and 1970 (from 5.9 percent to 11.5 percent) while the proportion working in sectors characterized by low wage rates (food processing, textiles, apparel, lumber, and furniture) increased only slightly (from 7.9 percent to 9.1 percent). Manufacturing employment increased by 4.4 percent in metropolitan areas of the country during the decade of the 1960s whereas nonmetropolitan counties increased by 23.8 percent. In the decade of the 1970s, metropolitan areas increased by 7.3 percent and nonmetropolitan counties by 20.3 percent (Fuguitt—Beale 1984).

Nonmetropolitan areas in the Sunbelt had a larger proportion of their resident labor force employed in manufacturing by 1970 than did similar areas in the Frostbelt that includes states in the northern Pacific, Mountain, and Central regions along with the Manufacturing Belt states (24.8 percent compared to 17 percent). Thus, nonmetropolitan areas of the Sunbelt contained a higher proportion of manufacturing workers in their labor forces than did the southern and western region as a whole, while nonmetropolitan areas in the Frostbelt had a lower proportion than the Manufacturing Belt did as a whole. The data indicate that manufacturing was more dispersed in small towns and rural areas of the Sunbelt but continued to maintain a strong attraction for metropolitan areas of the Frostbelt. The proportion of low-wage industry workers residing in nonmetropolitan areas of the Frostbelt throughout the 1950s and 1960s was relatively small and tended to remain stable at 5.5 percent. The low wage proportion in the Sunbelt was twice as large and grew from 10.6 to 13.7 percent. A sizable increase occurred in the proportion of high wage industry workers residing in Sunbelt nonmetropolitan areas; the proportion nearly tripled from 4.0 to 11.1 percent of the labor force. In Frostbelt nonmetropolitan areas, high wage industry workers increased from 7.6 to 11.7 percent of the total labor force. Evidence indicates that intraregional decentralization trends continued throughout the decade of the 1970s but slackened in the 1980s (Garnick 1985).

PRODUCTION AND NONPRODUCTION WORKER LOCATIONAL TRENDS

During the three and one-half decades following World War II(1947—1982), manufacturing employment in the United States grew by 4.73 million jobs (Table 14). The Manufacturing Belt experienced a net loss of 0.78 million jobs, while the rest of the country experienced a net gain of 5.51 million workers. For the country as a whole, 90 percent of the entire net growth in manufacturing employment was in nonproduction workers, mostly salaried workers engaged in management, supervision, sales R&D, and other support activities. Only 10 percent of the net jobs were gained in wage earners directly involved production. Nonproduction workers accounted for 17 percent of manufacturing employment in 1947, 28 percent in 1967, and 35 percent in 1982.

An important difference, however, occurred throughout the period in the growth of production and nonproduction workers between the nation's two major regions. While the Manifacturing Belt registered a total employment loss of 0.78 million workers, the loss represented a decline of nearly 2.5 million production workers but a gain of 1.7 million nonproduction jobs. The Manufacturing Belt for sometime up until the 1981—1982 recession had been more than compensating for net losses in production workers by net gains in nonproduction workers. Data also reveal the total net substitution of durable goods manufacturing employment for nondurable goods employment in the Northeast between 1950 and 1980: durable goods employment increased by 656,200 workers, while nondurable goods employment declined by 544,053 jobs. The 5.5 million worker gain realized by the rest of the country over the 1947—1982 period was nearly evenly divided, with a slightly greater increase in production workers comprated to nonproduction workers. During the first two decades of the period, production jobs accounted for 61 percent of the growth in the country outside the Manufacturing Belt. During the more recent decade and one-half, production jobs accounted for 40 percent of the net growth. By 1982, approximately 10 percent of the Manufacturing Belt's total workforce was employed in nonproduction manufacturing jobs compared to 6 percent of the workforce in the rest of the country.

The data reveal that since 1947 production workers have become more evenly distributed throughout the country whereas nonproduction workers, while increasing in numbers throughout the country, became more concentrated in the Manufacturing Belt. The data further reveal

TABLE 14

CHANGES IN MANUFACTURING EMPLOYMENT BY TYPE AND REGION 1947—1982
(in Thousands)

	1947—1967			1967—1982			1947—1982		
Region	Total Employment Change	Production Worker Change	Nonprod. Worker Change	Total Employment Change	Production Worker Change	Nonprod. Worker Change	Total Employment Change	Production Worker Change	Nonprod. Worker Change
Manufacturing Belt	1,396.0	-144.3	1,540.3	-2,176.7	-2,323.4	146.7	-780.7	-2,467.7	1,687.0
Other United States	3,535.2	2,155.9	1,379.3	1,973.9	778.9	1,195.0	5,509.1	2,934.8	2,574.3
Total United States	4,931.2	2,011.6	2,919.6	-202.8	-1,544.5	1,341.7	4,728.4	467.1	4,261.3

The Manufacturing Belt includes the New England, Mid-Atlantic and East North-Central Census regions.
The other United States includes the remaining six continental U. S. census regions.

Source: Compiled by Author from U. S. *Census of Manufacturers*.

that, within each region, nonproduction employment grew more steadily in large urban centers while production employment tended to rgrow more in smaller settlements.

The principal theme of industrial development in the U. S. for sometime has been decentralization from and within enstablished manufacturing districts to more peripheral locations. Formerly, low wage industry dominated the pattern of dispersal. More recently, traditional high wage industries have taken part in the decentralization. The empirical trends are evidence of the capital restructuring different industrial sectors as manufacturing firms trade-off the comparative advantages different size settlements in differents regions of the country for different manufacturing operations to maintain a competitive stance in national and global markets.

Capital investment trends

RESTRUCTURING TRENDS

While manufacturing has been decentralizing, industry has been undergoing a change from having a significant proportion of employment in single-plant establishments operated by production-oriented proprietors and managers to having multinational-multiplant firms operated by financially-oriented managers as the main generators of manufacturing employment. Multiplant firms employed 76 percent of the country's manufacturing workforce in 1982, up 20 percent from 1947. A much greater share of this increase in employment was in nonproduction jobs comprated to the share of similar jobs in single plant firms. By 1982, an average of 67.2 employees in each multiplant facility were nonproduction workers, almost double the 1947 average. Only 4.4 employees in single plant facilities, on the average, were nonproduction workers, nearly one less than in 1947. Multiplant firms, on the other hand, accounted for only 23 percent of the total number of manufacturing facilities in the country in 1982, up from their 15 percent share in 1947. Thus, the growth of a relatively small nimber of large corporations was at the expense of a large number of small firms.

A survey of plants newly opened between 1972 and 1978 by 410 *Fortune 500* companies revealed 58 percent produced a single product only for distribution to all the firms' markets and 9 percent were process plants producing components for distribution to other plants belonging to the firms (Schmenner 1982). Only 31 percent manufactured multiple products for a specific market only. Between 1972 and 1978, 535 major margers took place among U. S. manufacturing firms (mergers in which the acquired assets were greated than 10 million dollars, Federal Trade Commission 1981). Conglomerate mergers, involving the diversification into new product lines to spread risk and even-out profit cycles, accounted for the largest number of acquisitions (69 percent). Horizontal mergers between firms producing the same products to improve market share while simultaneously eliminating competition involved 23 percent of the total. Eight percent were vertical mergers to increase control over more sources of supply or over the distribution of allied product lines.

During the same period, American firms were establishing production facilities abroad. IN 1950, total U. S. direct investment in manufacturing in offshore locations amounted to only 3.9 percent of the fixed capital invetsment in domestic locations. By 1977 the ratio had reached

9.4 percent, and 1,841 U.S. multinational corporations owned a majority share in 9,702 offshore affiliates with half owning two or more separate facilities (Bureau of Economic Analysis 1981). American parent firms employed 17.1 million workers overall: 11.8 million in the U.S. (59.4 percent of the nation's manufacturing workers) and 5.3 million abroad, or nearly one-third of their total workers. The largest investments were in Canada, followed by the United Kingdom and West Germany. Between 1972 and 1979, a sample of 1,900 joint venture agreements between U.S. firms and firms from other countries resulted in the creation of 322 new facilities (Federal Trade Commission 1972-1979). The data reveal that the majority of ventures resulting in new facilities were with Western European firms (25 percent) followed by Japan (10 percent). Australia and New Zealand accounted for the location of 34 percent of the new facilities established by the ventures, followed by Western Europe (26 percent) and Japan (22 percent). Only 15 percent of the ventures resulted in new facilities being established in the U. S., indicating that American firms were largely responsible for promoting the agreements.

The empirical findings reveal the dynamic growth of a relatively small number of large firms that occurs through a process of adoption of new product lines (along with the expansion, contraction or divestiture of existing lines) and the geographic expansion of the firms into new markets. As a consequence, such firms are constantly restructuring their functional operations affecting linkages among their facilities, customers, suppliers, and subcontractors. The restructuring has manifested itself geographically by a redistribution of labor in which the Manufacturing Belt has spun-off lower income production jobs to other regions of the country while growing in higher income external control and support functions and higher value manufacturing.

PRODUCTIVITY AND TECHNOLOGY TRENDS

Important internal relations exist within firms between labor, production technology, investment decisions, and location. New capital investments often embody new technologies that are an important ingredient in plant staffing patterns, productivity, and employment growth. During the 1970s, U. S. expenditures for new plants and equipment (measured by value investments to value of ouptout) were lower than any major industrial country. This was an important factor contributing to the nation's poor produstivity performance (National Science Board 1981).

Manufacturing productivity during the decade (measured by value of output per worker hour) increased 28 percent in the U. S. compared to 102 percent in Japan, 60 percent in West Germany, and 26 percent in the United Kingdom. The U. S., in the 1980s, continued its weak productivity growth rate compared to other industrialized nations. The loss of over 1.5 million production jobs in the country between 1967-1982 compared to an increase of over 1.3 million nonproduction jobs is one reason for the nation's poor productivity performance.

The tradition of American capital investments in manufacturing innovations has been different from that of other countries and may be another factor underlying the poor performance. A study of 1,866 product and process innovations developed between 1945-1974 revealed that 40 percent of U. S. innovations were labor-saving compared to 13 percent in Western Europe and 6 percent in Japan (Davidson 1976). Material-saving innovations were more important in other countries: 47 percent of Western European innovations and 34 percent of Japanese innovations compared to 21 percent of U.S. innovations. Capital saving reasons accounted for 7 percent of the innovations in both the U.S. and Japan and 11 percent in Europe. The concentration of U.S. investment in labor-saving helps to account for some of the low net increase in the number of production workers in the country.

Still another factor that underlies low productivity is the growing dominance of large, multinational-multiplnt firms in the country. Medium size firms were found to spend four times the amount of investment in R&D per dollar of sales as large firms, while small firms spent twenty-four times the amount (National Science Board 1976). Certainly, the acquisitions of some firms were to acquire other firm's advanced technology and factor mixes as well.

Technological innovations, productivity increases, capital investment, plant staffing patters, and employment growth tend to be related to each other and have affected the rate of change in manufacturing employment among the nation's regions. AS production facilities age, severe production problems result from the lack of adequate space, from poor plant layout and materials flow, or from obsolete equipment and process technology. The capital costs associated with the modernization of such vintage plants are more excessive than the cost of establishing modern facilities, espacially when the locational advantages underlying the original site choices have been lost. As many of the products manufactured in the Manufacturing Belt neared the end of their life cycles, firms either closed facilities or adopted labor saving process technology, both of which resulted in employment declines. On the other hand changes in: 1)transportation, communications, process, and material tecnology; 2) capital, utility, and labor force availability; and 3) firm organization and management practices have allowed manifacturing facilities to locate on formerly inaccessible and unsuitable sites in small towns and rural areas in all regions of the country.

Interrelationships among technology adoption, firm functional restructuring, and locational change

The principal *special* mechanism underlying a substantial amount of the geographic decentralization of manufacturing within nations can be found in the direct relationships that exist between settlement size, external economies, and worker compensation for indentical jobs, regardless of the regions in which they are performed (Fuch 1967; Goldfarb—Yezer 1976; Hock 1972; Johnson 1983; Moriraty 1978). This mechanism reinforced by interregional differences that exist between urban size, external economies, and worker compensation. Since wage levels (and worker benefits) tend ti increase automatically with the growth of urban centers (and with plant size), the higher wage bills either price the less competitive plants out of the large centers or cause them to become more capital intensive in their operations by the adoption of laborsaving process technology (Rees — Briggs — Oakey 1986). The aspatial aspects of firms that interact with the city-size mechanism are the direct relationships that exists between plant size and worker compensation and the degree to which advenced production technology is applied to individual functional operations improve internal economies regardless of location. Plants in large centerst that fail to adopt advance production technology become less competitive and tend to go through a process of vertical disintegration either by ridding themselves entirely of the unproductive operations and relying upon subcontractors for their completion or by locating the operations in branch facilities in smaller settlements some distance away. The least competitive labor-intensive industries or operations locate in the smaller towns and rural areas in even more peripheral areas or offshore countries having lower than average wage compensation and external economies. To remain competitive, firms can adopt both location and technology investment strategies for different operations or substitute one strategy for another. The poor productivity performance and low level of capital investment in new technology coupled with the growth of industry in nonmetropolitan areas suggest that American firms have opted more for the location strategy.

The settlement-size industrial-sorting process can most readily be linked to the product life-cycle model in which different inputs and scales of production are required during the different stages of new, mature, and standardized product manufacturing (Moriarty 1983; Vernon 1966, 1979). While in recent years, multiplant firms have taken advantage of the marginal returns that can be derived from different size urban centers regardless of the life-cycle stage of their products, in general the manufacture of new products is a small-scale operation involving short production runs that are highly dependent upon conventional production techniques using high-cost engineers, technicians, and skilled craftsmen normally found in the larger urban centers of the core regions where specialized inputs and services (external to the firm) can also be found (Malecki 1979). Administrative and marketing personnel are readily available to monitor and decide changes in product design to improve market share. Thus, small plants with average wage bills lower than those of large plants are more marginally cost-efficient in larger metropolitan centers with their overall higher labor costs. In the manufacture of standardized components or products, production processes become routinized and labor-skill requirements reduced so that low-cost labor sites, many with ready access to markets, become important for plant facilities utilizing specialized mass-production techniques (Clark 1981; Erickson 1976a, 1976b; Erickson—Leinbach 1979; Moriarty 1983; Park—Wheeler 1983; Norton—Rees 1979). Such facilities require little in the way of administrative, sales, and R&D personnel or local inputs and services other than low-cost land, labor, and utilities. Thus, large plants with higher averange wage bills than samll plants are more marginally cost-efficient in small settlements (of offshore sites) with their overall lower labor costs. Multiplant firms more recently have moved beyond the simple relationship between location and product stage evident in the decades following World War II by realizing that small settlements can provide greater marginal cost-advantages for a variety of productions regardless of whether the product is in the mature or standardization stage.

The geographic implications of the settlement-size industrial-sorting process are straightforward. New product development tends to concentrate mainly in the established industrial districts or metropolitan centers of the core regions where the principal administrative functions, research and development, skilled craftsmen, and specialized subcontractors and inputs are located. In such regions the ratio of nonproduction workers to production workers is high. Mature and standardized product manufacturing tends to concentrate in more peripheral areas outside the core where low-skolled workers are available. In these regions the ratio of nonproduction workers to productio workers is low. Within each region, as metropolitan centers grow, their external economies expand and threshold levels are reached capable of supporting new firms oriented to local or regional consumer and intermediate markets. Many of these firms are likely to be in the product innovation stage and also require higher skilled craftsmen and technical and administrative personnel. The effect of growth in both the size and quality of the labor force is to increase overall wage bills and force the less competitive firms and industries into smaller towns or rural areas having lower than average wage rates, worker benefits, and external economies. Thus, within each region the ratio of nonproduction workers to production workers is high in metropolitan centers and low in small towns and rural areas.

Government regional policy

THE IMPACT OF GOVERNMENT POLICY ON INDUSTRIAL DECENTRALIZATION

The interregional and intraregional decentralization of industry has occurred more in response to private economic forces that affect the cost and efficiency of production than from government policies directed at spreading social and economic benefits more equitably to backward, underprivileged, and problem areas of the country. Nonetheless, government policies that had an effect on the geographic expansion of manufacturing were those associated with the development of local and regional infrastructure. The policies that exerted the greatest influence were those that resulted in the construction of the national highway, waterway and airway network—policies that are irreversible for the most part. Such policies increased the accessiblity of many formerly inaccessible areas and helped lower transport costs in addition to promoting faster service between locations. Regulations that eliminated discriminatory rail freight-rates after World War II also helped to accelerate decentralization. If the discriminatory rates had not existed in the first place, industry may not have become as concentrated in the Manufacturing Belt as it did.

Government policies that promoted the development of utilities in small towns and rural areas also influenced industrial decentralizaton. Until the Rural Electrification Act, small towns could not afford the costs of electric service, and industries were constrained to locate in built-up urban settlements. Favorable electric rates in some rural areas and regions influenced the location of some industries, especially those having high power costs relative to other costs. Waste disposal services and especially water service have long been proclaimed the harbingers of industry. Until government funds became more readily available in the 1960s and 1970s, few small communities were able to finance public works projects. Whereas in the 1960s the government programs provided assistance with the decisions as to the use of the funds made at the federal level, in the 1970s the funds were provided by the federal government but the decisions as to where they would be spent were made at the state and local level. During the 1970s a significant increase also occurred in the number of programs created by state governments to improve local infrastructure. In addition, a number of states established regional technical college systems to train workers either in specialized trades or in skills required by existing or new manufacturing establishments. The overall effect was that within a short period of time, small towns in rural areas grew remarkably in their ability to provide the basic external urbanization economies required by industry.

The factors that influence the location of industry are of two types: critical factors and tradeoff factors. Critical factors are necessary criteria or conditions that must exist in a place before it can be considered for a plant location: easy access, sufficient utility capacity, available labor skills, for example. Critical factors differ from one industry to another and from one plant to another in the same industry or firm depending upon the functional responsibilities of the different plants. Tradeoff factors are criteria that can be substituted one for another in the site selection decision: for example, the substitution of lower cost labor, land, utilities, and taxes to more than offset higher transportation costs or the added costs of internalizing necessary external economies as firms locate in less accessible areas. A substantial amount of the geographic decentralization of industry occurred because the large number of critical factors determining plant locations in the past have been reduced to a relatively few today. Conversely, the number of tradeoff factors has increased. This is because many smaller settlements are now able to provide the required criteria whereas, in the past, the criteria were likely to be found only in larger urban centers. The changes occurred largely as a result of government policies.

GOVERNMENT SPATIAL POLICY

With the realization by the federal government that most of their regional development policies—those providing guaranteed loans and grants to industry—primarily aided existing industrial firms to shift their facilities more easily from one area to another rather than creating the development of new industry, a cutback in federal programs occurred after 1980. This led some states to develop policies that concentrated funds in designated places only to establish public services rather than dispersing the limited funds among all places in the state (Committee on Balanced Growth and Economic Development 1978). In essence, the policies were modified growth-pole strategies that attempted to balance job opportunities, public service availability and resident populations in different size settlements within different regions of the states. The policies were designed to reinforce the urban hierarchical diffusion of economic development.

Within each region, settlements were assigned the responsibility to provide different public service functions in somewhat the same manner that central place theory allocates commercial functions to different size settlements (Table 15). In order of descending population size in each region, the largest place was designated as the regional center, the next largest two or three places were designated as district centers, while the approximately six to nine next largest places provided the functions of area centers. Eighteen to twenty-seven smaller places would serve as community centers while the numerous number of lowest order settlements were designated as support centers. Seasonal centers that provided jobs during different periods of the year, such as those associated with tourist areas, were assigned public service functions on a place by place basis. Thus, a hierarchical system of services was established in which each type of center provided all the services found in the next lowest order center as well as other services that were particular to their own center's designation. Each higher-order center was

TABLE 15

SUGGESTED PUBLIC SERVICE FUNCTIONS, POPULATION RANGES AND NUMBER OF CENTERS BY TYPE OF SERVICE CENTER

Selected Public Service Functions — Service Center Types

Regional utility/road engineering and Planning department
Agricultural extension testing laboratory
Hazardous waste disposal facility
Superior court
Tertiary treatment hospital
Four-year college

District utility/road department
Agricultural extension agent
District waste disposal incenerator
District court
Secondary treatment hospital
Two-year technical or community college
District school superintendent and support services

Utility/road repair and maintenance
Area solid waste collection
Small claims and traffic court
Secondary health clinic and nursing home
Senior school

Recreation center
Library
Primary health clinic — ambulance service
Middle school

Physician's extender or nurse practitioner
Elementary school and day-care center
Water, sewage, electricity and telephone
Police and fire protection

Service Centers: Population	Number	Service Area: Km²	Service Area: Population
Support Center: (1,750—4,000)	54—81	50	1,750—4,000
Community Ctr.: (4,000—9,000)	18—27	150	9,000—20,000
Area Center: (9,000—20,000)	6—9	450	35,000—85,000
District Ctr.: (20,000—45,000)	2—3	1,350	100,000—250,000
Regional Ctr.: (45,000—100,000)	1	4,050	300,000—1,000,000

responsible for providing its particular services to all lower-order centers in its service area. A typical region contained approximately 81 to 121 centers and a population of 300,000 to 1,000,000.

While population size was an important criterion in determining a settlement's service designation, an equally important criterion was the settlement's central location within its assigned service area so as to minimize the distance people would have to travel to obtain the required service. Settlements' service designations were initially assigned by state government officials with the provision that any settlement could petition the government for a change in its designation. Several settlements were not interested in growth and, after public hearings, chose to be assigned a lower order designation. Many settlements wanted to be assigned a higher order designation, some a few orders higher than their initial assignment. Settlements petitioning for an increase in their designation had to substantiate their request and agree to provide most of the funds to establish the higher order services.

The public services are financed by local taxes, state and federal government grants and subsidies, users' fees, or some combination depending upon the type of service. All settlements provided *joint* services that benefited all the service area's inhabitants equally. Many were financed almost entirely by local tax revenues: police and fire protection, public administration and management, secondary road construction and maintenance, local libraries, recreation parks, and solid waste disposal. Other joint services, some of which are quasi-public in nature but regulated by government agencies, provided communication, mass transportation, water, sewage, and electric service for which a user fee is charged. Many of these services were established, expanded, or maintained by state and federal government grants and subsidies. All settlements provided different levels of *merit services* based upon the settlement's designation in the hierarchy of centers. Merit services are those associated with providing health, education, judicial, agricultural extension, primary road construction and maintenance, and welfare services to inhabitants who may qualify for them from time to time. They are financed partially by local taxes and users' fees and partially by grants and subsidies from state and federal government agencies, which regulate their activities. Federal and state government income tax policies assist some individuals in the payment of user fees for certain health, education, and welfare services.

Summary and conclusion

Within the United States, industrial development for some time has been decentralizing from and within established industrial districts to more peripheral locations. The decentralization, however, has resulted in production workers becoming more concentrated in smaller settlements while nonproduction workers have become more concentrated in larger urban centers. Since a greater number of large urban centers exist (per unit of area) in the Manufacturing Belt, production workers have become more decentralized throughout the country while nonproduction workers have become more concentrated in the Manufacturing Belt.

While a substantial portion of the decentralization can be attributed to the growth of markets in peripheral regions of the country compared to the stagnating growth trends in the traditional core region, a significant portion can also be attributed to the growing dominance of multiplant, multifunctional, multiregional firms in the country. Faced with growing competition, uncertain economic conditions, and rapidly changing technology advances, such firms have adopted both location and technology investment strategies for different functional operations or have substituted one strategy for another.

In the past, location strategies were not readily available to firms, since individual plants were more multifunctional in their operations and required greater accessibility to subcontractors, suppliers, and markets (such as do many single plant firms today) in addition to necessary utility services and a labor force with a wide range of skills. With the more recent emergence of the single function plant linked to other plants in the same firm, coupled with the growing availability of utility services in small towns and rural areas within easy access of a large commuting labor pool made available by the widespread use of the automobile, firms were able to adopt location strategies to lower the overall marginal costs of production.

Government policies to decentralize manufacturing after World War II, initially for the purpose of national security but later to stem the tide of rural-urban migration and to spread social benefits to backward, underprivileged, and problem areas, were responsible for the more equitable distribution of public services throughout the country.

The empirical evidence reveals that hierarchical diffusion has played an important role in the spatial expansion of development, but that as far as industrial development is concerned, its role appears to be a historical stage only. Hinterland spread appears to be a more dominant long-run force, since the influence of the hierarchical system of cities is again on the wane. This is because manufacturing has become more equitably distributed among all size settlements in all regions of the country.

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TRENDS IN REGIONAL DEVELOPMENT

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KEY-WORDS: *convergence; decentralization; divergence; employment* structure; *industrial* efficiency; *industrialization; new* economic management system; *regional* equilibrium, ~ planning, ~ policy, ~ trends; *spatial* differences, ~ dynamics.

The notion of regional development is rarely applied to particular cases; instead, it denotes the process that is marked by absolute and relative parameters of several coordinated socio-economic units. In this respect, the notion of relativity gains special emphasis. The question is whether social, economic, and cultural differences between the spatial units being compared are increasing or decreasing; or whether horizontal units at different levels of development converge or diverge.

Convergence (i.e., the levelling-out of differences between dissimilar stages of development) and divergence (i.e., a process in the opposite direction) rank among the main issues in the branches of regional science (regional economics, economic geography, etc.). But the above mentioned issues may be even more important for regional planning policies because differences in regional development, along with other differences between regional units, can boost or retard economic development. Since these are decisive factors in public sentiment, they are closely related to social policies.

Divergence and convergence are thus the two main trends in regional development. Scientific research has thrown light on most of their conditions, the rules of their transition from one into the other, and on their impact mechanism. The main objective of this paper is not to tackle the above mentioned problem from a theoretical point of view, but to review regional development in Hungary over the past 30 to 40 years with special regard to trends in convergence and divergence between different regions. Experiences in Hungary accentuate the general theory that the rule of uneven economic and social development applies equally to small and large spatial units.

Whether the trend of convergence or divergence takes precedence over the other, or whether both are in effect at the same time depends on the actual physical, economic, and social conditions; the level of economic development; the mode of economic management; etc. Over the period in question, convergence and divergence were both in effect in Hungary at the same time. Convergence was the main trend on the level of large spatial units (regions, counties); while on the level of small units (towns, villages), divergence characterized development.

The general physical and socio-economic conditions of regional development

Hungary is a relatively small country with a medium density of population though with remarkable differences in the density of population and industry between regions. None of the regions has such physical properties that would make the development of industry or the settlement of people impossible.

After the post WW-II reconstruction period, in the late 1940s, Hungary was an industrially under-developed country dominated by agriculture. Having set up the conditions of a planned economy, the utilization of previously unexploited physical and social resources facilitated a fast and extensive type of economic development. This development resulted in a profound change in the structure of the socio-economic edifice. In those years, the economic development strategy aimed at rapid development of the industrial sector. The quick pace of this development, which lasted until the mid-1970s, has resulted in the important role industry plays within Hungary's economic structure today. The radical changes in the social and economic structure are very well reflected by the dynamics of the employment structure between the years 1949 and 1980 (Table 16).

TABLE 16

THE SECTORAL DISTRIBUTION OF ACTIVE WAGE EARNERS (%)

Sectors	1949	1960	1980
Manufacturing and construction industries	21.3	33.0	42.3
Agriculture	54.4	40.0	18.5
Tertiary industry	24.3	27.0	39.2
Total	100.0	100.0	100.0

Source: Publications of the 1949, 1960 and 1980 population census.

These were the main, decisive factors affecting the trends of regional development:

—the rapid and mostly extensive type (i.e., making use of new resources) expansion of the Hungarian national economy;

—the profound changes in the structure of the economy.

The pace of change was always interdependent on the progress made, which in turn was conditioned by general socio-economic factors. For example, the trend of divergence came to a halt due to factors arising from the trend itself, and it took on a new direction; by doing so, it started a trend of relative convergence.

In this respect, the 1960s and the late-1970s brought about a qualitative change in regional development and the conditions of the main trends. By the mid-1960s, Hungary became a medium-developed industrial country. By that time, much of the resources required by the extensive type of development had been consumed by the rapid economic expansion of the previous years. This was, therefore, a retarding factor to further development.

In response to these trends, a new economic management system was introduced that gave new incentive to company initiatives and in doing so new social resources were generated. Thanks to these reform measures, the period of quick-paced economic development was extended into the 1970s, thus giving further impetus to the existing trends in regional development. Hence, we can see clearly that the unfavorable impact of the running-out of resources was offset by the economic reforms that also stabilized the further course of regional development.

Industrial expansion came to a halt in the early-1970s. During this time the influence of agriculture and especially that of services on regional development became stronger.

Changes in the world economy, the sharp increase in oil and raw material prices, and the reduced marketability of Hungarian products became a major obstacle to production development. Limited production capacities and the lack of means of production had accounted for limits before. Consequently, by the late-1970s the pace of economic growth slowed down, and the need to transform to an intensive type of development became more and more apparent. As a result, it was necessary to reduce the spatial dynamics of the economy and to stabilize regional trends. The rapid change in the macro-structure that had characterized the Hungarian economy over the previous years slowed down as well. The qualitative changes in overall socio-economic relations also meant a turning point in terms of the trends of regional development.

The trend of convergence as a characteristic progress in the regional development of large spatial units

The process of lessening differences between the levels of development of large spatial units in Hungary (i.e., the capital city and the 19 counties) was characteristic of all those regions where the process had an influence on various aspects of social and economic life. Empirical data for the convergence of regional units are available for the early 1960s, but it can be assumed that the process had begun on a small scale in the 1950s and gained impetus later. In the process of convergence, the lessening of spatial differences in the level of economic development, especially industrialization, played the central role. In 1960 the level of industrialization, in terms of national income derived from industry per one thousand inhabitants, was 14 times higher in Komárom county, the most developed one, than in Szabolcs-Szatmár county, the least developed and industrialized county in Hungary. These remarkable spatial differences kept lessening year by year: in 1965 the proportion was 1 to 10; and in 1975 the proportion of the two extremes was 1 to 4.5.

This remarkable convergence is due to the fact that in the less industrialized counties the local workforce resources were utilized to such an extent that their industrial capacity increased above the national average. This process was started by the government's industrialization policy, which allowed more and more local means of control and the operation of incentive schemes.

The process of convergence slowed at the end of the 1970s; what is more, it completely came to a halt in the provinces by the early 1980s. Between the years 1979 and 1983, there was no difference in the development pace of industry between more industrialized regions and the less developed ones.

The same trend also applied to a much wider economic sphere. In terms of national income derived from industry and agriculture per one thousand inhabitants (a special parameter of the level of economic development), differences between counties representing the two extreme cases were much smaller. A remarkable convergence took place up to the mid-1970s. In 1965 the proportion of the two extreme cases was 1 to 2.8, while in 1975 it was 1 to 1.8 (Barta 1977, Bartke—Kulcsár 1971).

In close connection and interaction with the steady decrease of differences in industrialization and economic development between counties, differences in the employment structure also lessened. The growing proportion of those employed in industry compared to the total number of wage earners was especially remarkable in lesser industrialized counties. In Budapest the number of those employed in industry stabilized in the 1960s and later started to decrease more and more rapidly. The process of stabilization, and, later, the trend of slow decrease, also became characteristic of counties at a higher level of industrialization. The proportion of those employed in services increased remarkably in all counties from the 1960s on. In the 1970s services, the third sector of the national economy, became the chief factor of the modified employment structure in Hungary. All these accentuate the fact, which can also be derived from empirical data, that differences in the level of services and infrastructure between counties lessened continuously. True, the differences in services had always been smaller than those in the level of industrialization and in other sectors of the economy.

In spite of the process of convergence and the above mentioned facts, there were still other differences that had tremendous influence on living conditions. In order to consider completely the process of convergence on the regional level, one must not only take into consideration industrialization and economic development, but also the supply of infrastructure. The case of the regional distribution of average personal income is slightly different. Due to the convergence of different employment structures in various counties, the increasingly similar role of different branches of the economy as a source of income, and the achievement of full employment throughout the country, differences in average personal income in the early-1970s decreased to a low level. This can be explained clearly by the dissimilarities of local working conditions. For these reasons, the mere preservation of the favorable proportions achieved to date must be our objective, rather than aiming towards further convergence.

As far as regional dissimilarities of economic efficiency are concerned, certain aspects are worthy of our attention. Due to the enhanced difficulty of this issue, a synthetic approach is impossible.

Instead, we have to tackle the problem in terms of separately measurable components. In Hungary a method was invented to analyze spatial differences in industrial efficiency (Bartke–Tóth 1971).

Having applied the method in question, the results arrived at proved that the efficiency index of separate companies in the manufacturing sector was higher in the mid-1960s in those regions where the process of industrialization was above the national average. The level of efficiency in regions in the process of industrialization still surpassed the national average in the 1970s; furthermore, the proportion became slightly more favorable for them. This surprising phenomenon was due partly to one of the special features of the economic control and regulating scheme, namely that labor was regarded as relatively cheap while the means of production and capital investment were considered expensive.

Consequently, regions in the process of industrialization, rich in workforce but without a firm technical background, were in a more favorable position in terms of production expenditures per unit of industrial output. Although costs of transportation of goods increased as a result of the spatial decentralization scheme in industry, the rapid increase in industrial output compensated for the loss. From the mid-1970s onwards, a slow-down of industrial expansion and the modification of the economic control and regulating scheme changed this trend. Production efficiency in regions undergoing industrialization started lagging behind. We can draw the conclusion that it was in the area of production efficiency, a sensitive parameter, where changes in the trend of development first precipitated.

Although convergence seemed to be the main direction of regional development, changes in the regional index of efficiency also indicated an opposite trend, namely divergence between regions. It was even more accentuated by further data on the size of the population and figures on the regional distribution of population density.

Population figures of separate counties showed an uneven pattern. This was due partly to differences in the growth rates of the population; but the main reason was that masses of people left the provinces, and consequently the population of the capital city and the commuter belt around it, along with the industrial centers, grew much faster than the national average.

The movement of people from lesser developed areas to industrialized regions and to the greater Budapest area gained momentum in the 1960s. This resulted in a concentrated pattern of the distribution of population that has characterized the past years.

In the 1970s, the influx of people slowed down, and during the years 1980 to 1983 the industrialized areas stopped attracting more people. On the other hand, the population of the capital city and its commuter belt still had a bigger growth rate than the national average. This had a detrimental affect on the lesser industrialized counties. Overall, it means that the density of population in different areas shows an uneven pattern of distribution.

The levelling-out of the parameters of industry and services on the one hand; and the increasing regional disparities in the growth of the population on the other are interdependent processes that result in a change (mostly for the better) in spatial equilibrium. In this respect the most important factor is the regional equilibrium of jobs and the workforce.

The rapid growth of population in industrialized areas somewhat eased the local demand for labor. On the other hand, people leaving less developed areas decreased the local problems of full employment. At the same time, the movement of masses of people from one place to another resulted in the loss of the relative equilibrium between infrastructural supply and demand. The consequences of this had to be offset by massive government intervention.

Divergence on the local level

There is a strong trend of divergence on the local level, but at the same time there also seems to be certain tendencies of convergence in effect. The structural reform of the settlement pattern in Hungary was carried-out in such a way as to facilitate possibilities for further development of the different patterns of settlement. At the same time, changes in the regional structure of workplaces were also taken into consideration. Steps were taken to achieve a state of equilibrium, which resulted in a trend of convergence in the field of certain parameters of the supply of goods and in certain types of settlement. However, there was also an opposite trend, one of divergence, in effect.

The profound changes in the structure of the national economy (as illustrated in detail in the first section) also brought about a new distribution of jobs between the three main sectors of the economy affecting 36% of all wage earners. The results were an influx of people into industry and services at the expense of agriculture. Nearly two million people found new employment in either the industrial or services sector of the economy, out of which about one million changed residence and consequently left the countryside for urban centers. In accordance with regional development policy, industry and services were regarded as branches of the economy primarily situated in towns. Overall, it means that changes in the structure of the national economy over the past 30 years resulted in the increase of city dwellers by two million, and consequently a decrease in the number of those living in the countryside.

The development of the different types of settlement had various patterns. The number and the proportion of town dwellers were increasing steadily. In 1949, 36.5% of the total population lived in towns; in 1960 their proportion was 40.5%; in 1970 it was 46%; while in 1980 it totaled 53.3%. The number and the proportion of villagers were continuously decreasing because the natural reproduction rate of the population could not offset the losses caused by those leaving for towns.

The declining trend in the population of villages gained momentum in the 1970s; by the late-1970s, the natural reproduction rate of the population in towns was higher than that in villages. This can be attributed to the thinning out of the younger generation from the villages and a shift in the distribution of age groups among those remaining in the villages. In a way, an irreversible trend of divergence started (Enyedi 1978).

As far as towns were concerned, a tendency of concentration of their populations could be observed. In terms of the number of new inhabitants, it was the capital city that grew the most. But it was the five major industrial centers, Debrecen, Miskolc, Pécs, Győr and Szeged, where the rate of increase was higher.

In the 1950s and 1960s, the populations of certain towns in the Alföld (the Great Hungarian Plain) were still on the decrease. In spite of the continuation of this trend throughout the 1970s, the development of towns was more balanced. The pace was slower and there was a shift in the hierarchy of the various types of towns. The growth rate of the population of the various county seats became higher than that of the five major regional centers which earlier developed at the fastest pace. The promotion of progress in small and medium-sized towns is included in the objectives of the plans for the development of settlements in the 1980s. The shift of emphasis on the lower ranking towns sheds light on the development cycle of settlements. Having achieved a certain size, a process of relative—and later a process of absolute—decentralization takes place. In spite of the changes in the 1970s, and the slower pace of economic development, there were no significant changes in the relationship of town and village in Hungary. The growing concentration of the population in towns is still taking place, although at a much slower pace.

As far as infrastructure and services are concerned, their supply is becoming more and more even and steady, while differences in the distribution of the population are growing larger. Changes in the supply of public utilities (e.g., the water supply, the sewage system) are especially worthy of our attention. In the 1970s, it was the lower ranking settlements where more homes were connected to the water supply. It marks a trend of convergence between lower and higher ranking towns, which was not the case in terms of the number of homes connected to the sewage system. This number was growing steadily in towns with ten thousand inhabitants or more, while the figure was decreasing in smaller settlements. So, once again we have a pattern of two opposite trends, convergence and divergence.

A trend of convergence of different types of settlements in the field of services can also be measured in terms of the average number of schoolchildren per classroom, an index that was originally less favorable in larger towns. In the 1970s, the situation in smaller towns and villages became even more favorable, which was only partly due to the increase in the number of classrooms. The clear improvement of the situation can be attributed also to changes in the distribution of population. The migration of people from smaller settlements also had a favorable effect on the average number of pupils per classroom. At the same time, the influx of people into larger towns operated in the opposite direction and had a clearly detrimental effect on their average pupil-per-classroom figure.

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SPATIAL DECONCENTRATION AND CENTRALIZATION IN HUNGARIAN INDUSTRY

GYÖRGYI BARTA

KEY-WORDS: *branch-plants; Hungarian* industry; *industrial* location, ~ organization, ~ policy; *industrialization; management* centres; *regional* centralization, ~ development, ~ planning, ~ policy; *spatial* connections, ~ deconcentration.

Introduction

During the 1960s and 1970s, profound changes took place in the location and spatial connections of Hungarian industry. The most important reasons for these changes were as follows:

(i) The favourable effect of a *world economic* boom enabled the further growth of industrial production—despite its mediocre technological standards—due to the almost unlimited demands for industrial products (first of all in the markets of socialist countries but also in the expanding markets of capitalist countries). The 1960s were characterized by physical industrial expansion. The establishment of enterprises and plants and the spatial deconcentration of industry was based on increasing industrial production, which was not yet limited by either a slackening demand or shortage of raw materials and energy. Economic prosperity also postponed structural transformation of industry, the urgent need to leave extensive economic growth, and to evolve a new economic approach (for instance, a more thorough consideration of efficiency viewpoints).

(ii) The 1960s were accompanied by an *economic reform.* The new economic system increased the independence of industrial enterprises and made it possible for them to use a part of their profit for self-development by their own decisions. Enterprises became interested in increasing production (often by any means). To increase capacity, new plants or branch-plants were opened, often in less industrialized rural towns of medium and small size, even in large villages. In such a way, enterprises have obtained masses of cheap labour force by means of relatively moderate capital investments.

(iii) *Regional planning and regional development policy* in Hungary have come into the limelight since the early 1960s (Enyedi 1983). Rather significant regional differences existed, first of all between the more developed, industrialized and the underdeveloped, agricultural areas. Regional development policy aimed at diminishing regional differences by decreasing the industrial dominance of Budapest, by supporting depressed regions of earlier coal mining regions (through creation of new, mainly industrial jobs), and by the industrial development of economically backward, mainly agricultural areas in the Alföld and South-Transdanubia.

As it appears from the above mentioned factors, industrial development was almost the exclusive means of regional policy during this period. Rapid and extensive development and expansion of industry represented a major change in the spatial structure of the country's industry. On the one hand, the spatial expansion, or *deconcentration,* of industry (both means of industrial production and production itself); and on the other, the spatial centralization of the organization of industrial enterprises must be stressed. While industrial activity was appearing and becoming increasingly important in poorly industrialized regions of the country or where it formerly did not exist at all (spatial deconcentration), the management of industrial production is performed from fewer and fewer settlements (regional concentration). Thus industry spreads over increasingly expanded areas and becomes dependent upon other, distant settlements. This paper aims to present the details of these parallel industrial processes and evaluate their joint impacts on regional development.

Spatial deconcentration of industry

Industry in Hungary was largely concentrated territorially already before the Second World War: in north-west Transdanubia (Győr-centered), in Budapest and its environs, and in the Northern Highlands. For instance, in 1940 about 2/3 of industrial production was given by Budapest (Bartke 1971). Manufacturing industry could be said to be insignificant in the remaining areas of the country; industrial service functions were performed by small-scale industry (Barta—Enyedi 1981).

Industrial concentration extended during the post-war period as plans focussed on the development of heavy industry requiring large-scale technology. Several small companies were liquidated or merged by nationalization; small-scale industry nearly ceased to exist because of misinterpretation of political and ideological concepts.

From 1950 to 1960 industrial production tripled and the number of workers employed by industry increased about two-fold. Apart from the diminishing proportion of Budapest, the proportions of regional distribution did not change basically.

The process of deconcentration began in the early 1960s. Until the late 1960s, it was accompanied mainly by an increase in the number of industrial workplaces and workers. During the decade between 1960 and 1970, the number of workers employed by industry grew by almost 40 percent or 0.5 million workers. The increase in the number of workers was spatially differentiated and differed from the earlier regional proportions and industrial development tendencies. In Budapest, the number of industrial workers has been decreasing gradually since 1965, due partly to the exhausting labour force source and partly to a purposeful industrial development policy. In counties of poor or average development level, however, the extension of job creation started to accelerate just after 1965 (60 percent of the increase in total number of workers employed by industry was represented by the counties; Barta 1973). In fact, the industrial deconcentration process was motivated by spatial re-structuring of employment rather than by changing regional proportions of industrial investments (Figure 2).

Between 1960 and 1970, regional distribution of industrial investments did not necessarily promote effective industrial development policy of backward areas: during this decade the most

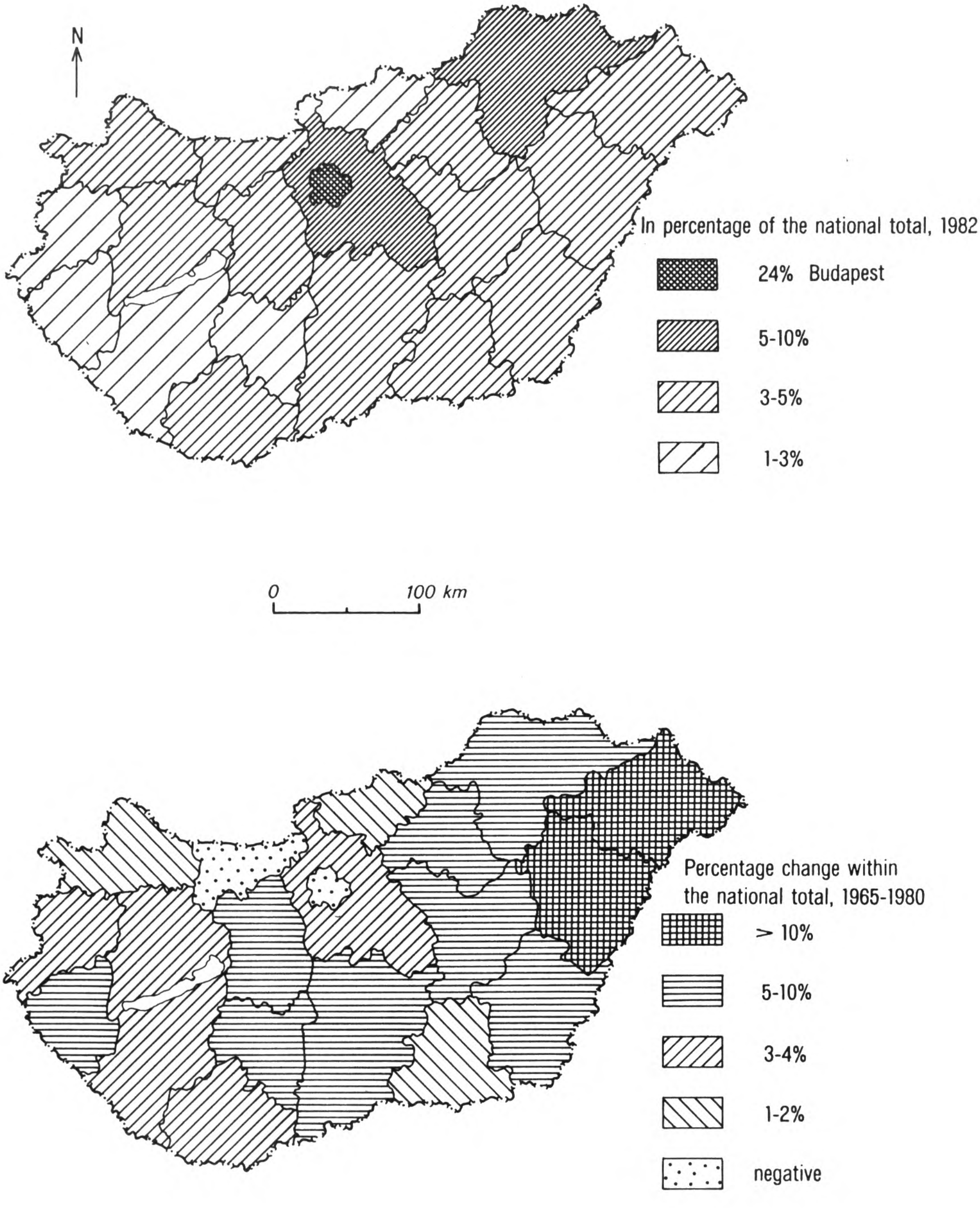

FIGURE 2 *Spatial distribution of industrial manpower 1982 and industrial manpower growth shares by county 1965–1982*

developed county (Komárom) was given nearly nine times more industrial investments per 1,000 inhabitants than the least developed (Szabolcs-Szatmár). Thus, industrial regional levelling can be traced by changing proportion of workers employed by industry rather than by the distribution of industrial fixed assets.

After 1970, it could be observed that the number of industrial workers decreased—at an accelerated pace—all over the country:
between 1970 and 1975, by -0.15 percent; during 1970-1980, by -1.54 percent; and during 1980-1982, by -2.6 percent annually. All in all, between 1960 and 1982, the number of industrial workers diminished by almost a quarter of a million.

To sum up, after 1970 industrial deconcentration continued partly by means of a spatially differentiated increase in the means of production (investments) and partly by a spatially varied decrease of labour force. Between 1970 and 1975, already the number of workers employed in industry diminished in three counties besides the capital city, in 14 counties between 1975 and 1980, and in 16 counties between 1980 and 1983. As a result, the regional proportions of industrial employment have changed greatly: the proportion of Budapest and, to a lesser extent, the proportion of the regions of the so-called industrial axis (including Győr-Sopron, Veszprém, Komárom, Pest, Nógrád, Heves and Borsod-Abaúj-Zemplén counties) have diminished, while that of the Alföld and South-Transdanubia have increased (Table 17).

TABLE 17

CHANGING SPATIAL DISTRIBUTION OF LABOUR FORCE EMPLOYED IN STATE- AND COOPERATIVE INDUSTRY BETWEEN 1965 AND 1982 (%)

Area	Distribution of the Number of workers		Distribution of the Fixed assets	
	1965	1982	1965	1982
Budapest	41.1	24.3	30.8	22.3
Counties	58.9	75.7	62.2	77.7
Towns*	37.6	49.4	45.7	56.7
Villages	21.3	26.3	23.5	21.0
Industrially backward regions**	24.9	37.3	16.9	28.9
Country totals	100.0	100.0	100.0	100.0

*without Budapest
**Regions of the Alföld (the Great Hungarian Plain) and South-Transdanubia (about half of the country's territory)

Source: Területi Statisztikai Évkönyvek (Regional Statistical Yearbooks) Budapesti Statisztikai Évkönyvek (Statistical Yearbooks of Budapest) 1965, 1982.

The value of industrial fixed assets grew by almost five times between 1960 and 1982. Since the location and extent of further developments are determined primarily by pre-existing industrial investments, changes in the spatial distribution of fixed assets are not as great as in employment.

Specialists' opinions differ on the deconcentration process of the industrial labour force. It is true that regional development plans did not anticipate the magnitude or direction of deconcentration (e.g., upon rural industrialization), but its mostly favourable impacts on settlement development are appreciated and it is considered important to maintain the results. However, specialists dealing with the development of industry unanimously have an unfavourable opinion of the deconcentration effects of the industrial labour force, as far as inadequate and incomplete investments and widespread use of out-of-date, underdeveloped technologies are concerned. They are convinced that low efficiency of industrial production, lack of co-operation, etc. are partly the consequences of regional deconcentration of industry. Tendencies presented above are shaped by the changed regional proportions of industrial production: the proportion of Budapest in industrial production has decreased, that of the regions of the industrial axis and especially of the Alföld has increased (Table 18).

TABLE 18

THE REGIONAL DISTRIBUTION OF INDUSTRIAL PRODUCTION (%)

Region	Estimated national income*				Net national product*
	1960	1965	1970	1975	1980
Budapest	39.7	36.2	32.3	28.1	25.1
Industrial axis	39.5	41.0	41.2	43.7	37.7
Total	*79.2*	*77.2*	*73.5*	*71.8*	*62.8*
Alföld	10.4	11.7	15.5	16.7	26.7
South-Transdanubia	10.4	11.1	11.0	11.5	10.5
Totals	100.0	100.0	100.0	100.0	100.0

Source: Bartke, I. 1971; Barta, Gy. 1973, 1975; Nemes Nagy, J. 1984.

*The indices of estimated national income and net national product are calculated by combining wages and value of fixed assets regardless of productivity, which differ by enterprises (regions). They are used for estimating regional distribution of production.

Regional centralization in industry

The organization of industrial enterprises changed significantly in the 1960s and 1970s. Industrial expansion represented primarily not the establishment of new enterprises but that of new branch-plants within the existing companies. The amalgamation and merger of enterprises characteristic of the period were carried out in several cycles.

Since the late 1960s, it has become increasingly difficult for industrial enterprises to make investments in cities, mainly in Budapest, as far as the extension of workplaces and the increase in labour force are concerned, which could be explained first of all by the exhausting labour force supply. However, there were abundant manpower reserves in industrially backward (mainly agricultural) regions, small towns, and villages, where hundreds of smaller or larger branch plants were established during these 10-15 years. Although the opening up of new plants was rather frequent, the number of plants did not increase because of amalgamation, reorganization of plants that accompanied the merger of enterprises, and change in profile. As a matter of fact, the number of industrial plants has been decreasing since 1965. For instance, between 1970 and 1975, one third of all rural industrial plants were established, while a quarter of them were liquidated.

Strengthening or weakening of enterprises through merger is subject to the stages of economic policy. During the period 1962-1964, the number of industrial enterprises decreased by some 1/3. In 1967-1968, this process stopped; what is more, there was a tiny increase in the number of industrial enterprises. After 1972, central management began to strengthen and many enterprises were amalgamated again, which reached its peak in 1976-1977. Since 1979, only minor efforts have been made to merge enterprises, which finally came to an end: even central counter-processes have been launched recently (e.g., the disintegration of inefficiently managing large enterprises and trusts).

As the periods of industrial expansion coincide largely with the periods of company amalgamations, an extremely strong and often unequal struggle for labour force has started. This become apparent in the early 1970s, when available manpower reserves had already become exhausted all over the country.

Both industrialization carried out by the establishment of branch plants and the company amalgamations have led to *regional centralization* in industry. Of industrialized towns, a few industrial centres have risen that perform the functions of management and location of industry in the distant areas, too (Table 19).

Table 19 demonstrates first of all the great differences in size that exist between Budapest and the other cities. It also shows that these cities organize a major part of their industrial activity in peri-urban regions. There are several cities (mainly Budapest) where the majority of workplaces of enterprises already are located outside the city. According to the changing situation of the past 10 years, cities are divided into two groups, apart from Székesfehérvár with its insignificant industrial activity outside the town. It is mainly the previously industrialized cities (Budapest, Győr, Miskolc) where industry has expanded outside the cities, while the recently industrialized cities (Debrecen, Nyíregyháza, Kecskemét) found ways for further growth within the city. Perhaps this finding can be explained by a much greater increase in population of the latter cities during these ten years (it amounted to 22-53 percent) than in cities of the former type (2-18 percent).

It is not a Hungarian peculiarity that industry is located purposely or moves out spontaneously from the capital city and larger cities. In Vienna, between 1972 and 1982, the number of industrial workplaces was reduced by 26 percent; so it is thus not so surprising that the number of industrial workers decreased by 35 percent in Budapest during the same period, and only a minor number of them were obliged to move because of removal of enterprises. As regards

TABLE 19

INDUSTRIALIZING ACTIVITY OF HUNGARIAN CITIES
(OVER POPULATION OF 100,000) BETWEEN 1972 AND 1982

Industrial Headquarters	Population in 1,000	Numbers of settlements with plants belonging to the headquarters		Workers in branch-plants of distant headquarters as % of locally employed		Employed in or controlled by headquarter cities as % of national total industrial employment	
	1982	1972	1982	1972	1982	1972	1982
Budapest	2,064	431	536	51	81	47	43
Miskolc	211	47	49	48	65	3	4
Debrecen	205	43	44	42	39	2	3
Szeged	175	49	67	43	58	2	2
Pécs	173	59	63	71	65	3	3
Győr	127	73	75	37	67	3	4
Nyíregyháza	115	65	48	70	45	1	1
Székesfehérvár	108	27	27	11	13	1	1
Kecskemét	100	59	37	80	60	1	1

Source: Ipari telephelyi adatok 1972, 1982 (Data on industrial plants), unpublished data of the Central Statistical Office.

Paris, during 1954-1971, half a million industrial workplaces were removed (Bastie 1973). In all probability, however, it is already a rare phenomenon in the world that the measure and permanent strengthening of organizational centralization is linked exclusively to one city of a country (Barta 1984).

The changing industrial structure of cities (e.g., the development of up-to-date industrial sectors and removal of traditional branches) as well as centralization of the organization of industrial enterprises (which is also general in developed countries, although to different degrees than in Budapest), have enlarged the *urban concentration of intellectual employees.* It is a fact that management centres of industrial enterprises prefer longer distances to their production plants over leaving the mental climate and economic, retail, and cultural life of large cities. The proportion of specialists participating in the management of industry is in close connection with the level of economic independence of a region (Planque 1983).

Similar investigations have been conducted in Hungary, too, with the difference that the country was divided into two parts only: Budapest and the countryside; and instead of a 'control force' the proportion of intellectual workers (within workers employed by industry) was considered to be a basis. The index of independence was counted on the basis of proportion of parent companies settled in the countryside having plants located in the countryside (Futó—Csillik 1984). The conclusion can be drawn that greater independence involves a greater proportion of intellectual workers in Hungary, and during the period examined, from 1971 to 1982, both the independence and the proportion of intellectual workers decreased significantly in the countryside. This investigation has already dealt with a problem resulting from the over-centralized structure of the economy: management centres absorb intellectual capital of the countryside, which could constitute a basic condition for further rural development.

A concentration of management functions in the capital city means that the most dynamic elements of industry remained in Budapest in spite of regional levelling of production differences. In 1982, 42% of all industrial plants belonged to industry of the capital. It seems to prove partly the assumption that the role of Budapest in the industry of the country is much greater than it would follow from the proportion of workers employed by industry in Budapest (24.3%), or the contribution of the capital city to industrial production (25.1%).

Although the role of a few cities in the location and management of industry has strengthened recently, it kept lagging behind the significance of the capital. Strengthening regional centralization means not only a decrease in the number of management centres (settlements) and a growing attraction force of the others, but also the extension of *counties depending upon distant centres* (Figure 3). The strengthening dependence upon distant centres in the whole country is well illustrated by Figure 1, and recently there have been counties where the management of nearly half of the industrial plants is carried out from distant centres. Since the 1970s, industrial dependence in most counties has strengthened and become general in the whole country.

After 1980, the proportion of locally managed industrial plants kept decreasing in most counties, which means a weakening independence of local economy even in those counties where the dependence already had reached its highest level by 1980. Different levels of dependence have developed among the counties. The dependence became strong around the most important industrial centres (first and foremost around Budapest), and in industry of recently industrialized regions (e.g., West-Transdanubia).

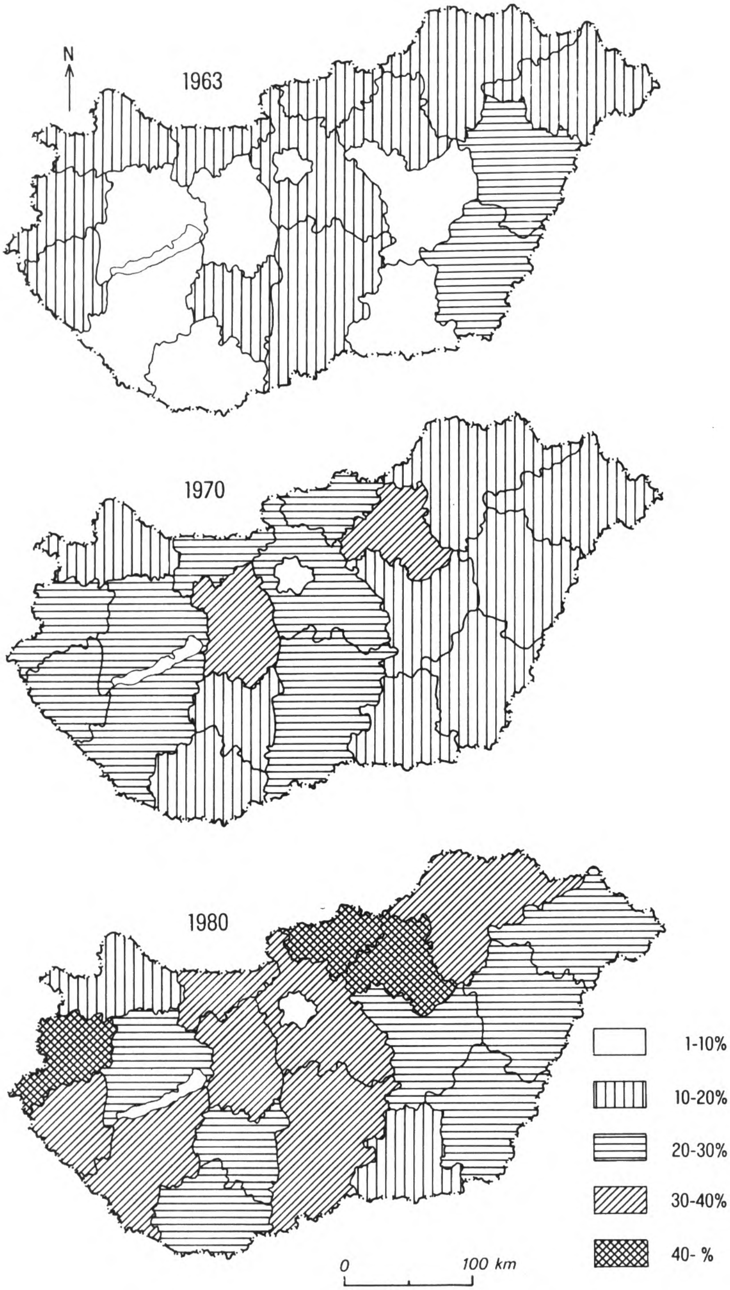

FIGURE 3 *Industrial branch plants owned by out-of-county companies*

Evaluation of industrial and regional processes in the 1960s and 1970s

It is not easy to give a brief account of industrial policy and industrialization and its results over the past 20-25 years, because it consists of contradictory processes that made positive and negative impacts on general development and regional transformation of industry. In the present paper, a very strict distinction was made between dual processes of industrial development—deconcentration and organizational centralization—which proceeded parallel and at the same time strongly affecting each other. By industrial organization is meant a framework for industrial development that determines the main directions of industrial deconcentration process within the limits.

Regional policy plays a decisive role in industrialization and regional development in terms of equalization of regional differences; however, such a large-scale deconcentration of industry as occurred in the 1960s and early 1970s was never before planned. It is to be stressed that regional policy outlined the concept for industrialization, but there were very limited financial resources to implement these concepts. They were, as a rule, insufficient even to give the processes a definite orientation. In reality, spatial deconcentration of industry was mostly a process resulting from the possibilities of industry at that time and served the interests of industrial development. *In such a way, industrial deconcentration was mostly an unplanned, spontaneous process with unforeseen impacts in regional terms.*

Rural industrial development of companies seated in cities was not directed by integrated regional policy or regional planning. Enterprises could afford to establish branch plants in settlements offering them the most favourable circumstances (e.g., cheap and abundant labour, available infrastructure, etc.). It is simply evident that other aspects that served only indirectly the interests of enterprises fell into the background (e.g., more efficient production, reduction in production costs, broadening of co-operation, etc., were much more the demands of the national economy than the interests of industrial enterprises).

Transformation and centralization of industrial organization have impacts on regional centralization, too. The extensive mode of development, the pressure of permanent growth, the incompetence of already existing, extremely centralized industrial organization (there are whole branches under the control of certain monopolies and trusts), or the enforcement of interests of power and policy in contrast to efficiency, productivity, etc., all lead to the cyclically unstable but steadily strengthening centralization of industrial organization, the significant regional impacts of which were detailed earlier.

To sum up, industrial deconcentration and centralization launched and accelerated certain spatial processes that had both negative and positive effects on regional development. It is not the regional and settlement policy but the industrial policy, as well as conflicting interests between enterprises and the national economy, that cause growing inner tensions in industry and unfavourable spatial effects as inadequate and incomplete investments, lack of regional co-operation, increase in transport costs, etc. It is true, however, that the benefits of rapid industrial deconcentration for settlement development can be attributed to regional policy only to some extent.

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TECHNOLOGICAL AND ORGANIZATIONAL CHANGE IN AUTOMOBILE PRODUCTION: A NEW CONTEXT FOR REGIONAL POLICY?*

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KEY-WORDS: *branch* plant; *economic* development; *kanban* system; *manufacturing* deconcentration, ~ dispersal; *polyvalent* worker; *production* technology, ~ reorganization; *regional* decline, ~ inequalities, ~ policy; *skills* linkages, ~ de-linking; *spatial* linkages, ~ de-linking, ~ repercussions; *technological* change.

Introduction: spatial linkages, regional decline, and regional policy

One of the principal concerns of regional research and policy for some time has been the deconcentration and dispersal of manufacturing investment and employment within and across regional and international boundaries. These shifts derive in part from the spatial de-linking of skills and functions within the large corporation, and the differential location of various segments of production and other activities of the firm. Both the causal mechanisms and the results of this de-linking and geographical reallocation process have been studied intensively (Bluestone—Harrison 1982; Carney—Hudson—Lewis 1980; Frobel—Heinrichs—Kreye 1980; Harvey 1982; Hymer 1972; Massey 1984; Massey—Meegan 1982; Moulaert—Salinas 1983; Storper—Walker 1984; Walker—Storper 1981). This is, then, a well-explored phenomenon, with highly significant implications for regional economies in terms of the level and nature of employment and the prospects for any kind of integrated and self-generating economic development. Moreover, the problems this spatial de-linking creates apply both to older, declining industrial areas and erstwhile peripheral regions that may be currently enjoying a measure of relative prosperity and job growth.

In this connection, the use of the term 'integrated' refers to the spatial relationships among functions and occupations within the firm, including the familiar distinction between corporate control functions and actual production, but extending to the whole gamut of corporate activities and related occupational structures — R&D, marketing, design, programming, skilled versus unskilled production processes, etc. The tendency in advanced industrial economies has been toward the spatial disintegration of these activities, resulting in a geographic division of labor increasingly based on functional and occupational categories rather than sectors, as in the past (Massey 1984). For those few regions that find themselves at the top of the control and/or skills hierarchy, this outcome is perfectly acceptable. But it is clear that the number

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of potential Silicon Valleys is extremely limited (Saxenian 1985). Moreover, the existence of specialized R&D and/or corporate control regional complexes implies that the large number of regions not so favored are left to fight among themselves for the lower-skilled (and, not so incidentally, lower status) activities that remain (Massey 1985). This not only perpetuates regional inequalities, but leaves those areas specialized in, e.g., low-skilled assembly functions extremely vulnerable both to competition from other regions for a given number of jobs, and to sectoral or macro-economic reverses that strike hardest at employment in production per se. From the regional point of view, it appears highly desirable for a variety of reasons to foster a functionally and occupationally integrated development trajectory. Yet, insofar as this 'ideal' runs counter to prevailing realities, it is difficult to achieve in practice.

'Self-generating' refers here to the strengthening of intra- and inter-firm input-output linkages within the regional economy, which would seem to increase the likelihood that profits generated from any given investment or round of investments will be retained in the region and provide the basis for further growth. In this sense, the spatially bounded input-output linkages themselves would serve as a constraint to what has been called the hyper-mobility of capital. Echoes of cumulative causation and agglomeration economies will be evident, but, as will be discussed below, these are seen in a rather specialized light.

If the processes of spatial de-linking evoked above have helped to create the problems faced by a growing number of regions in the advanced economies, they have also effectively short-circuited many of the development initiatives that have been attempted by regional policymakers. As this partial gloss of ideal attributes of regional development paths is meant to suggest, regional policies, by their very nature, depend for their success on the existence of spatial relationships of the sort considered above. They have thus been increasingly confounded by the tendency toward the dissolution of these relationships within the structure of the large corporation.

The fate of growth poles is a well-known case in point. Even where the hoped for growth impulses and inter-firm and inter-sectoral linkages materialized on the general (non-spatial) economic plane, the geography of these linkages in practice remained stubbornly ambiguous. They could and did occur just as easily outside the region of the dominant industry or firm as within it, an effect foreseen by Perroux himself (Perroux 1970, p. 102; c.f. also, Hansen 1970; Darwent 1974). From the point of view of regional development policy, the problem of how to fix these linkages spatially has never been resolved.

Other development initiatives, notably industrial location incentives, have suffered from the same weaknesses (Harrison—Kantor 1978; Goodman 1979). Attraction of a branch plant to a particular area often provides very little in the way of economic fall-out beyond the normal multiplier effects associated with net employment increases. According to the extent to which the branch plant is incorporated into an intra-firm (but extra-regional) input-plant linkage structure, the effects of new investments are often significantly attenuated by the typically narrow range of activities and skills represented (with associated implications for income levels and upward mobility).

In sum, then, regional policies, spatially fixed by their nature, have often found themselves swamped by the spatial and organizational fluidity characteristic of advanced capitalism. Even the rare regional policy 'success stories', as Massey has persuasively argued, may have less to do with the policies themselves than with the coincident transformation of corporate circumstances and requirements that led to a reallocation of investment in favor of formerly lagging regions (Massey 1979).

This paper considers the possibility that recent patterns of change in the technology and organization of production may have as one important side effect the reinforcing of the intra- and inter-corporate spatial linkages on which regional development policy depends. It will focus principally on the automobile sector as an example both of the changes currently under way and their possible spatial implications. The second section considers changes in the technology of production, while the third looks at the reorganization of production within and across firms. The fourth section considers the applicability of the discussion to other sectors. The paper concludes with a consideration of the implications for regional policy and the potential limitations of the spatial repercussions evoked.

Technological change in production and spatial linkages

THE ORIGINS OF RECENT TECHNOLOGICAL CHANGE IN THE AUTO INDUSTRY

There are several reasons for focusing on the automobile industry. First is the central importance of the sector in the industrial evolution of advanced capitalist countries; in the language of growth poles, it was historically a classic example of Perroux's *industrie motrice.* More importantly, from the point of view of this paper, it also represents a classic example of the geographical evolution of an industry from extreme concentration to marked decentralization and an extensive (and highly rationalized) spatial division of labor, reaching a kind of apotheosis in the concept of the 'world car' (Cohen 1983; Hill 1983). Finally, for the U.S. and Western Europe at least, the sector has lately become a classic example of the mature industry under seige: forced to confront new forms and new sources of competition in a rapidly changing marketplace.

This latter point, what Abernathy *et al.* (1984), have referred to as the 'de-maturity' of the industry, has led to an intense effort on the part of the traditional manufacturers to develop new marketing strategies, new products, and new ways of producing them (Altshuler *et al.* 1984). One of the most significant results of these combined pressures has been a very rapid movement towards increased automation of production processes. In this connection, it is important to understand how the combination of factors alluded to above helps shape the technological choices that are being made. The automobile industry, after all, is no stranger to automation. But as competitive circumstances in the industry have changed, the *kind* of automated processes that are most appropriate for the problem at hand have changed as well.

The auto industry, as is well known, was a pioneer in the detailed division of labor linked to the application of special purpose machinery turning out enormous runs of standardized product (Aglietta 1979; Bonnafos *et al.* 1983; Piore—Sabel 1984). The economies of scale obtained thereby helped, among other things, to sustain an expanding market for the industry's output by both lowering costs and permitting wage gains in line with productivity growth. In turn, the relative homogeneity of the market, combined with extreme producer concentration, helped to create the conditions under which this particular technological approach (i.e., one based on special-purpose, single function or dedicated machinery) was for quite some time highly successful.

The adoption of what is known as the Fordist model (Aglietta 1979) was intimately linked with an overall tendency toward the deskilling of labor in production and also the functional de-linking of skills, e.g., along the model of the separation of conception and execution (Braverman 1974), but encompassing a broader range of sub-categories within production itself. This in turn creates the conditions for the spatial separation of various elements of the production process, and thus for the problem posed at the outset of this paper.

Given the dramatic changes in the circumstances of the industry, it is not surprising that important elements of the logic upon which its production process is based have also undergone significant alteration. The connection between product standardization, production technology, and economies of scale is a crucial case in point. One of the outcomes of increasing competitive pressures in the industry has been an intensification of market segmentation in the areas of product size, performance, quality, and available options that go far beyond the purely cosmetic (Altshuler *et al.* 1984). This has been accompanied by what appears to be an acceleration in product adaptation to changes in the market (Bonnafos *et al.* 1983). Under the old production technology, this kind of product proliferation and rapid change would have extremely detrimental effects in the arena of scale economies (Piore—Sabel 1984). Yet, in particular given the level of competition (not to mention the relative stagnation of the market), economies of scale cannot be foregone; another way must be found to achieve them.

This other way, it increasingly appears, is offered by the adoption of flexible automated manufacturing technologies[1]. The adoption of programmable machines that can perform multiple functions or the same function in different ways depending on product configuration permits a substantial degree of product flexibility without sacrificing economies of scale. Short runs, and a mix of product types on the line, become economically feasible (McMillan 1984).

This is not, it should be noted, purely a result of the equipment in use. The flexibility of the production system is also based on extensive redesign of the product aimed at simplifying the vehicle (i.e., reducing the number of parts and operations to be performed) and standardizing some parts that can be used in a wide range of models (Durand et al. 1984; Bonnafos *et al.* 1983). Table 20 depicts this simplification process for a major French producer.

TABLE 20

SIMPLIFICATION OF THE AUTOMOBILE PRODUCTION PROCESS

Model	Year Introduced	Number of Components	Number of Soldering Points	Degree of Mechanization
VI	1971	373	4,284	46.6%
VX	1978	350	4,103	81.6%
V3	1981	300	3,680	82.5%

Source: J-P. Durand, *et al.*, 1984, p. 229

A second, and quite obvious, benefit of the new systems is the reduction in overall demand for labor (the question of changes in the skills mix required will be addressed below) (Bonnafos *et al.* 1983; Bergouignan *et al.* 1985). Equally crucial, however, is the reduction of down-time of the equipment in use, particularly in the areas of set-up time and transfer of parts from one operation to another. With older technology, it has been estimated that the time of actual machine use did not exceed 20% (Bonnafos *et al.* 1983). Particularly in the face of increasing competitive pressures, the efficient use of capital becomes ever more crucial. This has led, as will be seen, to a new configuration of machinery on the shop floor and a new way of organizing the flow of parts among machines.

Implications of the new technology for skills linkages

The impact of technological change on the labor process is a central issue (Walker 1985). It has long been argued that the overriding tendency of technological change in production is the progressive deskilling of the workforce through the transfer of human skills to the machine (Braverman 1974). In some respects, this tendency is clearly evident in the application of flexible automated systems. For multiple-purpose machines, for example, set-ups, and the transition between tasks, are increasingly orchestrated by the computer program rather than being the responsibility of the machinist. Whole operations (soldering and painting, for example) are performed by machine under the supervision or with the assistance of human attendants.

At the same time, the application and utilization of the new processes requires the development of new skills, e.g., programmers and electronics technicians (Durand *et al.* 1984; Piore—Sabel 1984; Sabel 1982; Shaiken 1984). Thus, the overall skills mix of the firm may shift toward a higher level of qualification, especially insofar as it is lower-skilled workers who are eliminated (Bergouignan *et al.* 1985). Renault, for example, reportedly foresees a reduction of 25% of its unskilled workforce by 1990, while the number of technicians and skilled workers is expected to rise (off a much smaller base) by 15% and 8%, respectively (Bonnafos *et al.* 1983).[2]

The crucial question, for our purposes, is whether or not the changing skills mix will be accompanied by stronger spatial ties across skills categories. There is some evidence, albeit of a fragmentary and even speculative nature, that this is the case. The issue can be approached at two levels — the skills of individual workers and the skills mix across workers.

The rise of the polyvalent worker?

Recent research in France has emphasized the development of what is called the polyvalent worker in automobile production. In contrast to Fordist principles, individual workers embody a range of skills and are able to work at a variety of tasks. This evolution is based on two developments.

In the machine shop, specifically, the application of numerically and computer controlled machine tools has entailed their regrouping in families of machines, closely linked together in terms of the flow of the production process and the circulation of parts by automated transfer processes (Durand *et al.* 1984). This means, first, that any individual worker is now physically close enough to machines performing different tasks that, given the opportunity, he or she is able to work on different machines. This is in contrast to a system where machines performing different operations were widely separated on the shop floor. The opportunity arises from the fact that a substantial share of the individual worker's input into a given machine's operations has been replaced by the program. This inevitably frees up a considerable amount of the worker's time, so that he or she is no longer tied to a specific machine.

Whether this constitutes in any real sense reskilling or polyvalence is open to question. If by reskilling one means increasing the complexity of tasks and the workers' control over the process, this does not necessarily seem to be occurring. Indeed, given that the essential parts of the task are now regulated by the program, the worker's function appears increasingly limited to overseeing the proper functioning of the machine and to intervening in case of abnormality (Bergouignan *et al.* 1985). Durand *et al.* would argue that this intervention function is an important element of polyvalence as the worker must be capable of at least minor repairs and readjustments to correct any problem. Given the close linkages between different machines, this is especially crucial as a malfunction in any one of them will disrupt the entire flow.

Indeed, for Durand *et al.* the very complexity of the new machinery is the second principle underlying polyvalence. They argue that it requires a more sophisticated worker to intervene in case of malfunction. Thus, if in theory the machine operator does not need a high level of qualification under normal circumstances, the complexity and, notably, the cost of the equipment suggests the importance of retaining skilled workers on the floor as a kind of risk insurance.

Or a polyvalent work force?

Whether or not these polyvalent skills need, in fact, to be embodied in one person remains to be seen. It may be sufficient that the machine operator simply signal for assistance in case of malfunction. In this, the system would differ little from previous methods of operation where mechanics are called onto the shop floor as needed.

Nevertheless, there are reasons to believe that spatial skills linkages within the firm and between the firm and its suppliers will be strengthened. In the latter case, the complexity of the machinery and the necessity to keep each piece of equipment functioning so as not to disable a linked group or family of machines reinforces the importance of spatial proximity between equipment suppliers and users for major problems of service, maintenance or adjustment (Bergouignan *et al.* 1985).

Moreover, the flexibility that is required by the intensification of competition and *permitted* by the new forms of automation also requires considerable flexibility on the part of suppliers of parts and sub-assemblies. If the final assemblers are competing on the basis of a high level of product diversification, they must be prepared to react swiftly to the changing composition of final demand. This, as noted, is one of the key attributes of the new automated systems: they permit a shifting mix of product configurations on the line without sacrificing scale economies. Frequent modifications of products on the assembly line also requires a very rapid response by suppliers as their product configurations and product mix change as well. The smooth functioning of the flexible line would seem to benefit strongly from spatial proximity of suppliers and final assemblers (Bergouignan *et al.* 1985).

Similarly, within the firm, it appears that the spatial separation of the conception of the product and the production process (design and engineering) from actual production (characteristic of the Fordist model) leads to serious problems of implementation and adaptation. Not only do maintenance workers and programmers need to have access to the machines, as would be expected, but the interaction between design and engineering functions and the programming and operation of the equipment is apparently deepened (Bergouignan *et al.* 1985; Durand et al. 1984).

In other words, the very complexity of the machinery and the much tighter interdependency of machines on the automated transfer line both conspire to render the production process in a sense more fragile. Under the old system, if an individual machine producing for stock broke down, the repercussions were relatively limited: the output from other machines of the same type would enable production to continue. With machines of different types linked together by automated transfer mechanisms, a breakdown in one means the functioning of the entire group is threatened. This means, further, that an extensive spatial separation of the production process from the workers that make the equipment function (programmers and technicians) and even (and more in contrast with the previous system) from the workers who conceptualize the process (designers and engineers) threatens to undermine both the flexibility and the smooth functioning of the entire process.

To recapitulate, the argument to this point hinges on two key factors. First, under current competitive conditions, auto producers face considerable pressure to move away from the previous pattern of broadly standardized output for a relatively stable and homogeneous market toward a posture of flexibility and adaptability to an unstable, highly differentiated and rapidly changing market. This already suggests that spatial linkages will be strengthened as intensified flexibility and adaptability require much tighter coordination of all phases of the manufacturing process from design and engineering through final assembly. Changing competitive conditions also provide the context for the second factor, the adoption of a particular brand of automation technology that tends to foster the reintegration of skills and functions.

It would be an exaggeration to say that the Fordist model permitted the spatial separation and scattering of all functions and skill categories in minute detail (the presence of maintenance workers was always necessary even where labor in production — i.e., on the assembly line — was relatively unskilled). In this sense, the changes discussed here are in some respects a matter of degree. Nevertheless, as flexible automated systems are progressively introduced, there are reasons to believe that spatial linkages that had been previously broken down will be recomposed, both at the level of ties among skill levels within the firm and ties between the final assembler and its suppliers. Furthermore, this process may be facilitated by changes in the cost structure of the firm associated with the introduction of this equipment.

Cost structures and spatial linkages

One of the factors underlying the decentralization of production under the Fordist model was a spatial application of the Babbage principle. In non-spatial terms, the technical division of labor within the firm entailed the splitting up of an integrated production process into discrete tasks. As a first order of analysis, this does not prevent the entire production process from being carried out by individual workers who follow the process through from start to finish; it merely rearranges the way in which they perform their functions. This leaves the individual worker still responsible for a variety of tasks that may range from unskilled to highly skilled within a given production process.

The application of the Babbage principle entails parcelling out different tasks (with their associated skill requirements) to different workers who embody only the skills necessary for that particular segment of the production process. This enables the firm to further reduce costs by paying for only those skills absolutely necessary in every phase of production (cf. Braverman 1974). Unskilled workers performing unskilled functions command a lower wage than skilled workers engaged in more complex tasks.

This particular form of the division of labor certainly can be accomplished in one location, based on segmentation of local labor markets. However, spatial concentration of skills and functions can lead to an upward wage drift across skills levels with the firm, particularly a unionized one. Even in the absence of unions, social and political pressures within a highly concentrated and integrated production facility can undermine the firm's ability to minimize costs through the specialization and disintegration of tasks and their assignment to different categories of workers. One possibility is subcontracting to extend the division of labor across firms and weaken wage drift in any individual unit (Scott 1983a; Holmes 1984). The geographical unevenness characteristic of capitalist development provides another enticing option. This is a more extended spatial division of labor based upon regional variations in conditions of labor supply, i.e., skill levels and wage rates (Massey—Meegan 1982; Massey 1984; Walker—Storper 1981, 1985; Bluestone—Harrison 1982).

With the current emphasis on intensifying international competition and the concomitant necessity of further reducing costs of production, it would seem likely that this principle would be further reinforced. Auto producers should be intensifying their search for the lowest cost areas of production that are feasible (in terms of available skills) for production. In this sense the increasing spatial linkage across skills evoked above threaten to be undermined by the potentially higher costs involved in linking different functions together as this would necessarily be in those generally higher cost areas where the higher skilled workers (i.e., programmers and engineers) are available. Yet there are, perhaps, countervailing tendencies arising from changes in the total cost structures of the firm.

First, through increased automation, the firm is already benefitting from a reduction of labor costs through a reduction of employment.[3] Though the changes in skills mix alluded to earlier mean that individual workers may command higher salaries, the overall weight of labor force cuts, even if these are largely in the unskilled categories, would still appear to leave a significant margin for cost savings by the firm. Moreover, the higher wages of some workers may be expected to be offset by productivity gains.

Second, and partly consequent on the first point, there is some evidence that the labor cost 'problem' is being superceded by a problem of capital utilization. This, at least, is the conclusion of Durand *et al.* who argue:

"... automation means the first order problem is no longer direct labor costs but the costs of amortizing the machines, of down time and, even more, of the complete cycle of the product (from research, organization and preparation through machine finishing)" (Durand *et al.* 1984, p. 28).

They quote one manager who observes that in his area of responsibility:

"The share of labor in these costs is no more than 30%. The yield of the transfer machines (on the integrated production line) represents 75% of the problem. Faced with this problem, I consider the whole of the workforce without distinguishing between direct and indirect labor in my price calculations" (Durant *et al.* 1984, p. 165).

The efficient utilization of capital is not a new problem for the firm, particularly those in capital-intensive industries. Again, this may be more a matter of degree or, more precisely, of the relative magnitude of different cost problems faced by the firm. The important point here is that, insofar as capital utilization is tied to the existence of a (spatially-bounded) polyvalent work force, the cost savings that could be achieved through a more extensive spatial division of labor become less compelling.

There is a further dimension to this issue, however. It has been persuasively argued that spatial decentralization of production is not merely a cost-reduction phenomenon. Spatial separation also weakens the ability of workers to organize, or even if unionized to effectively assert demands in the areas of work rules as well as wage rates (particularly in the case of multiple sourcing of products, a strategy widely employed in the auto industry). Moreover, decentralization to formerly lagging or 'peripheral' areas means access to a labor force lacking in a strong industrial tradition and more amenable to management demands, particularly in the area of accepting new production technologies (Bluestone—Harrison 1982; Holmes 1984; Massey 1984; Massey—Meegan 1982; Scott 1983a; Storper—Walker 1984; Walker—Storper, 1981).

Given the highly interdependent nature of the production process that is related to the introduction of new technologies, it may be the case that the search for a relatively pliant workforce will be further intensified as work stoppages in one segment of production will drastically affect other areas. If indeed new facilities are to be more highly spatially integrated than in the past, this integration may occur in the so-called peripheral areas for reasons of improved labor control. This could accelerate the shift away from older industrial areas with a strong tradition of worker militance.

Yet, there are mitigating factors. The current crisis in the auto sector already has enforced a considerable amount of 'labor discipline' as is evidenced by wage concessions and the acceptance of increased flexibility in the area of work rules (*Business Week* 6/21/82, 4/26/82, 11/30/81; *Economist* 3/2/85). Moreover, the adoption of new labor relations practices (i.e., quality circles) may be viewed as a way to 'manage' the problem. If a chastened workforce can be encouraged to participate in the development and adoption of new technologies and new ways of working, then the incentive to move is diminished.

The recent decision by General Motors to site its new, highly automated Saturn facility in Spring Hill, Tennessee (population 1,000) might appear, at first glance, as a classic attempt to escape from a traditional unionized labor force. Yet, it appears that not only did the union participate in the planning process for the new facility, but that the majority of workers at the Saturn plant are expected to be drawn from existing General Motors facilities (*New York Times* 7/31/85). Part of the location strategy in this case may have been to increase the likelihood of unionizing the nearby Nissan plant, benefitting both the UAW (United Auto Workers) (through extending the reach of the union) and GM (by forcing its Japanese competition to play by the same rules) (*Economist* 8/3/85).

Some caveats

Before moving to the discussion of the organization of production, a few cautionary words are in order. Particularly in view of the recent nature of the changes evoked, the situation remains quite fluid.

For example, a key question that should be raised concerns the likely duration of the tendencies described. Part of the argument to this point is based on the complexity and, indeed, the *newness* of the technology. Over time, it must be anticipated that some of this complexity will diminish. Newer generations of equipment are likely to be both simpler and more reliable as early problems and bottlenecks become apparent and efforts directed to resolving them. Moreover, increasing experience on the shopfloor will undoubtedly provide lessons in the utilization of the equipment that will also tend to diminish the relative fragility of the production process alluded to above (Rosenberg 1982). As management fears about the ability to keep the whole process functioning smoothly are allayed, firms may be encouraged once again to pursue a strategy of more extensive spatial separation.

The second question concerns the nature of proximity: how close is close? Does the polyvalent workforce literally need to be assembled together in one location or within a given subnational region? Or are travel times of, for example, half a day or a day—at least for the most highly skilled workers such as designers and engineers—acceptable? In the latter case, although location within one country may still be advised, the possibilities for a fairly extensive regional division of labor still exist.

Third, it was stated above that part of the new flexibility in production is a function of the redesign of the product rather than the production technology itself, i.e., the simplification of the vehicle and the standardization of some components that can be used in a variety of models. This standardization suggests the possibility that some segments of the production process can still be safely decentralized even as flexibility in the final product configuration reinforces other spatial ties (i.e., between the final assembler and suppliers whose output must be coordinated with the changing patterns of demand). With experience and further design work, the share of standardized parts may increase relative to those that change from model to model or from car to car.

Fourth, an essential part of the argument to this point may be summarized by saying that both the new forms of competition and the new technologies in use require improved and speeded-up information flows across the various parts of the process (from design through final assembly) in order to achieve needed flexibility and rapidity of response to demand shifts. One must, therefore, reckon with the possibility that improvements in information and communications technologies may mitigate the need for direct personal contact. This is most clearly the case for transmittal of changing product specifications within and across firms via, e.g., linked computer networks. It may also be true for other operations such as remote troubleshooting in the event of machine malfunction, particularly as the machinery is simplified (e.g., through modularization of key electronic components). Finally, the implications of these changes may not be equally strong across all segments of the production process. The issue of standardization of some parts and components has been noted. Moreover, it appears that the processes most affected have been in such areas as machining and components production rather than assembly itself (Bergouigan *et al.* 1985).

Nevertheless, as will be argued below, the spatial implications of the recent changes in the industry do not stand on technology alone. A second, and possibly more far-reaching factor, concerns the organization of production.

The organization of production and spatial linkages

One of the better known imports from Japan in recent years has been the concept of *kanban* or the 'just-in-time' system.[4] Although usually thought of strictly in terms of inventory control, the *kanban* system is intimately linked with the overall organization of production within the plant, and between the final assembler and its suppliers. The result has been described as "an integrated, synchronized conveyer system" (McMillan 1984 p. 214), one of whose chief benefits is dramatically reducing the amount of time required to produce an automobile (Altshuler *et al.* 1984; Abernathy—Clark—Kantrow 1984; Sugimori *et al.* 1977). Inventory control, however, is an essential part of *kanban* and one whose implications for the spatial allocation of production are readily apparent.

The traditional method of production control in the industry relied on the maintenance of large stocks of work-in-process inventory across all segments of the production process. This system is not without certain benefits. The stocks function as buffers against bottlenecks, equipment breakdowns, work stoppages, or sudden increases in demand. It is also an important factor permitting the extensive spatial decentralization of production as relatively long lead times (including transit) can be tolerated by the system.

There are, on the other hand, important costs associated with this arrangement. In the first place, large inventories represent dead stock, increasing overhead charges and lengthening the turnover time of capital (cf. Holmes 1984). Second, costs are increased through the inefficient use of fixed capital stock and labor. The traditional system often creates serious imbalances of stock between different segments of the production process as each process has its own characteristic cycle time. As these imbalances worsen, some equipment and groups of workers will be rendered temporarily surplus, again representing dead time to the firm (Sugimori *et al.* 1977).

The *kanban* system entirely changes the timing of the production process, insofar as possible, parts are produced as needed and inventories are kept to a minimum. The timing is established by the final assembly process, which calls up components and subassemblies as needed. Parts are, in a sense, pulled through the system as all preceding processes adjust their output (both the quantity and configuration) to the requirements of the following stage (Sugimori *et al.* 1977; McMillan 1984).

The cost savings extend beyond the reduction of inventories. Notably, although individual pieces of equipment may still be temporarily in 'surplus' as they are producing parts only on demand, this is not true for workers.[5] A key element of the system is that workers are not tied to specific machines but are responsible for multiple operations within a given zone (Sugimori *et al.* 1977; McMillan 1984). The parallel with the earlier discussion of 'polyvalent' workers will be evident.[6] Significant cost savings accrue from the fuller utilization of the time of individual workers and also through the possibility of reducing overall employment levels through the elimination of a certain amount of overmanning, which results when workers are tied to specific machines.

The spatial implications of this are twofold. The first is that the timing and coordination of the flow of parts among processes becomes a crucial variable in the absence of buffer inventory stocks. Whether a specific process is performed within the firm or subcontracted, there is a heavy emphasis on flexibility and rapidity of response to the changing demand requirements imposed by the final assembly stage. For subcontractors in particular, this means frequent deliveries of small batches of output to the final assembler. The logistics of the system greatly reinforce spatial ties among the various segments of the production process (Holmes 1984; Sheard 1983; *Business Week* 6/21/82).

Not surprisingly, the auto production system in Japan, itself, is marked by strong spatial clustering (Sheard 1983). Among other things, this emphasis on spatially integrated production may help to explain Japanese firms' relative slowness in engaging in foreign direct investment until spurred by protectionist measures (Sheard 1983; Hill 1983). It is notable, in this context, that Japanese producers that have established plants in the U.S. have drawn a number of their suppliers who have located in the same areas, Ohio for Honda and Tennessee for Nissan, for example (*New York Times* 8/2/85, 8/10/83, 7/6/83).

The second spatial implication bears on the cost structure of the firm and echoes the argument elaborated above concerning the relative magnitude of cost problems faced by the firm. It should be clear that the organization of production under *kanban* offers significant cost savings to the firm, and this not just through the reduction of inventory costs. In the first instance, idle time of equipment and most especially of workers is kept to a minimum. Secondly, the amount of time required to produce an automobile is drastically reduced. Altshuler *et al.* estimate that Japanese manufacturers can build an automobile with only 65 percent of the labor hours required by U.S. firms (Altshuler *et al.*, 1984 p. 159). Significantly, this does not appear to be the result of the use of superior technology in production. Though no systematic studies have been carried out, Abernathy, Clark and Kantrow suggest that the technology employed in U.S. and Japanese auto firms is roughly equivalent. They further estimate that the capital employed per unit of output is lower in Japanese facilities than in the U.S. (Abernathy—Clark—Kantrow 1984; cf. also Altshuler *et al.*, 1984 p. 160). In the same line, Sugimori *et al.* estimated that in 1970 the turnover ratio of working assets for Toyota (which originated the *kanban* system) was a startling ten times greater than that realized by two U.S. competitors (Sugimori *et al.*

1977, p. 563). Thus, it appears that it is in the organization of production itself Japanese producers realize a significant share of their cost advantage compared with foreign competitors.

The result, again, is that the relative significance of the labor cost 'problem' is attenuated, as are the benefits of a more extensive spatial division of labor. Matching skill requirements in different segments of the production process to the lowest cost geographic source of labor supply for each skill category will have a relatively weak impact on the total cost structure of the firm. Indeed, extensive decentralization imposes additional costs by disrupting the flexibility and the smooth functioning of the kanban system.

The result is the reassertion of the role of external or agglomeration economies within the industry that counter trends toward the decentralization and dispersal of different segments of the manufacturing process (cf. also Lapple—van Hoogstraten 1980). However, this phenomenon differs in at least one important way from the traditional view of agglomeration economies.

Specifically, these economies are not mediated through conventional market relations. The final assembler can, in a sense, construct its own agglomeration economies, whether this occurs within a vertically integrated firm or through its close contractual (and in some cases partial ownership) relations with suppliers. In this sense, the prior existence of an agglomeration, even an industry- specific one such as Detroit, does not necessarily draw production to it. Nissan could establish a classic 'greenfield' plant in Smyrna, Tennessee because it could induce its suppliers to follow it.

This effect holds true in terms of labor markets as well. The reliance on spatially integrated production suggests, *ceteris paribus,* that the higher skill functions will tend to dominate the siting of the production complex. While pools of unskilled labor for unskilled operations can be found virtually everywhere, this is not necessarily the case for higher skilled workers. These must be available for the system to function, suggesting the need to locate near supplies of skilled labor. However, GM's solution for Saturn, as indicated above, is evidently to import the necessary workers, a strategy that is eminently feasible given the slackness of the automobile labor market as a whole.

The result is that an element of footlooseness enters into the picture insofar as the question of where production will be reconcentrated—and agglomeration economies constructed—is still open. The precise conditions under which a firm will choose to site new facilities near an existing specialized industrial agglomeration (e.g., GM's highly automated, kanban-based Orion facility outside of Detroit) versus a greenfield location (Saturn in Tennessee) remain to be specified.

In the case of the Saturn plant, for example, the choice of Tennessee was reportedly influenced by the geographic shift of the U.S. market towards the sunbelt so that a Tennessee location offers reduced freight costs to a broader market than does Detroit *(New York Times* 7/31/85). Nevertheless, the new location is easily within a one-day delivery time for parts produced in the older industrial agglomeration.

This again raises the question of the meaning of spatial proximity. Thus, although it has been argued here that the new forms of organization of production will tend to foster the spatial reintegration of production and to strengthen input-output linkages within a given region, the boundaries of this region may be relatively broadly defined.

It may be observed that the entry of Japanese producers into the U.S. market via direct investment has to date been based largely on final assembly of components imported from Japanese plants. This may appear to undermine the argument concerning spatial re-integration. I would argue, however, that this is to be expected in the early phases of a foreign investment effort and that, over time, local vertical integration, relations with local (domestic) suppliers or parallel investments by Japanese suppliers should become more extensive (*New York Times* 11/29/84; *Business Week* 1/23/84).

Applicability to other sectors

An important issue in terms of regional development and regional development strategies is whether the trends identified here are specific to the automobile industry or may be expected to arise in other sectors as well. I would argue that the possibility of extension to other sectors depends on three principle factors: the nature of production, the characteristics of industrial organization, and the nature of competition. Thus, for example, this style of organization appears more likely in sectors characterized either by continuous flow processes or by the assembly of large numbers of discrete components, particularly when the final product configuration is variable and a significant share of these components are subject to variation as well.[7]

Equally important, however, is the structure of the industry. It seems likely that this should be, as in the auto industry, marked by extreme concentration and significant monopsony power on the part of the final assembler on the one side, with a large group of smaller, competitive parts suppliers on the other (cf. Scott 1983b; Holmes 1984). Where the final assembler is extensively integrated vetically, it clearly has the power to coordinate the location of various segments of the production process. But insofar as it buys in parts from other firms, it must have the market power to effectively influence their location decisions in order for the system to function smoothly. This is most clearly the case where its purchases account for a large share of the output of a given supplier.[8]

Finally, competition in the industry should be based on product performance and attributes rather than strictly price. This gives rise, as argued above, to a significant emphasis on flexibility, continual modification of products, and rapid adaptation to market changes.

One sector that appears to match these criteria rather well is the computer industry. IBM, for example, is promoting what it calls 'computer integrated manufacturing' (CIM) in its own production facilities. They place prime emphasis on flexibility to ensure that a new product can be brought rapidly to market and that manufacture can be switched readily from one product to another (*Financial Times* 7/9/85). Significantly, according to IBM

"CIM is a concept which wipes out the 'old rules' under which design and manufacture takes place in self-contained areas like sales order input, product design, engineering, testing, planning, stores, materials handling, production lines, packaging and dispatch" (*Financial Times* 7/9/85).

As in the case of automobiles, IBM has relied extensively on automated production, requiring the redesign and simplification of products. The result, at their Kentucky typewriter plant, is that it now takes half an hour to build a machine instead of half a day. This has changed their cost mix for materials, labor, and overhead from 48:10:42 to 77:8:15 (*Financial Times*

7/9/85). The small share of labor costs suggests no great advantage would be obtained from a more extensive spatial division of labor (for example, locating assembly in Mexico or overseas).

Moreover, IBM appears to have adopted the *kanban* system as well. According to one of its own advertisements concerning a facility in the UK:

"Computer links between IBM and suppliers' warehouses, and within the factory, mean that parts arrive for assembly when and where they are needed, making continuous flow manufacture possible" (*Financial Times* 6/28/85).

Whether the technological and organizational changes evoked in this paper—along with their associated spatial repercussions—will become increasingly widespread across sectors remains to be seen. Nevertheless, this is not a phenomenon that applies solely to the automobile industry.

Conclusion: implications for regional policy

At the outset of this paper, it was argued that the spatial disintegration of skills and functions within the modern corporation and the resulting extensive spatial division of labor has posed serious problems for regional economic development and the implementation of regional policy. Growth paths have been weakened and individual regions left more or less vulnerable, depending on their position in the spatial hierarchy by this lack of spatial integration. What was described as integrated and self-generating growth becomes ever more difficult to achieve in the face of attenuated and shifting spatial relationships of various elements of the production process. By the same token, regional policy, which is dependent on well-defined spatial linkages, remains a dubious and frustrating enterprise.

However, there are signs that some of the forces underlying this spatial division of labor are being transformed. For the automobile industry, the adoption of new technologies and new ways of organizing production appear to be strengthening spatial relationships across skills and functions within the firm and between a firm and its suppliers. At the same time, alterations in the cost structures of items attendant on these changes tend to reduce the importance of one of the key benefits of an extensive spatial division of labor: minimizing labor costs by locating various activities of the firm at the lowest-cost source of supply that offers appropriate skills for each activity. It has also been argued that, depending on competitive conditions and industrial structure, these changes may be expected to influence firm strategies in other sectors.

These changes, then, appear to augur well for regional policymakers. The successful implantation of one investment will be more likely to lead to complementary investments in the same region. In this sense, regional policy is less likely to be a numbing succession of hard-fought 'one-shot' deals. The spatial re-integration of skills also means that the region is less likely to develop a highly vulnerable 'skills monoculture'. The prospects for integrated and self-generating growth appear more promising.

Nevertheless, there are some important caveats that should be kept in mind. Among the more important are the continued relative footlooseness of these newly-integrated investments. Within an advanced capitalist country such as the U.S., the range of skills needed to support a more integrated production complex, if not ubiquitous, are at least widely available. Moreover, as is deomonstrated by the Saturn location decision, the appropriate skills mix can be created by the firm through the importation of labor. Thus, even a sector-specific industrial agglomeration, such as Detroit, can be bypassed in favor of greenfield locations in semi-peripheral or peripheral areas. What might be perceived as the natural advantage of an existing industrial agglomeration can still be rendered insignificant in the face of the corporation's power to create an industrial landscape of its own choosing.

Second, the spatial boundaries of an integrated production complex, given modern transportation and communications systems, may be relatively large, even if not thoroughly atomized. Saturn, again, is a case in point. Headquarters and engineering operations will reportedly be located in the suburbs of Detroit, although this may in part reflect a desire to placate GM's home state of Michigan (*New York Times* 7/30/85).

Thus, from the point of view of individual regions, the situation remains murky. Although the spatial linkages exist, the geographical horizons of the firm are not thereby inordinately constrained. The power to choose locations from a wide variety of areas—and indeed to construct appropriate factor supply conditions in any particular place—still resides wholly with the corporation. The best that can be said is that, once committed to a location, there is a greater likelihood that additional complementary investments will be induced in the region in question (however broadly defined) and that the investments will be more stable geographically as it is no longer a question of gradually devaluing a particular plant but an entire industrial complex. In this way, the favored region will be more likely to exhibit the attributes of functional and occupational integration (the polyvalent workforce) and self-generating growth/linked investments. There remains, however, the central question of which region will be so favored and why.

This question should underscore the need to avoid a determinist approach to understanding the relationship between technological change and the geography of production (cf. Walker 1985). In the first place, the technology itself does not merely appear to be subsequently matched up with the characteristics of particular locations. The kinds of changes considered here are the result of a complex set of factors including changes in the nature of the market and the conditions of competition, as well as problems arising in the sphere of labor-management relations. The new technologies and organizational methods may alter the locational possibilities and constraints faced by the firm, but they in no sense dictate the outcome. Thus, although the changes may introduce a certain inflexibility (i.e., the need for spatial proximity or the reliance on skilled workers to keep the new machinery functioning), the power of the firm to mold and re-mold the industrial landscape is not, for all that, seriously threatened.

Notes

[1] It will be apparent that the analysis thus far emphasizes, if not a demand-pull model of technological change, at least one that is closely linked to changes in the market and the nature of competition. While not accidental, this emphasis is not meant to obscure the impetus to technological change arising from, e.g., the existence of technological problems, inefficiencies, bottlenecks and the like within the sphere of production itself (cf. Piore 1968; Rosenberg 1984); or, most particularly, the conflict inherent in the capital-labor relationship. On the latter point, it is evident that if the Fordist model proved ultimately to be vulnerable in the marketplace,

it was no less of a problem in the sphere of production and labor relations (Aglietta 1979; Mandel 1974; Bonnafos *et al.* 1983; Durand *et al.* 1984).

[2] It should be noted that, in this context, the use of the term 'reskilling' may be misleading as there is no *a priori* reason to expect that unskilled workers will be upgraded to the new categories.

[3] The extent of potential labor savings is indicated by GM's plans for a plant producing a 'family' of axles for different models that is described as "an automated, highly flexible manufacturing complex that can operate for an 8-hour shift without any human production workers" (*New York Times* 10/24/84).

[4] GM, for example, had introduced *kanban* in 65% of its domestic plants by 1982 and expected to be entirely converted to the new system by 1985 (*Business Week,* 6/21/82).

[5] In fact, it appears that the *kanban* system may entail somewhat higher fixed costs, but these are countered by a substantial reduction in operating costs (McMillan 1984: 214).

[6] For this reason, the *kanban* system cannot be fully operationalized in the presence of the rigid work rules and task demarcations that have been characteristic of the industry in the U.S. and which have historically been strongly defended by the union—not without reason. However, in its current straightened circumstances, the UAW (United Auto Workers) has evidently been willing to accept modification of work rules in some plants in exchange for union participation in decision making and some assurances concerning job security (*Financial Times* 7/3/85; *Economist* 3/2/85, 8/3/85; *New York Times* 8/3/85).

[7] The use of the term 'variable' is intended to suggest something slightly different from the concepts of standardized versus unstandardized, although these also may be at issue. At a minimum, the configuration of the components, even if functionally quite similar, varies in accordance with variations in the final product configuration.

[8] There is some evidence that the U.S. auto producers are, following the Japanese model (Sheard 1983), turning to long term contractual arrangements with a smaller group of suppliers. (Holmes 1984; *Financial Times* 7/18/85).

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THE HETEROGENEITY OF INDUSTRY CHANGE, COMPETITION, AND REGIONAL IMPACTS

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KEY-WORDS: *business* strategies; *differentiation,* intraindustry ~, strategic ~; *industrial* change, ~ deconcentration, ~ evolution, ~ heterogeneity, ~ organization, ~ segmentation; *innovation; monopolistic* advantage; *organizational* learning, ~ structure; *product* life cycle.

This paper shifts our focus from macroeconomic problems of regional development to the regional development implications of industrial activities. The specific focus is on the varied activities of businesses within a given industry, and how this variation may affect regional development. Analysis of locational adjustment patterns and regional economic impacts of industrial change requires recognition of several kinds of heterogeneity: of the types of enterprises within the industry; of types of facilities within the enterprises operating in the industry; and of the processes and products logically classified within the industry. This paper explores the relationships among industrial change and these sources of heterogeneity in the reactions to change as a first step toward improving the analysis of regional implications of industrial change. Following a brief description of the relationship of this paper's questions to those of other papers in this collection, the considerations underlying industry change and intraindustry differentiation are presented, in turn.

Industrial deconcentration

In light of the paper by Dr. Barta concerning industrial deconcentration—the establishment of industrial activities outside of core areas—several questions come to mind about the nature and ultimate extent of deconcentration. These questions can be summed into the sentence: *which* enterprises, in *which* industries, deconcentrate *which* activities, when? This paper has a primary goal of exploring the first question. The second question is best studied with attention to production costs and competitive structures, using frameworks from industrial economics and industrial organization. The third question has regional development implications for material and service linkages, occupational types, wage levels, and level of technology. These implications are a part of the spatial division of labor that Professor Glickman addresses in his paper. The dynamic aspects of industrial deconcentration—when activities will be established outside of core areas—requires study of regular changes in industrial markets, costs, and technology. The next section of this paper provides one possible framework for the study of industry change. Additional insights can be gained from the product life cycle (PLC) model developed by Vernon (1966, 1974) and his followers, when it is recognized that the PLC model

*The author would like to thank Christopher Montante for his valuable assistance in compiling the case studies.

is most applicable to industries with particular characteristics (income elasticity of demand, geographically dispersed markets, and oligopolistic industry structure). Dr. Schoenberger's case study of the automotive industry illustrates the extent to which detailed study of particular industries is required to identify all relevant considerations in a process of industrial deconcentration.

Industry change

Industry change is a multidimensional concept. In an attempt to generalize the nature of change in locational factors of importance to an industry, Harrington (1983) inspected tendencies for development of particular aspects of industry requirements and competition. Information appeared as a key consideration. The generation, use, and sale of information regarding markets, production technology, and future operations influence the nature of competition in an industry. Changes occur as suppliers, producers, and purchasers gain information through experience. Increased information brings changes in the nature of products and production, the equipment and materials purchased by producers, and the criteria for market success. Porter (1980) used the term 'industry evolution' to cover a range of changes in "the forces driving industry competition" (p. 4): bargaining power of suppliers and purchasers, threat of new entrants or substitutes, and nature of competitive rivalry. These changes affect the nature of feasible business strategies, or feasible bases for Schumpeterian dynamic monopoly. These business strategies determine the nature of labor and material employment, size and nature of production operations, and size and nature of enterprises involved, with implications for the locational factors and local impacts of facilities. First, however, attention must be focused on the range of enterprises within the industry and the type of monopoly that may be achieved by certain of these enterprises.

Sources of industry heterogeneity

There is a set of interlocking sources of dynamic, imperfect competition in key industries of a modern economy. Resultant quasi-monopolies provide the heterogeneity of response to industry change (including locational responses) that is the topic of this paper. Four sources are inspected below:

1. monopolistic competition based on product differentiation;
2. monopoly aspects of proprietary information within enterprises, generated by organizational learning;
3. heterogeneity in input requirements (including varied extents of labor, material, and information internalization) based on differences in enterprise strategy; and
4. segmentation of an industry (or of a complex of closely-linked industries) into leading, independent, and dependent sectors.

Monopolistic competition. Chamberlin (1962) introduced product differences within an industry as a firm-level decision variable and as a source of imperfect competition quite independent of (and more important than), a restricted number of sellers or the potential for increasing returns to scale. The difficulty or cost of purchaser substitution among products from different sellers determines the elasticity of demand facing an individual seller and, at some extreme, the boundaries of the 'industry'. Even before Chamberlin's 1933 first edition, discussion of individual sellers' markets protected by geographical or product distance had entered economic literature (Straffa 1926; Hotelling 1929). Despite the use of a geographical analogy to product differentiation in Hotelling's and subsequent work, these conceptions of product differentiation are insufficient for the current treatment of industry heterogeneity. Insufficiencies stem from their recognition of only the one source of heterogeneity and from their assumption that monopolistic competition will potentially reach an equilibrium across protected markets, with prices and profits enforced by the partial substitutability of products.

Information-based monopolistic advantage. Schumpeter (1950) recognized the wide range of potential monopolistic advantages ("the new commodity, the new technology, the new sources of supply, the new type of organization" p. 84) that could be gained by sellers, providing monopoly profits through lowered costs or lowered demand elasticity. These advantages are transitory, however, because they are based on information from which the seller may derive benefits only temporarily—until the information is no longer unique to the seller or until a superseding advantage is developed by that of another seller. This Schumpeterian interpretation of monopolistic advantage is most reasonable in an industry undergoing rapid change, an industry linked to a rapidly changing industry, or an entire industry in danger of being superseded by processes or products from a new or previously non-competing industry. The corporate planning and systematic, scheduled innovation that have become a part of the late-twentieth-century economy means that most economic activities are susceptible to change in at least one of these ways. In such a rapidly changing context, amortization of physical or developmental investment is the major motivation for the relative security afforded temporarily by a monopolistic advantage. Each temporary advantage brings with it a unique set of locational factors, stemming from specific inputs or markets, process stages, organizational structures, and occupational demands. Certain sellers may become most adept at creating a particular type of monopolistic advantage by specializing their resources for information generation, thereby stabilizing their (locational) resource demands. (See the discussion of strategic specialization, below).

Information-based advantages as well as material-based advantages create certain forms of developmental inertia for individual sellers. With respect to information-based advantages, the generation of successive information to maintain a monopolistic advantage entails organizational learning. Organizational learning may be defined as the regular, internalized learning of proprietary information. Learning has occurred when a decision has been conditioned by evaluation of the results of a previous action as well as by assessment of the relevant environment for the action (Day—Tinney 1968). Simple organizational learning entails modification of tactics with respect to current goals of the seller. Shifts in input proportions or marketing strategy, in response to past performance, represent the kinds of 'along-the-rule' changes engendered by simple learning (Argyris—Schon 1978). These changes may be the basis for generally short-lived monopolistic advantages of the seller. More significant redirection of the seller's mode of operation, potentially including entry into or exit from entire markets, results from complex organizational learning. Implementation of organizational learning is hindered by inertia caused by the organization-specific characteristics and assets (management, equipment, location) acquired via earlier decisions. The experience-based nature of organizational learning and the difficulty of rapid change in organization characteristics and assets combine to create evolutionary paths of change, including the changes in monopolistic advantages held by sellers. These changes are motivated by industry change and by the temporary nature of information-based monopolistic advantages.

Vernon (1974) recognized that certain industries maintain imperfect competition via information-based monopolistic advantages specific to individual sellers. He termed such industries the "innovation-based oligopolies," and posited that facility-location decisions among such sellers differ from the decisions of sellers involved in "scale-based oligopolies." In the former case, location of the facilities most directly responsible for generating advantage- yielding information depends upon the type of information and its point of application within the seller's organization. Applied technical research may be used widely within the organization, and (at a sufficient scale) may be located "where input costs are lowest" (p. 92). Product or process development, more immediately appropriable within the seller's production, should be centralized to maximize communication among marketing, planning, and production facilities. This centralization may occur at the corporate or divisional level, depending on the size and heterogeneity of the overall organization. Marketing-related information generation tends to be centralized in similar fashion. Location of production facilities in innovation-based oligopolies is influenced by development location, market location, and factor-cost differentials. Vernon modeled industry structure as proceeding from innovation-based to scale-based oligopoly, and then potentially to senescent or regulated oligopoly. During these latter two stages of purported industry development, information generation is less important for competition, and location decisions are based on concerns of production-unit scale, spatially variable input cost, and market location.

Strategic differentiation. Besides differences in the specific products offered, process used, or management structure followed, sellers in the same industry may differ in more general policies followed in deciding among products, processes, and structures. In the business literature, such policies are termed strategy, and have the goal of allowing an enterprise or business unit to deploy and modify its resources to maximize performance within its environment of competitors, quasi-competitors, and input and product markets (Hofer—Schendel 1978). The strategic match pursued by an enterprise is modified as the environment it faces changes or is expected to change. The rate of modification is dampened by inertia in enterprise characteristics. Nonetheless, interpretation of strategy is impossible without recognition of the changing and projected context of the particular enterprise (Schumpeter 1950, pp. 83-84). Within a single industry, sellers may pursue different strategies because of: heterogeneity of the fixed assets (skills, experience, organization, physical capital) associated with the sellers; differences in the locations of these assets; the imperfection of markets for exchange of these assets; and the heterogeneity of buyer preferences in some markets (Newman 1978; Caves 1980, pp. 64-65). The resources and markets sought by and allocated within an enterprise are spatially variable, and the enterprise's internal allocation must be spatially manifested. Therefore strategy, along dimensions appropriate for the industry under investigation, may be a key to enterprises' geographical distribution of activities and resultant local impacts.

Strategic differentiation provides a basis for distinguishing levels of competition among sellers in an industry. Within an industry, the greatest competition is within groups of sellers pursuing similar strategies. Separation between strategic groups is maintained by barriers that are the various fixed factors associated with each seller (Porter 1979, p. 215). Definition of strategic groups, i.e., selection of the appropriate dimensions of strategy along which to group sellers, differs with the industry type and the investigative purpose.

Industry segmentation. Significant differences in the total resources and independence commanded by sellers provide an additional source of differentiation within and across industries. Taylor and Thrift (1983) conceived an economy to be composed of small (peripheral) and large (central) enterprises, differentiated not only by relative size but by measures of complexity and power that are causally related to size. Their segmentation model was patterned after Averitt (1968), who divided the economy into center and periphery enterprises according to the enterprises' size, industry, and dominance within the industry. For Averitt, the dominant technology within an industry (itself a technologically defined concept) determines the mix of enterprise types and the nature of competition within the industry. Enterprises producing (physical or service) output by (i) individual units or in small batches face few economies of scale, and operate much like the firms in neoclassical theory. Averitt assumed some product differentiation so that these small enterprises may have a competitive goal of manipulating their prices to maximize profit, via strategies of market segmentation. Averitt provided a review of the machine-tool industry of his day as a periphery-enterprise-dominated industry due to its small batch methods, slow rates of technological change, and market cyclicality. More recent changes in this industry would make a very informative case study of structural changes accompanying product and process technological change. Numerically controlled and fully computerized machine tools have increased the industry's capital and R&D investment, and will potentially change marketing strategies and industry structure. The geographical manifestation of the reorganization within and among enterprises will reflect both the changes within the industry and intraindustry differences in reactions to the changes.

Enterprises engaging in (ii) large batch or mass production realize scale economies that make oligopoly with price leadership the natural market structure. The enterprises' goal should be to minimize costs and lower prices to increase market share and maximize profit within a setting of informally administered prices. Attention is thereby focused on production technique and productivity. Enterprises engaging in (iii) process production observe that "unit costs will automatically fall until existing plants are operating quite near their engineering capacity" (pp. 31-32). Prices are flexible downward only. Enterprises' competitive goals are to stimulate long-run increases in demand via marketing (cost-reduction in intermediate markets, advertising in consumer markets). Averitt (p. 34) made the prescient remark that [in mass production] "close managerial supervision of the human element in production pays handsome cost economies .... As old-style mass production techniques become automated, removing low-skill labor from the line, mass production management shifts its attention to marketing. Automation blurs the original distinction between mass and process production."

From a survey of 110 large manufacturing establishments in New Jersey, Blau *et al.* (1976, p. 34) concluded that while mass production technologies entail routine work and simple administrative structures, the introduction of process technology or the computerization of support activities increased the importance of specialized skills and the structural complexity of the establishment.

Small or peripheral enterprises may be grouped according to their relationship with the center. Backward or forward 'satellites' depend upon contractural relationships with, and sometimes on financial credit from, center enterprises. 'Loyal opposition' enterprises operate within center-dominated industries, competing in small market niches or under leading-enterprise price umbrellas. Averitt (1968, pp. 90-91) noted the possibility of small-share specialists competing in a center-firm-dominated industry, via close attention to a single segment of the center competitors' market. 'Free agents' operate in industries not dominated by center enterprises, generally industries very close to raw materials or to final consumers in the production chain.

Because of the requirements of the dominant technology in an industry and the peripheral-enterprise's supply, demand, or price dependence upon center enterprises, it is difficult for a peripheral firm to become a center firm. Organizational constraints—internal change from an entrepreneurial to general-manager to multidivisional management—also inhibit the metamorphosis. Finally, financial constraints face rapidly growing periphery enterprises. A peripheral enterprise requires a small initial capital, from entrepreneurial savings augmented with bank debt. To grow rapidly, equity participation is often required, without the feasibility of a public stock offering. Later, public shareholders may be sought—and may not be found. The availability of venture financing seems to be dependent upon the widely perceived growth prospects of an industry as a whole. In the majority of industries, not so well perceived, the primary vehicle for transition from periphery to center is acquisition. Loyal opposition enterprises are the favored acquisition target, as larger enterprises attempt to gain market shares and/or expand product lines. The benefits of dominance are many. Averitt (1968, p. 71) argued that "center firms maintain better geographical and product diversification—thus center firms can withstand losses in one area or on one product indefinitely," if the presence of that market segment assists the enterprise indirectly (via linked sales) or forms a barrier to competitive entry.

Summary. These four interpretations of the differences in sellers' relationships and responses to industry change are not mutually exclusive. While Schumpeterian monopolistic advantage may be the most general framework for intraindustry differentiation, it is usefully augmented by Chamberlin's emphasis on one form of differentiation, by the regular pattern of policy decisions entailed in strategic differentiation, and by a recognition of unequal capabilities and dependencies among sellers. The following case studies provide examples of imperfect competition within a rapidly changing industry, resulting in specializations of business strategies and of locational needs and impacts of varied activities of the sellers.

U.S. semiconductor manufacturers, 1958-1980

Regional development efforts by most U.S. counties and states have placed a great emphasis on the location of manufacturing establishments. Establishments involved in the production of electronics components (such as semiconductors) and final electronic products have been especially desired, because of the current and projected growth rates of demand for these products. Therefore it is important to investigate the possibility that differences among companies within the same electronics-based industry affect the locational decisions or the local developmental impact of the companies' establishments.

Segmentation among U.S.-based manufacturers of semiconductor devices can be used to illustrate some of the relationships posited above because of the characteristics of the industry during the study period. Though a specific semiconductor device is quickly standardized throughout the industry, proprietary information is crucial for the development of new devices, devices with slightly different specifications, and processes to produce devices more cheaply or more reliably. During the study period, semiconductors were produced by companies of drastically different size and market power, from AT&T and IBM to new companies employing only 100 people. Similarly, the strategies of the companies varied along dimensions of vertical integration, breadth of product line, and emphasis on cost-cutting versus highest specifications. Analysis of the influence of these differences on location of industry facilities is aided by the relative unimportance of material- or product-transport considerations and by the rapid growth of the industry during the study period (allowing the location of many new facilities).

Marshall (1982, p. 1680) suggested that longitudinal case studies, stressing strategic options and decisions, be used in a discussion of strategies' implications for localities. The following case studies of three companies in the semiconductor-device industry (during the years 1960-1980) are used to illustrate some of the relationships posited above. Braun and MacDonald (1978) provided a thorough overview of this industry during the period, which included: major process and product developments in 1960-61 and 1968-70; a series of new-company entries during those periods; strong reactions to the recessions of 1960-61, 1969-70, 1973-75, and 1980; rapid increases in product performance/price; and a steady decline in the relative importance of the inelastic military market. During the period, the potential for learning-curve economies led sellers to maximize sales subject to some minimum profit constraint. By 1980, each of the three companies treated below served a substantial share of the world's semiconductor (and especially integrated-circuit) markets. Only Intel exhibited characteristics of a peripheral enterprise until its rapid growth and the ready availability of capital for well-managed companies in this particular industry brought it dominant status.

Texas Instruments. In the late 1950s and early 1960s, Texas Instruments (TI) was considered an independent within the semiconductor industry: a company with all or most of its business in semiconductors. In the early 1960, TI led the industry in sales and its technology was considered second only to Western Electric/Bell Laboratories. TI's success was attributed to its broad product line of semiconductors, which included silicon and germanium transistors of all types, silicon diodes and rectifiers, and silicon controlled rectifiers (*Business Week* 1960). The company gained superiority within the industry with broad technological skills and an ability to add new products quickly. For example, in the late 1950s TI agreed to design and supply germanium transistors cheaply to a small company in Indianapolis, Indiana. The purchasing company produced mass market transistor radios, making TI the first semiconductor company to earn substantial profits from consumer radios.

TI's emphasis on internal learning was exemplified by its concentration on research and development. In 1959, it was estimated that TI spent $30 million on R&D (from sales of under $200 million, an unusually high ratio for the time). Half of the research funds were allocated from the federal government. An estimated 1400 of the Semiconductor Components Division's 6000 employees devoted full time to research, product development, engineering support, and patients. (Total corporate employment was 15,000). (*Business Week* 1960).

TI supported its R&D expenditures with a combination of growth and profitable products. The company sought to protect itself from the reduction of consolidated profit margins by integrating vertically and horizontally. At this point, TI was unusually vertically integrated: its production engineering group designed and produced most of the company's semiconductor equipment (Texas Instruments 1961). The company's vertical movement was also into raw materials, instruments, and other electronic devices that used semiconductor products. Its silicon plant was built to supply silicon for other semiconductor manufacturers as well (*Business Week* 1960). The strategy of vertical integration was extended when, in 1972, TI successfully established itself in the consumer electronics business with the hand-held calculator. The move was controversial at the time because it was made at the expense of early leadership in semiconductor memories and microcomputers. Early on, TI also moved horizontally into other electronic components including silicon resistors and tantalum capacitors. This horizontal movement continued, and, by 1978, the company built end-user products for all market areas: consumer, computers, and military (*Business Week* 1960, 1978).

This vertical and horizontal breadth required close attention to both cost-cutting process innovations and new product technology, reflected in the organizational structure and reward systems. TI's avowed strategy was to be a cutting-edge product innovator, while the company gained the reputation of a manufacturing giant focused on production technology and scale. This strategic diversity was managed by an innovative system for complex learning. The system had a project-oriented management structure focusing on future growth, while a conventional operating hierarchy concentrated on present profitability. Its original aim was to develop and build new technologies, products, and businesses (*Business Week* 1978).

By using the learning curve concept, TI gained the benefits of being first to introduce a product to the market and maintaining a leadership position in high-volume markets. For example, in 1968 TI announced its 64K memory several months ahead of its competitors. During the mid-1970s, TI successfully competed with large Japanese producers as prices for simple watches and pocket calculators plummeted, driving several large US producers from these low-end consumer markets. By 1978 programs were underway to automate the assembly of calculators, large-scale integrated circuits, and a broad range of other products. TI viewed the trend towards automation as the only way the company could build its low-end products in the U.S. (*Business Week* 1978).

To maintain high production volumes on growth products, without pausing for new plants to gain high productivity, TI built new facilities before capacities were reached at existing fabrication plants. The company's U.S. operations were concentrated in central Texas, and it established fewer Southeast Asian assembly operations than did most of its large U.S. independent competitors. Marketing and design facilities were established throughout Western Europe, with some manufacturing functions occasionally included. (For location-data sources, see Harrington 1985).

Intel. From its start in Santa Clara County (California) in 1968, Intel built its reputation on technical breakthroughs. Robert N. Noyce, co-inventor of the integrated circuit and former general manager of the pioneering Semiconductor Division of Fairchild Camera and Instrument Corp., started Intel with the aim of finding undiscovered niches where the introduction of a new technology would create entire new markets. In the early-to-mid 1970s, Intel accomplished this by pioneering first the computer memory chip and then the microprocessor. The new semiconductor technologies created new industries and disrupted existing ones, making Intel the premier technology-based growth company of the 1970s. The company grew more than a hundredfold between 1970 and 1980, from $4 million in sales in 1970 to $663 million in 1979 (*Business Week* 1980a).

Innovation and concentration in semiconductor memory and microprocesors gave Intel short technological leads. Soon after each new product introduction, 'second source' producers began to encroach upon Intel's markets. By the late 1970s, Intel's 8-bit microprocessors faced increased competition from other producers such as National Semiconductor. New product breakthroughs would not have benefitted the company unless it was able to deliver products via a highly efficient manufacturing operation. In the mid-1970s, the company began to stress manufacturing and marketing skills to achieve sales increases in large, growing, and hotly contested markets. In 1978 (total revenues, $400 million) and 1979, (total revenues, $663 million) Intel spent a total of $200 million for capacity additions, and planned to spend an additional $150 million on property, plants, and equipment in 1980 (*Business Week* 1980a).

Intel used these major capital expenditures to deconcentrate its design, fabrication, and assembly operations outside of California. To facilitate information transfer within innovative product divisions, Intel tended to relocate divisions as coherent units, including design and planning functions (*Business Week* 1980b). New locations thus required a range of occupational skills and ancillary services. By the late 1970s, Intel's major operations existed in Santa Clara County, near Portland, Oregon, and near Phoenix, Arizona. In 1979 a 150,000-square-foot facility northwest of Phoenix was planned to assemble memory boards for end users. A second facility southeast of Phoenix was also planned to produce single-chip microcomputers. The company's decision was likely influenced by the abundance of technical and assembly talent in Phoenix. Other semiconductor companies already in the Phoenix area (Motorola, General Instrument, EMM Semi Inc., General Semiconductor, Northern Telecom, and Medtronics) had created a substantial labor pool (Waller 1979). In 1980, Intel opened a design center in Israel and was planning another in Japan to tap new sources of engineering talent. The company publicly expressed the desire to find new communication techniques that would tie the organization together (Business Week 1980a).

National Semiconductor. National Semiconductor started operations in 1959 in Danbury, Connecticut, making discrete transistors. In 1966 the company was acquired by a private financier, who lured the General Manager and four top managers from Fairchild's Semiconductor Division, source of many of the industry's entrepreneurs. Charles Sporck, the new president, focused the product line on integrated circuits and moved the headquarters to Santa Clara County (Lydon 1982). Sporck built the company with a goal of manufacturing efficiency and high-volume production of standard products. During the 1974 industry recession, when semiconductor orders decreased dramatically, National was quicker than most companies to reduce production via severe layoffs. The company's agility was credited to rapid decision making and informality of management style (*Financial Times* 1978). National later began to stress the importance of proprietary products, and, by 1976, those products accounted for 75 percent of the company's sales (*Business Week* 1976).

In the years that followed Sporck's entrance into National, the company made several rapid changes in direction, and in the early 1970s ventured into the low-priced, final-product consumer electronics market. National invested heavily in manufacturing and marketing of its consumer products but failed to predict the subsequent market saturation and fierce price wars (note the TI case study, above). Profits dropped by 50 percent in 1977. A large part of the company's loss in profit was attributed to the failure of its consumer operation. By 1978 National had recovered by placing less importance on consumer sales and withdrawing from the manufacture of calculators altogether. Emphasis was placed on expanding the breadth of its computer products division from micros through mainframes. In the late 1970s, the company was spending 40 percent of its R&D budget on computers, versus other final products and semiconductor devices (*Financial Times* 1978).

National's rapid growth and cost cutting emphasis were reflected in the number, locations, and nature of its facilities. In 1970 the company had five facilities in four countries and had assembly subcontractors in three Southeast Asian countries and in Mexico. By 1975 thirteen wholly-owned operations were in ten countries. As of 1980, the company owned nineteen facilities in twelve countries. In contrast to Intel, many of National's facilities were assembly plants in Southeast Asia. During the same period, marketing operations were established in two European countries, with an additional fabrication and testing facility in Scotland.

In 1980 National announced its decision to locate a wafer fabrication facility for bipolar integrated circuits in Arlington, Texas (between Dallas and Fort Worth). The reasons given for the company's selection of the site included the area's stable community, which was attractive to technical professionals, its suburban atmosphere, and its proximity to outstanding educational facilities (Ferguson 1980). Clearly important, as well, were the labor resources and supplier networks created by TI's bipolar facility and the headquarters and operations of Mostek, a TI spinoff, all within 15 miles of Arlington.

Conclusions

While the cases presented here are only illustrative, they do make clear the extent to which these three large companies maintained their success during the study period by pursuing, obtaining, and investing in various sources of monopolistic advantage. Advantages were possible despite the essentially commodity nature of semiconductor devices, which are marketed according to specifications, delivery reliability, and price. The search for enterprise-specific advantages created strategic groups within the industry, each group led by the strategy's most successful proponent. The organizational structures, R&D policies, and process technologies of these companies were influenced by their dominant strategies of large-share generalist (TI), large-share specialist (Intel), and large-share, low-cost hybrid (National). (These descriptions are supported by case findings and by 1980 global market share estimates by product line (Dataquest 1984)). In addition, the mix of locations selected for various corporate and business activities reflected the cost, flexibility, and information needs of the companies' dominant strategies. Given the technologies and geographical cost disparities available during the study period, the most severe cost cutting was accomplished with the assistance of offshore assembly operations. Product flexibility and information transfer were enhanced by comprehensive facilities in places large enough to support their size, while production-level flexibility was achieved via layoffs. Rapid development of a comprehensive facility was assisted by location in a local labor market containing existing semiconductor operations and in a region containing electronics supplies and services. Further support for these and other geographical manifestations of strategic groupings among major U.S. semiconductor producers was reported by Harrington (1985). Measurement of actual local impacts requires further research. Currently, the results of the differences outlined above can only be implied. Comprehensive facilities should require a greater range of skill and pay levels within the workforce. Automation of manufacturing processes tends to increase division of labor, skill specialization, and organizational complexity (Blau *et al.* 1976), increasing the heterogeneity of the workforce. In the semiconductor industry, output flexibility tended to be achieved by maintaining multiple operations whose output and employment levels fluctuated widely, relinquishing less information than via subcontracting, for example. Now that many semiconductor operations of various kinds have operated outside of the industry's core regions for some time, inspection of local employment, wage, and linkage impacts would be a valuable exercise.

This paper has attempted to augment the conceptual background for such an investigation, by focusing attention on the varying ways in which sellers can adapt to industry change. These differences affect the manifestation of competition in the industry and operate within the changing constraints of the industry's evolving technology and markets. As such, they are an important link to the local, human outcomes of global competitive struggles within and among industries.

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REGIONAL DEVELOPMENT AND REGIONAL POLICY IN CENTRAL EUROPE, 1950-1980*

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KEY-WORDS: *regional* development trends and policies; *inequalities; policy* evaluation

Introduction

The purpose of this paper is to relate broad patterns of regional development to regional planning goals in four nations of Central Europe. An earlier study reviews the English and German language literature on the regional planning 'systems' in Austria, the Federal Republic of Germany (FRG), German Democratic Republic (GDR), and Switzerland and compares/contrasts their regional problems and regional planning institutions, goals, strategies, and measures (Berentsen 1985a). One of the stated, major regional planning goals of all of the nations is the reduction of regional inequalities.

Results of original analyses and a review of others' work suggest that though many regional problems in Central Europe have lessened in *absolute* terms, *relative* problems remain and new regional problems have emerged. This has led a number of European researchers to question long accepted regional planning strategies based on industrial job creation and convinced them to favor new strategies, from which potential impacts would lessen persisting regional inequalities and address the new problems.

Evaluating the impact of regional development policy on patterns of development is difficult because so many ever changing political and economic factors affect these patterns and because such a wide variety of public policies affect the evolution of space economies. Numerous researchers have already noted the methodological problems of isolating the impacts of regional development policies in Central Europe (Ashcroft 1984; Gatzweiler 1982; Hanser 1981; Recker 1982; Spehl 1984). Nonetheless, given the need to evaluate programs that involved the investment of hundreds of millions of dollars yearly by the early 1980s, a number of partial, primarily descriptive analyses have been undertaken during the last few years (Ashcroft 1984; Berentsen 1978, 1981a, 1981b; Brosse—Buchkremer 1981; Deutscher Bundestag 1982; Freund—Zabel 1978; Hudson—Lewis 1982; Peters 1971; Recker 1978; Spehl 1984; Stöhr 1984; Yuill *et al.* 1980). None of these have compared trends in development and public policy impacts in all four of the nations considered here and few provide the kind of systematic empirical analysis

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undertaken in this study. Though the results of the work reported here provide only a view of the skeletal contours of regional development trends in Central Europe, they are at once both surprising and readily understandable, given trends in the economies of developed nations and the nature of discussion in the regional development literature during the last 5 to 10 years. The empirical results of the analysis suggest that regional inequalities in Central Europe declined during the 1960s and then displayed a mixed pattern, including increases in some cases during the 1970s. This is consistent with the findings of numerous other studies on regional change in Europe (e.g. Kommission d. E.G. 1981; Molle *et al.* 1980; Nieth 1980).

What is new in this study is that the results suggest that across the board declines in inequalities in the 1960s and declining inequalities in *selected* variables and nations in the 1970s do not appear to be necessarily related to decentralization of industrial jobs. Creating decentralized industrial jobs has been a major objective in all of the nations studied here, which, to the extent that it was achieved, has undoubtedly helped reduce regional socioeconomic inequalities. However, improved regional socioeconomic conditions and reductions in some kinds of regional inequalities have also been achieved during periods of spatial concentration of industrial employment (Austria in the 1950s and Switzerland in the 1950s and 1960s) and during the recent era when (a) there have been absolute declines in industrial employment and (b) 'peripheral' regions have been losing indigenous control of industrial employment and becoming dominated by branch plants in slow growth industries (Brugger 1981; Spehl 1984; Stöhr—Tödtling 1982; Tödtling 1983a, 1983b). These results tend to support the arguments of researchers who recommend more emphasis be put on stimulating tertiary sector employment in problem regions (Boesler 1974; Elsasser 1983; Luder—Stuckey 1982; Spehl 1984) and who point out the apparent successes of public policies that have emphasized social development (e.g. public health care) in all parts of these nations by transferring tax receipts from higher to lower income regions (e.g. see Bennett 1984; Berentsen 1976).

Regional development patterns and policies in Central Europe, 1950-1980

There is general agreement in the literature about regional development trends in Western Europe during the period from the late 1950s to the early 1980s: regional inequalities declined up until the mid 1970s' recession; and thereafter either remained constant or increased (Kommission d. E.G. 1981; Molle *et al.* 1980; Richardson 1984a). The literature on Austria, the FRG, and Switzerland reports the same trends (Brugger 1981; Elsasser 1977; Gerheuser—Mangold 1981; Herzog 1981; Nieth 1980; Spehl 1984). Some regional inequalities appear to have declined and some probably increased in the GDR during this period; trends in this socialist centrally planned nation have not followed closely those in the West (Berentsen 1981a, 1987).

The literature on Western Europe suggests that several factors combined to result in the observed trends. After economic recovery began in Western Europe during the 1950s, a labor shortage (partly caused by wartime population losses) developed and the decentralization of industrial employment ensued. In the GDR a similar trend resulted from both the desire to improve employment opportunities and living standards in predominantly rural areas and to create an industrial proletariat in the countryside (Bönisch *et al.* 1976; Schmidt-Renner 1953). The strength of this trend overcame the effects of countervailing forces toward concentration of industrial employment and the net result was deconcentration of jobs in industry. However, the immigration of millions of foreign workers, mechanization in production, the slackening of international economic growth, and increased competition from the industrializing, developing world changed the supply-demand relationship for industrial labor in Western Europe by the mid 1970s. After about 1975 urbanization and agglomeration economies and the concentration of 'control functions' (e.g. decision-making and research) of industry in large urban areas emerged as dominant factors in the location of new industrial activities and, importantly, in the selection of plants tagged for closure (e.g. see Gerlach—Liepmann 1972/73). As a result, the last 10 years have, in general, witnessed a less well defined trend toward industrial deconcentration and heightened concern for the characteristics of industrial activities in 'peripheral areas'. Most notably, industrial employment in these areas is often characterized by jobs in branch plants and in slow growth, low wage industries that may be especially susceptible to competition from the developing world. Concern in Central Europe for these problems is great (Altermatt 1982; Brugger 1981; Molle 1983; Spehl 1984; Stöhr 1984). The current locational advantage of highly accessible, large urban areas in Western Europe is documented by several Central European studies (Bächtold 1983; Bundesministerium für Raumordnung 1979; Kaniak 1981; Olbrich 1984; Stiens 1982). There is also agreement that urban agglomerations, and wealthier regions in general, have benefited most from the ongoing integration of the economies into the world and EEC markets (Elsasser 1982b; Gerheuser—Mangold 1981; Institut für Regionalforschung 1979; Lendi—Leibundgut 1983; Lendi et al. 1982; Rey 1983; Roberts 1981; Spehl 1984; Stiens 1982; Vanhove—Klaassen 1980).

Besides the labor shortage and market/agglomeration factors that have affected the regional concentration/deconcentration of industrial employment, there may be another set of factors that are and have been important in shaping the space economies of the western nations discussed here factors that have received more recognition in the U.S.A. than in Europe. Improved socioeconomic conditions in the 'periphery' of Western Europe (and probably to some extent in the GDR) must also be related to the expansion of employment in the tertiary sector resulting from enlarged local markets. This would result from the more reliable incomes derived from industrial employment (as opposed to seasonal incomes typical of primary sector activities), from improved incomes associated with the expansion of commuting between 'peripheral' areas and core regions, and from increasing levels of transfer payments to poor and retired persons in the periphery. Considerable evidence of the importance of these factors in accounting for the 'population turnaround' and vitality of smaller urban centers in the U.S. already exists and conditions consistent with the evolution of the same effect also exist in Central Europe (U.S.: Berentsen 1985b; Beyers 1979; Fisher—Mitchelson 1981a, 1981b; Morrill 1980; Russell—Berentsen 1981; Taaffe et al. 1980. Central Europe: Bächtold 1983; Baumann *et al.* 1983; Bennett 1984; Berentsen 1976; Kaufmann 1983; Leibundgut 1977). If smaller, local market centers in the 'periphery' have been strengthened by these factors, they would help create a process of cumulative causation by way of employment multipliers and would help cushion 'developing' regions from the negative impacts of a slowdown or reversal in the pre-1974 trend toward dispersion of industrial employment. The relative impact and importance of these factors on patterns of regional development, however, are not yet fully known.

Whatever the underlying causes, regional problems that have developed as a result of factors described above are both evident to and well documented by researchers in Central Europe. During the postwar period in Central Europe, the areas most often regarded as 'problem regions' have been those with some combination of: poor infrastructure, poor market accessibility, overspecialized economic structure with employment in lagging industries, and, most recently, symptoms of too rapid growth (e.g., traffic congestion, pollution, severe land use conflicts). It was and is believed that the first three of these conditions were basic causes of low incomes, high unemployment, and poor health and education in lagging regions and, thus, were responsible for unacceptably high regional inequalities. From 1950 to the mid 1970s the western nations surveyed here were most concerned with rural regions with too few non-primary employment opportunities; Austria and the FRG were also concerned with regions bordering Eastern Europe and suffering from poor market accessibility. Since the mid 1970s, recession and increased international competition for industrial jobs has caused these nations to become concerned with overspecialized industrial regions (e.g., the Ruhr and Jura). Since perhaps 1965 or 1970 the western nations have also been concerned with too rapid growth in metropolitan areas at the expense of the periphery. The GDR was much concerned with industrializing its rural areas in the 1950s, but the location of its existing capital stock and resources (such as they are) in the South and its national planning priority for maximizing national economic output shifted emphasis away from this goal by the early 1960s. (For a more detailed discussion of these regional problems see Berentsen 1985a).

The relative level of seriousness of these regional problems has varied through time and space. Certainly in the 1950s abject poverty existed in at least some areas of all of the countries; by the 1980s though no doubt some individuals remain in poverty, it is much more difficult to identify entire regions where poverty is prevalent. In fact, a number of researchers argue that regional problems in Switzerland and the FRG are not especially severe (and analysis to follow will show that by 1980 Austria's problems appear to be not much worse). However, the great concern for socioeconomic equality in the FRG and the political ramifications of inequality in culturally diverse Switzerland have resulted in more study of and greater emphasis on the eradication of regional inequalities (FRG: Bucher 1982; Bundesforschungsanstalt 1981; Gatzweiler 1982; Kommission d. E.G. 1981; Unwin 1982; Vanhove—Klaassen 1980; Yuill *et al.* 1980. Switzerland: Altermatt 1982; Campbell 1982; Elsasser 1977; Fischer *et al.* 1981).

Given the early preoccupation with the problems of rural, primarily agricultural regions and the planning communities' emphases on industrialization, it is easy to understand how governments' early regional development programs were based on attempts to integrate 'peripheral' regions into national and international markets by promoting industrial export-bases in these areas. Evidence for the prevalence of the belief in export-base theory and the emphasis on creation of industrial jobs exists for all of the Central European nations in the 1950s and there is continued, though not undisputed or solid, support for these emphases into the 1980s (Austria: Österreichische Kommunalkredit A.G. n.d.; Stöhr 1984. FRG: Deutscher Bundestag 1982; Institut für Raumforschung 1954; Jung 1982; Spehl 1984. GDR: Bönisch *et al.* 1976;

Reuscher—Reiner 1977; Schmidt-Renner 1953. Switzerland: Elsasser 1983; Hanser 1981; Luder—Stuckey 1982).

During the 1950-1980 period, all of the western nations adopted public policies and enacted specific programs to sponsor industrialization in problem regions. The programs have generally either supported the development of infrastructure and/or offered subsidies to companies that invest and create jobs in specific problem regions. These programs have been most heavily funded in the FRG. A great variety of institutions have been established to oversee these and other social and economic programs, whose ultimate goals have been to reduce regional socioeconomic inequalities, to halt depopulation of some rural areas, and to achieve optimal, long term national economic growth (see Berentsen 1985a). Recently a number of researchers have questioned the wisdom of this emphasis on creating an industrial base in 'peripheral' areas, owing both to the characteristics of the industrial economies that emerge in these regions (dominated by branch plants, low wages, and slow, unstable growth) and to the increasing dependence of entire national economies on export-oriented industrial production (Bartels—van Duijn 1982; Elsasser 1982a, 1983; Giese—Nipper 1984; Maier—Tödtling 1984b; Olbrich 1984; Spehl 1984; Stöhr 1984; Steinle 1983). Thus, a large number of writers, whose arguments will be reviewed below, argue that there is need for new kinds of regional policies in Europe.

Analysis: data and methodology

In order to relate patterns of regional development to regional policy goals in Central Europe, data were gathered on temporal patterns of regional inequalities for selected socioeconomic variables for the four nations. This turned out to be an arduous task owing to the necessity of meeting the following conditions for each variable: (1) data were needed by regions for at least 1960, 1970, and 1980 for all nations; (2) definitions of the variable used by data collectors had to remain relatively unchanged throughout the study period; and (3) the boundaries of enumeration districts had to remain reasonably constant. A variety of basic problems were thus encountered in developing an adequate data base, including: (1) great change in regional units used for governance and data collection in the FRG during the 1960s and, especially, 1970s; (2) lack of comparability of variables' definitions between nations; and (3) lack of a good income variable (or even a reasonable surrogate like retail sales per capita).

Nonetheless, three reasonably good indicators of socioeconomic well-being and regional economic structure were identified—infant mortality, auto ownership, and industrial employment—and data were collected for about 70 regions in the four Central European nations. Infant mortality rates are in some ways better indicators of regional levels of development than are income measures. This is because (1) infant mortality rates are affected both by the availability of health care to a completely helpless and high priority individual, based on resources controlled both by families (income) and by the state (via provision of social services); and (2) infant mortality rates are sensitive to the distribution of income and health services among a large portion of the population (i.e., families with children). The most commonly used income measures are, on the other hand, simple averages that incorporate little if any information about the distribution of income. Infant mortality has frequently been used as an indicator of social and economic well-being and strong arguments can be made for its utility as a measure of development (Giese 1985).

In this study infant mortality rates were often based on 3 year averages in order to assure that a reasonably large number of births and deaths were accounted for in each region. This avoided basing results on annual values, which can vacillate to some extent because of the relatively small number of infant deaths in a given year in many regions (e.g. infant mortality 1970 = average of 1969-1971).

Automobile ownership per capita has also been used as an indicator of economic well-being. Auto ownership can be highly correlated with income (Berentsen 1976, 1981a; Giese 1985), shows levels of possession of one of the world's most prized consumer goods, and allows access for owners to economic and social opportunities beyond the confines of a small area. A shortcoming of this variable is that good systems of public transport in Europe, especially in cities, and high fuel costs make the auto a less necessary and appealing good than, for example, in the U.S.A. Also, higher and higher levels of ownership are leading to a lessened ability of the variable to distinguish between variations in regional well-being, though this in part simply reflects higher material living standards in all parts of Central Europe. Nonetheless, the auto is most certainly an important status symbol and mechanism for assuring personal independence in Europe and levels of auto ownership continued to increase in most parts of Central Europe thoughout the study period.

Unfortunately, data on auto ownership were not available for the GDR. Instead, a surrogate—delivery of new cars per population—was utilized. Given the shortage of private cars in the GDR, their high price, and long waiting periods to get them, owners can be expected to keep their autos once purchased. There is, indeed, no apparent large scale sale of used cars in the country (Berentsen 1978).

Industrial employment is another variable that has been used in the past to measure levels of development. Given the rise in importance in the tertiary sector, and increased salaries and wages in some portions of this sector as well as problems with wages and job security in some parts of the secondary sector (notably in slow growth industries and in branch plants), the variable is now probably not well suited for this purpose. It is included here in order to assess the extent to which patterns of regional industrialization have achieved early policy goals of decentralization of industrial employment.

One problem with data on industrial employment is that data sources did not always explain in detail who an 'industrial worker' is. This means that some care should be taken in comparing mean levels of industrialization between the nations, though these levels display no real surprises. (The GDR emerges with the highest and Austria with the lowest levels of industrial employment per 1,000 population throughout the 1960-1980 period).

The variables chosen include no broad, quantitative-qualitative index of 'quality of life', though the importance to people of such factors as environmental and cultural amenities and political freedom is unquestioned (Gatzweiler 1982; Walter-Busch 1980). Planners have not yet successfully found a way to evaluate people's trade-offs between objectively measured indicators (e.g., income) and subjective evaluations of well-being.

The choice of which level of regional aggregation to work at was determined both by the desire to use regions with comparably sized populations and by data availability. The regions chosen do not always represent functional economic regions, though they approximate these in Austria and Switzerland. The regions do, at least, generally include territory in metropolitan area(s) and their hinterland(s). In Austria, the 9 provinces were chosen and in the GDR the 15 political districts. In the FRG, administrative districts (Regierungsbezirke) were used. These number 37 (including West Berlin, officially an international city but effectively part of the FRG) in 1960 but were reduced to 30 (again including West Berlin) by 1980. There were some difficulties comparing the FRG results for one point in time with another, but the changing number of units posed no real problem for comparing results between the nations, either for one year or over time. Switzerland had 25 cantons until recently; now, with the new Jura canton, there are 26. These political units vary greatly in area and population size and most have total populations far smaller than the units in Austria, the FRG, and GDR. Therefore cantons were joined into regions to create functional units with populations more comparable to the other units in the study. The literature offered little guidance for this task and the units were constructed taking into consideration patterns of spatial interaction, language, and religion (Imhof 1965). The regions used in the study for 1980 are outlined in Figure 4. (Regions in the FRG were somewhat different from this in 1960 and 1970). Most regions in Austria, Switzerland, and the GDR had populations in 1980 ranging from 250,000 to 1,500,000. In the more populous FRG, most populations ranged from one to four million in 1980.

Two relatively simple methodologies were used to measure changes in patterns of regional inequality between 1950 and 1980. Means, standard deviations, and coefficients of variation (CVs) were calculated from the regional values of each nation for each time period and each variable:

$$CV_{X_t} = \frac{\left(\sum_{r=1}^{N} (X_{rt} - \overline{X}_t)^2/N-1\right)^{\frac{1}{2}}}{\overline{X}_t} \cdot 100$$

where

CV_{X_t} = coefficient of variation for a nation
X = variable X
t = 1950, 1960, 1970, or 1980
r = region within a nation

These descriptive statistics give an indication of relative levels of regional inequality between nations and through time. Simple correlation coefficients (r) were also calculated in order to assess the association between regional levels of infant mortality, auto ownership, or industrial employment between one time period and another:

$r_{X_{t1t2}}$ = correlation between regional values on variable X between time period 1 and time period 2.

These statistics were generated in order to identify the degree of stability or change in the relative development levels of regions as measured by a particular variable through time. A highly positive correlation denotes little change from one point in time to another; a correlation closer to zero (or a negative value) identifies significant change in the relative position of regions on a particular variable. The latter would, of course, indicate considerable regional change within a nation.

FIGURE 4 *Regions used in 1980 analyses*

Analysis: results

Williamson's classic work on regional inequalities and levels of national development (Williamson 1965) has often led researchers to the assumption that the relationship between the two variables displays relatively simple patterns through time. Development trends into the 1970s in the U.S. and Europe supported his generalizations; but trends since have not. The results of the analyses reported here generally show declines in regional inequalities in the 1960s but no definite pattern of change in the 1970s. One interesting result is that whereas regions with the highest and lowest levels of infant mortality and auto ownership remained relatively unchanged between 1950 and 1970 (measured by the use of correlation coefficients), change was typical of the 1970-1980 period. This result parallels concern in Europe now for a broader range of 'problem' regions than had been the case during the 1950s and 1960s.

Infant mortality rates declined to relatively low levels by 1980 in all four nations (Table 21).

TABLE 21

INFANT MORTALITY: STATISTICS FROM REGIONAL DATA

		1950	1960	1970	1980
mean	Austria[a]	54.9	34.4	25.4	14.4
	Switzerland[b]	32.1	21.9	15.7	8.3
	FRG	NA	33.4	23.6	12.6
	GDR	NA	39.1	18.6	12.2
st. dev.	Austria[a]	8.1	4.7	2.2	1.6
	Switzerland[b]	6.2	2.7	3.4	1.8
	FRG	NA	4.8	2.3	1.8
	GDR	NA	5.2	1.3	1.7
CV	Austria[a]	15	14	9	11
	Switzerland[b]	19	12	22	21
	FRG	NA	14	10	15
	GDR	NA	13	7	14
		1950-60	1960-70	1970-80	
correlation	Austria[a]	+.83	+.39	−.05	
	Switzerland[b]	+.97	+.92	+.57	
	FRG[c]	NA	+.59	+.18	
	GDR	NA	+.50	+.41	

NA = not available
CV = coefficient of variation
correlation = correlation (r) between regional values of two separate years

a — data are averages from 1951—52, 1960—62, 1970—72, and 1978—80
b — data are averages from 1950—51, 1959—61, 1969—71, and 1979—81
c — comparable regions were created by way of unification in order to calculate statistics

Mortality levels and inequalities compared very favorably to, for example, the U.S.A. and Hungary (1980: U.S. ave. 13.1, st. dev. 2.4; Hungary ave. 23.1, st. dev. 2.9). Switzerland's development proceeded most rapidly and it still evidences the lowest rates, which are among the lowest levels of infant mortality in the world. However, after declines in regional inequalities in the 1950s, inequalities increased in the 1960s and held steady in the 1970s. (The same 1980 results were derived by using all 26 cantons as observations; scale apparently does not affect these results). Increased inequality on this variable in Switzerland during the 1960s is atypical; means, standard deviations, and CVs (regional inequalities) declined in the other three countries during this time period. Two things help explain the Swiss inequalities in 1980. First, infant mortality rates remained above national average levels (8.4/1000) in Ticino canton (11.8/1000), where they have always been relatively high and where there are, in general, more socioeconomic problems than elsewhere in Switzerland (Fischer 1980). Note, though, that the infant mortality rate for Ticino is *below* the national average for the other Central European nations. This introduces the second explanation for the relatively high CVs for Switzerland, namely that absolute regional inequalities, as measured by the standard deviation, are as low in Ticino as they are in other countries, but a lower mean in Switzerland produces a higher CV value and therefore a higher relative level of inequalities. Nonetheless, even these relative problems with inequalities cause concern in regionally conscious, culturally diverse Switzerland.

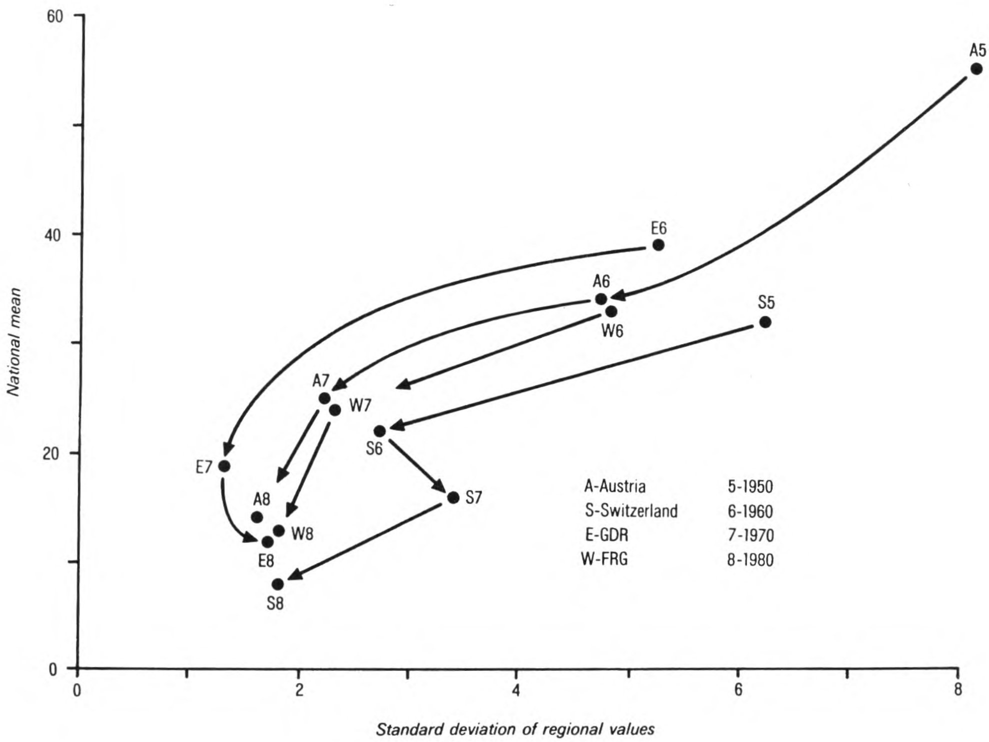

FIGURE 5 *Infant mortality*

One way to portray the successes of these Central European nations in achieving both lower mean levels and smaller *absolute* regional inequalities is by plotting the two components of the statistic measuring *relative* regional inequalities (the CV) against one another, i.e., plotting means against standard deviations (Figure 5). From such a plot it is clear that the nations of Central Europe have all moved toward the optimal goal of low infant mortality rates and low regional inequalities (lower left on Figure 5), though progress toward the latter was not made in the 1970s.

Another positive characteristic of trends in infant mortality in Central Europe in the 1950-1980 period, noted earlier, is that correlations between regional infant mortality levels have steadily declined from one time period to the next in all of the countries. This means, for example, that regions with the highest infant mortality rates in Austria in 1970 are not necessarily in the same situation in 1980 ($r_{1970/1980}$ = -.05). This suggests that conditions in the 'problem' regions of the 1950s and 1960s (e.g., Burgenland) improved considerably during the last 10 to 20 years. Regional problems, at least as measured by this variable, were apt to be *relatively* more widespread, though obviously less severe in *absolute* terms, in 1980 than in 1950 or 1960. These results provide evidence that the regional concentration of problems in Central Europe has eased and indicate an important reason why more regions than ever *appear* to suffer problems. In the case of infant mortality rates, the problems are *relative* ones; in absolute terms mortality has declined substantially. (This, however, is most definitely *not* the case for unemployment rates, which will be discussed later.)

Analysis of auto ownership produced results similar to, though not identical with, infant mortality (Table 22 and Figure 6). In the western countries, ownership increased throughout the 1950-1980 period and regional inequalities (as measured by CVs) fell to relatively low levels. This resulted from more rapid increases in ownership levels than in levels of variation between regions (Figure 6). Regions' relative auto ownership levels within their respective nations changed most rapidly between 1970 and 1980 (see 'r' statistics in Table 22). By 1980 ownership levels were fairly high in all regions, regional inequalities were low, and the relative ownership levels of regions had changed significantly from 1960.

In Austria, the FRG, and Switzerland the results reflect improved standards of material well-being and lessened regional inequalities throughout the study period. In the GDR a quite different pattern emerges. This probably does not result from the fact that a different variable was used as an indicator (new auto delivery per 1,000 population), but rather from the fact that policies with regard to consumer goods and consumer well-being are dramatically different in the GDR than in Western Europe (Berentsen 1980; Cornelsen *et al.* 1977). New auto deliveries were at a very low level in the GDR in the 1950s and 1960s, resulting partly from national economic problems and partly from the austere consumer policies of Walter Ulbricht. When deliveries began to increase under Ulbricht, there was discrimination in favor of urban-industrial areas (e.g. Halle, Karl-Marx-Stadt, and especially East Berlin: 11.44 in 1960). With more emphasis on consumer well-being in the GDR after Eric Honecker took office in 1970, new auto deliveries continued to increase and regional inequalities declined somewhat. Nonetheless, problems in the availability of consumer goods, especially in regions of apparent low priority (note the consistently higher standard deviation values between 1960 and 1980), remained as one of the most serious political, social, and regional problems in the GDR in 1980 (Berentsen 1980).

TABLE 22

AUTO OWNERSHIP (PER 1000 POPULATION): STATISTICS FROM REGIONAL DATA

		1950	1960	1970	1980
mean					
	Austria[a]	NA	63	172	208
	Switzerland[b]	33	72	213	347
	FRG	NA	72	208	348
	GDR[c]	NA	(3.0)	(5.9)	(8.9)
st. dev.					
	Austria[a]	NA	16	24	14
	Switzerland[b]	10	19	32	37
	FRG	NA	10	13	20
	(GDR)[c]	NA	(0.5)	(2.3)	(2.5)
CV					
	Austria[a]	NA	25	14	7
	Switzerland[b]	29	26	15	11
	FRG	NA	14	6	6
	(GDR)[c]	NA	(16)	(38)	(28)

		1950–60	1960–70	1970–80
correlation				
	Austria[a]	NA	+.98	+.39
	Switzerland[b]	+.99	+.91	+.08
	FRG[d]	NA	+.74	+.34
	(GDR)[c]	NA	(+.79)	(+.73)

NA = not available CV = coefficient of variation
correlation = correlation (r) between regional values of two separate years

a — data are from 1961, 1971, and 1981
b — data are from 1950, 1958, 1968, and 1980
c — data are averages for new car deliveries from 1959—61, 1969—71, and 1976—78
d — comparable regions were created by way of unification in order to calculate statistics

Levels of automobile ownership may no longer be a discriminating indicator of regional variations in well-being in Austria, Switzerland, and the FRG. By 1980 ownership levels may have approached 'saturation' levels, given gasoline prices, road conditions, and availability of good public transport systems in these countries. If this is true, a quantitative measure of ownership might be inappropriate for 1990; a measure of quality of auto (e.g. value) might be more sensitive to regional variations in well-being. In the GDR, ownership levels lag those of Western Europe and the quantitative measure used in this study will probably continue to serve as an adequate indicator of regional variability in durable goods consumption for the rest of the century.

Switzerland, the FRG, and Austria displayed similar trends in industrial employment per 1,000 population during the study period (Table 23, Figure 7). Levels of industrial employment declined in all the countries between 1970 and 1980. There were modest declines in regional inequalities, which, however, remained relatively high in 1980 due to considerable stability in the location of industrial employment throughout the study period. Inertia is clearly an important factor in spatial patterns of industrial employment (Brösse—Buchkremer 1981). Regional shifts in industrial employment that occurred in these countries, though contributing toward equalization of regional industrial employment, did not make major impacts on previously existing patterns of industrialization. In the GDR, industrial employment increased from 1960 to 1980, probably owing to a combination of factors, including a political emphasis on industrialization and development of an industrial working class; capital shortages, which slowed rates of mechanization and job displacement in industry; and relatively low levels of labor productivity (Alton 1981; Cornelsen *et al.* 1977). Except for this growth in industrial employment, patterns of regional industrialization in the GDR were similar to those in the western nations in terms of declines in regional inequalities, which, nonetheless, remained large, and stability in the nations' levels of industrial employment and basic patterns of spatial distribution of industrial employment (see also Berentsen 1983).

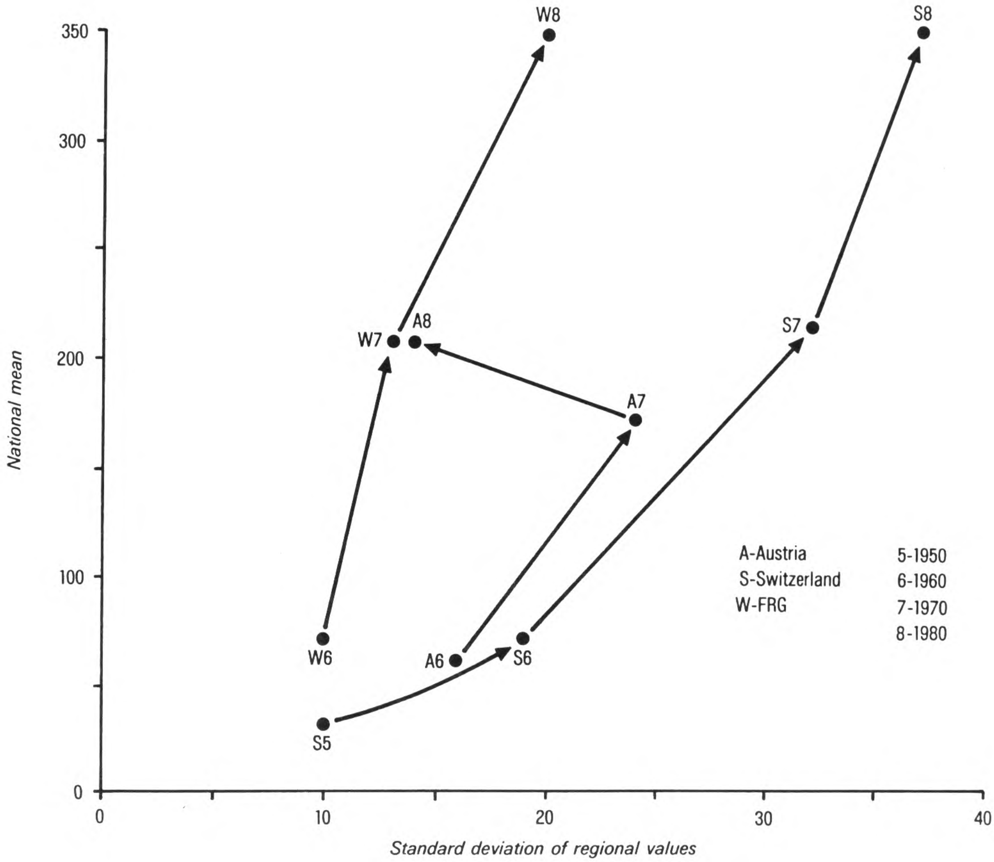

FIGURE 6 *Automobile registration*

TABLE 23

INDUSTRIAL WORKERS (PER 1,000 POPULATION): STATISTICS FROM REGIONAL DATA

		1950	1960	1970	1980
mean					
	Austria[a]	65	78	80	74
	Switzerland	100	118	140	109
	FRG[b]	NA	136	133	115
	GDR	NA	146	152	177
st. dev.					
	Austria[a]	28	35	32	26
	Switzerland	41	43	47	37
	FRG[b]	NA	40	35	27
	GDR	NA	64	55	53
CV					
	Austria[a]	44	45	40	36
	Switzerland	41	36	35	35
	FRG[b]	NA	30	26	24
	GDR	NA	44	36	30

		1950–60	1960–70	1970–80
correlation				
	Austria[a]	+.97	+.96	+.97
	Switzerland	+.99	+.99	+.99
	FRG[b, c]	NA	+.98	+.93
	GDR	NA	+.99	+.95

NA = not available
CV = coefficient of variation
correlation = correlation (r) between values of two separate years

a — data are from 1951, 1961, 1971, and 1981
b — data are from 1961, 1970, and 1982
c — comparable regions were created by way of unification in order to calculate statistics

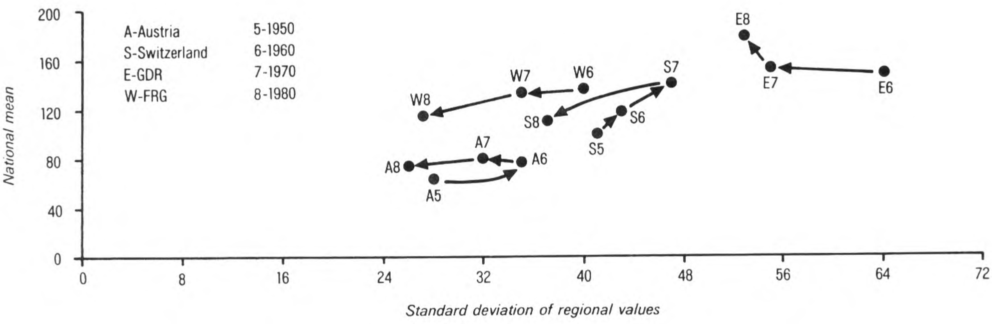

FIGURE 7 *Industrial employment*

Discussion

These results corroborate, at least to some extent, those of other researchers. Regional inequalities appear to have declined in Europe in the postwar era, especially between 1960 and 1970. After 1970 a definitive pattern of change in inequalities is difficult to establish. Using estimates of gross domestic product per capita broken down by region (and retail sales per capita for the GDR), the author produced crude estimates of regional income inequalities through time. Like the results of other researchers, the inequalities displayed no distinctive temporal trends, though there are indications that inequalities may have increased after the severe recession in Europe during 1974-1975 (Fischer et al. 1981, 1982; Gerheuser—Mangold 1981; Kommission d. E.G. 1981; Molle 1983; Molle *et al.* 1980; Richardson 1984a; Spehl 1984; Steinle 1983). There is, of course, no doubt that job security worsened substantially all across Western Europe after the mid 1970s. For example, in 1970 there were two million unemployed workers in the EEC; in 1982, there were ten million (Steinle 1983).

Steinle (1983) presents a convincing argument for the causes of this problem and helps illuminate two of the basic reasons why European regional problems seem to be more severe now. First, unemployment problems have worsened, thereby eroding everyone's confidence in job security. Even if other aspects of social and economic well-being have not worsened, the possibility of this seems to exist. Given Europeans' rising expectations in the 1970s (Hansen 1984), increased unemployment has caused not only more problems in particular regions but also a more pervasive sense of relative deprivation across the continent—particularly since employment and income growth have resumed in the U.S. Second, regional unemployment problems have become severe in 'core' areas, long established industrial regions with relatively high incomes. That even the Ruhr area, symbol of continental industrial strength and geographic center of northwest Europe's market, now faces economic problems has provided, perhaps, the most compelling reason for Germans to consider a broader definition of regional problems. Recognition of a broader range of problem regions has, in fact, occurred in Austria, the FRG, and Switzerland. 'Problem' regions now include 'core' areas; most generally these are heavily industrialized cities (Elsasser 1982; Hudson–Lewis 1982; Maier–Tödtling 1984a; Steinle 1983).

The persistence of regional inequalities in Europe, the apparent worsening of some regional problems since the mid-1970s, and the emergence of problems in formerly prosperous areas has brought a call for changes in European regional development strategies (Bartels—van Duijn 1982; Carney *et al.*, 1980; Hudson—Lewis 1982). The increased dependency of regions caused by increased reliance on external markets and by non-local ownership of economic enterprises has led many to argue for the development of more local autonomy, resources, and market potential (Brugger 1981; Elsasser n.d.; Spehl 1984; Stöhr 1981, 1984; Tödtling 1983a). Others have argued the need for achieving greater regional and national competitiveness by fostering an economic environment favorable to innovation (Brugger 1981; Eidgenossiches Volkswirtschaftdepartment 1983; Hudson—Lewis 1983; Luder—Studkey 1982). Willem Molle argues that "To raise the innovation potential of a region, a set of measures is needed, aimed at improving: access to inventions and innovations; access to finance and investment; and receptivity to change and competitive position" (Molle 1983, p. 33). Whatever the proper policies may be, there seems to be a consensus that Europe now faces such a new set of regional economic problems and conditions that entirely new regional policies are needed (Carney *et al.* 1980; Enyedi 1984). A single-minded goal to industrialize all parts of a nation and thereby to bring development to the 'periphery' no longer seems either possible or appropriate (Bartels—van Duijn 1982; Olbrich 1984; Richardson 1984b; Spehl 1984).

In decades past, industry benefitted from the relatively stable, long-term demand for individual products; and workers benefitted from stability in the location of production, allowing them in some cases to live in one place and practice one skill for a lifetime. These conditions no longer exist, because:

(1) Demand for products is changing rapidly as technologic advancement allows introduction of new products into the marketplace and as better informed, more prosperous consumers exhibit shifting tastes and purchase more 'luxury' goods with their larger disposable incomes.
(2) Automation in goods producing sectors is causing both locational shifts and job losses in many industries (see Kuehn—Braschler 1986; Markusen 1985).
(3) Lower real costs of transportation and communication, greater international competition in a wider range of manufactured goods, and multinational corporations' ability to respond to spatial variations in production costs, have also led to greater temporal and spatial instability in the location of industrial production (Markusen 1985; Ross 1983).

These changing conditions disfavor industrial nations with few newly emerging, growing industries. Stability in these countries, and particularly in regions overspecialized in industrial or primary sector activities, is threatened and these nations do and probably will continue to face serious economic and political problems. To repeat, it no longer seems prudent for the creation of industrial jobs to be the major, sole goal of regional economic planning.

The results of the analyses presented above certainly support this argument. Higher standards of socioeconomic and material well-being were achieved in all regions of Central Europe between 1950 and 1980. These improvements occurred contemporaneously with only moderate declines in levels of regional inequalities in industrial employment. No doubt, there must be a positive relationship between the two changes (as, indeed, one could argue from the examples of Burgenland and Kärnten in Austria or the Trier and Niederbayern districts in the FRG); but the improvements in infant mortality and increased auto ownership reported above seem much more substantial than can be explained by modest changes in industrial employment. Industrialization in peripheral areas helped increase incomes and provided year round livelihoods for people previously dependent on seasonal employment. It also resulted in increased tertiary sector employment and raised local tax bases, which helped provide more funds for developing infrastructure and providing health, education, and other services. However, tertiary jobs and improved services also resulted from: (1) increased levels of transfer payments and social development programs sponsored by national and provincial governments in problem regions; (2) increased employment in tourism resulting from higher incomes and greater mobility of people from Europe's more prosperous regions (especially important in western Austria and the mountains of Switzerland); and (3) greater personal mobility as the result of higher levels of auto ownership, which led to higher levels of commuting from peripheral to core areas where specialized, higher paying, year round jobs were available (Berentsen 1976; Krönert 1981).

In short, there were a number of factors that helped improve socioeconomic conditions in Central Europe's less developed regions. These included both public social and economic policies as well as free market forces, such as increased auto ownership and decentralization of industrial jobs during the 1960s resulting from urban labor shortages. The emphasis of public regional economic development policies on the creation of industrial jobs has, indeed, probably been overemphasized. On the other hand, the impacts of public social and infrastructural development policies appear to have thus far achieved some goals. Infant mortality has been reduced substantially, especially in some of Western Europe's previously least developed regions. Even if income levels remain *relatively* low in many areas of Central Europe, abject poverty and the rather extreme social and economic deprivation of, for example, many people and regions in the U.S. South does not appear to exist in Austria, the FRG, GDR, or Switzerland.

The relatively rapid declines in inequalities for infant mortality compared to industrial employment may reflect the existence of higher marginal returns on social as opposed to economic investments in lagging European regions. While the economies of peripheral regions in the short-run compete in something akin to a 'zero-sum game' for attracting new jobs, no 'competition' exists in the social arena. Medical personnel and educators pursue less ambiguous and competitive goals, e.g. eradication of infant death and illiteracy. Evidence would suggest that national development planning efforts in Central Europe have achieved these social goals better than the economic ones. Social goals may be easier to realize because public support has been easier to mobilize for a redistribution of national wealth to resolve pressing problems like the health of infants than to agree on redistributive mechanisms for assuring employment and economic security in all regions. An 'ultimate', desirable level of economic well-being is, perhaps, much more difficult to define and achieve than a zero rate of infant mortality, resulting in much more competition for resources and much less consensus on appropriate policies for economic development. The literature that now exists on patterns of and policies for regional development in Central Europe does not indicate how this apparent problem might be resolved; it does indicate the concern for new and old regional problems and a consensus in favor of re-examination of planning strategies for realizing regional planning goals.

Conclusion

The results of this paper suggest that for the most part the historical record of regional development in Central Europe during the period 1950-1980 was a positive one. However, new and stronger forces now affect these nations' economies (e.g. greater international and interregional economic integration and, as a result, competition). Long established and accepted economic policies favoring the development of export based industrial structures in all regions should and, indeed, are being challenged and reevaluated. The Western consumer's high preference for tangible, material goods as well as other economic conditions favoring temporal and spatial stability in industrial employment appear to be eroding. A new era, in which the importance of human capital is greater, may have dawned (see Castells 1985; Malecki 1984). Regional policies favoring innovativeness in product development, increased emphasis on service sector employment, and greater personal mobility are called for. These options present challenges to governments in Central Europe, particularly since compared to the U.S.A. people in Central Europe are less mobile and governments are more committed to policies favoring 'place prosperity'.

It is unlikely that a regional policy as simple as the development of an industrial export base will suffice for long in today's world of fast changing technology, shifting market demands, and relatively high level of regional specialization of production. Economic and regional change in Central Europe seem both apparent and imminent. Public policies must either anticipate some of the change or will be called on to respond to rapid change as it occurs. The fact that many similar regional trends and problems can be identified among a group of nations with the political and economic diversity and the high level of socioeconomic well-being of these four Central European nations suggests that the issues discussed here may be relevant to many developed nations outside of Central Europe.

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Abbreviations: DISP - *Dokumente und Informationen zur Schweizerischen Orts-, Regional-, und Landesplanung.*
E.G. - Europäische Gemeinschaft

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MANAGEMENT OF ENVIRONMENTAL IMPROVEMENTS IN THE LAKE BALATON REGION

GYULA BORA

KEY-WORDS: *agriculture, environmental* protection, *eutrophication, infrastructure, Lake* Balaton, *land* use, *quality* of water, *recreation, resort, tourism, 'weekend-house* building boom'.

Lake Balaton and its catchment area represents an excellent case study for investigating conflicts that can emerge from efforts to protect the environment and from the economic policy solutions that are applied to eliminate conflicts so as to avoid catastrophic situations.

The physical characteristics of the Balaton recreational area

The long but narrow feature of Lake Balaton is situated along the southern margin of the Transdanubian Mountains, and lies in a tectonic rift valley of Pleistocene age. It is not only Hungary's, but also Central Europe's, largest lake. To the north it is bounded by the Balaton Highlands and the Bakony Mountains, where the summits reach a height of 300 to 400 metres above sea level; while to the east it is bordered by the Mezőföld loess plateau. The southern shore is generally a low-lying broken hilly region, although some points do reach an elevation of over 250 metres.

As regards other characteristics (Table 24), the Balaton is a shallow lake with a depth of under 3 metres. The rate of sedimentation is high: one part of the lake has been completely silted-up by river sediment (River Zala), while the Bay of Keszthely has been damaged by sedimentation. As a consequence of its shallow depth, a part of the lake's sediment is ruffled by wave action, and the amount of suspended matter is high.

A further characteristic of the Balaton is that although its catchment is extensive and encompasses 125 watercourses, only 33 of these permanently flow into the lake. The largest is the River Zala, which accounts for about 50 per cent of the water supply arriving from the catchment. Originally, the River Zala flowed through a marshland embracing the south-eastern part of the lake, which was the one-time basin of the Balaton, already silted, called Little Balaton; consequently it was cleaned of a majority of the suspended silt. In order to gain arable land in the past century, the River Zala was conducted directly into the lake with the help of an artificial bed and thus the siltation of the lake accelerated.

The water of the lake, except for small variations, has not changed for quite some time. The largest loss derives from evaporation, mainly during the high temperatures of summer. This, together with water flowing into the lake plus precipitation, is just sufficient to maintain a stable water level, with any periodic excess being carried away by the Sió Canal (the Canal, as well as the lock, serve the additional function of water-level regulator). The Sió Canal is the only river transporting water from the Balaton and is navigable during a limited period of the year.

TABLE 24

THE MAIN FEATURES OF LAKE BALATON

Length:	78 km	Average yearly precipitation:	690 mm
Average depth:	3,1 m	Total length of water courses:	2,430 km
Shoreline:	135 km	Potential water resources/average annual runoff:	$\frac{10^6 m^3}{year}$ 1,000
Surface:	596 km^2		
Height above sea level:	104 m	Total amount of fertilizer used in the catchment area in equivalents:	70 $P_2O_5 \cdot \frac{10^3\ t}{year}$
Average water quantity:	1,900 $10^6\ m^3$		
Catchment area:	5,775 km^2		

Source: L. Dávid—L. Telegdi—G. Van Straten (1979).

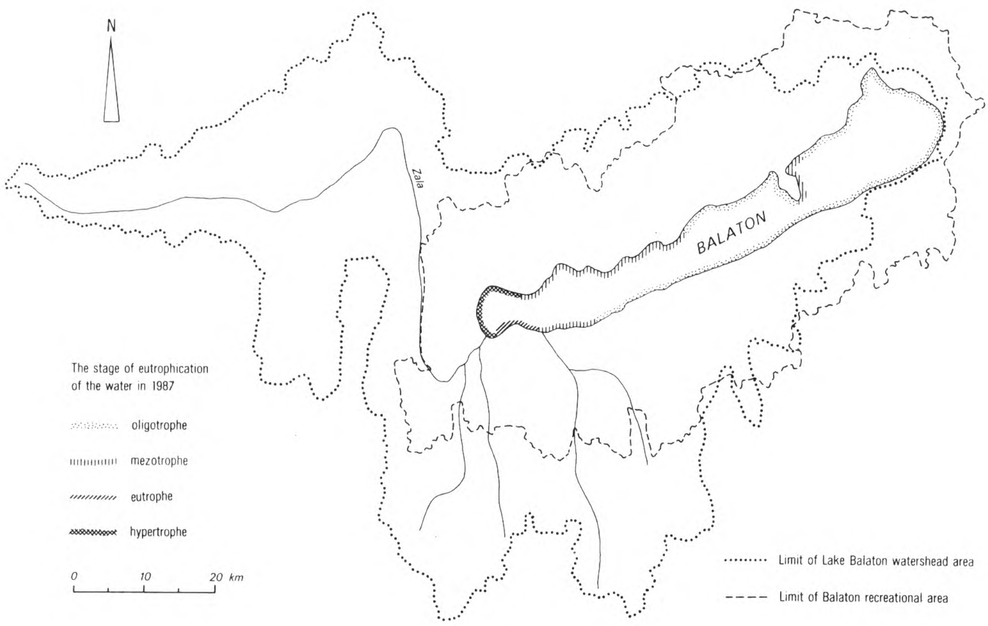

FIGURE 8 *Watershed and recreational area of Lake Balaton*

The catchment of Lake Balaton occupies about 5 per cent of the country's area; its greatest extension is to the south and west of the lake shore (Figures 8). Only a small part is mountainous, most being of a hilly character that has been well dissected by watercourses. The high frequency of steep slopes yields a considerable risk of erosion.

The land in the catchment area is predominantly arable. The traditional ploughing practices, as well as planting and cultivation of grapes directly on the lake shore, contribute to the risk of erosion. As a consequence, a considerable quantity of alluvium arrives into the lake from the catchment area, brought mostly by the River Zala, which traverses a region of above average annual precipitation.

Functions and economic structure

Over the centuries, the economy of the region focussed on agriculture and fishing and these activities have determined the settlement pattern of the area. From the beginning of this century, however, recreation and tourism have become more important. In the beginning, the growth of this function was slow, but during the past three decades expansion has been so dramatic that it has been designated the most important function of the Balaton region.[1] Nowadays it is an area under great pressure and is so treated by the national long-term project for development in tourism and recreation.

The recreation functions of the lake may be divided into the following categories:

(a) 'Social-tourism' is associated with the buildings owned and maintained by trade unions, enterprises, and different institutions for the purpose of organized recreation. In 1984 accommodation amounted to 79,000 beds, or 60 per cent of the national total; while the number of guest nights reached 6,75 million, or 54 per cent of the national total.

(b) 'Commercial tourist activities' are organized through local and national enterprises, and are centered on hotels, camp sites, and rooms let out privately. The number of beds was 104,600 in 1984, 42 per cent of national capacity.

(c) 'Recreation of a private character' takes place in privately owned buildings such as weekend houses and summer and second homes, where not only the guests, but also the owners, may pass their leisure time and spend their summer holidays. There are about 32,000 buildings where the owners and their family members spend an average of 50 to 55 days annually.

In underlining the importance of the Balaton, we can mention that in 1984 approximately 29 per cent of Hungary's foreign currency revenue from tourism was derived from international tourist activity in the Balaton area.

The changing face of the Balaton region

During the last century, land use in the Balaton region underwent radical change. The last third of the 19th century was a period when *agriculture* and land use of certain parts of the lake-shore were closely associated with the agriculture of the surrounding meso-regions. Consequently, much of the northeastern part of the region—e.g. Mezőföld—was devoted mainly to wheat and maize production and animal husbandry. Although part of the southern shore had a similar land-use pattern, much of the so-called Somogy region was given over to traditional livestock, mainly cattle-breeding, because the marshy and swampy surface there was naturally suited to pasture and meadow land. Along the northern shore, by contrast, land use was of a more disparate character, as arable land was only available in limited quantity. Due to the littoral position of the Bakony Mountains and the surrounding hilly regions, including the volcanic areas of the Tapolca basin, and also because of the favorable sunshine and temperature characteristics, a high quality wine-producing viticulture evolved on the volcanic and red stone covered surfaces. Otherwise most of the northern part was characterized by contiguous forest.

From the turn of the century the development of *recreation* became increasingly associated with the belt extending along the lake-shore. Where guest houses and hotels were established, these recreation areas often got separated from the original settlements. The fast development of recreation and tourism between the two world wars led to the rapid expansion of the built-up area along the shore-line. Banks and real estate firms divided the land into parcels that were purchased from landlords and local small-holders at a considerably higher price.

Industry is comparatively less developed in the Balaton area and the amount of land so utilized is rather low. On the northern shore, mainly in the Tapolca basin, basalt quarrying was once important but was largely discontinued at the end of the 1960s for reasons of landscape protection. Only one significant industrial concentration remains on the lake shore, a chemical plant in the region of Balatonfűzfő that has been continually expanding since the 1930s. The three towns of Siófok, Balatonfüred, and Keszthely also possess some smaller, nonetheless notable, industrial plants.

After the Second World War, particular emphasis was placed on the development of social tourism but since the 1960s more attention has been given to the creation of a large-scale tourist capacity with the provision of hotels and other establishments. This has resulted in more construction activity, which in turn has caused the government to compile a regional plan involving building regulations for the sake of preserving the Balaton. The basic target of this plan was to save areas for the so-called collective recreation, e.g., for further hotels, enterprise resort hotels, beaches, parks, sports grounds, playgrounds, etc. The plan generated world-wide interest, and the planner won the Abercrombie prize. However, this plan failed to assert itself because of the enormous need for construction sites. The plan assumed less growth than has actually occurred and, because of the rise in income and growth of recreation land use, the face of the lake-shore has changed radically.

The *dwelling* stock has grown rapidly, especially in three towns and in other central settlements. On both shores, but mainly on the southern shore, the possibility of augmenting one's income from summer tourism was a great motivating factor behind the construction of private houses.

The number of *resort* and weekend houses is also extremely high. As a consequence of rising incomes, increased leisure time, and the unsatisfied demands of both social and commercial tourism, the country has been passing through a 'weekend-house building boom' since the end of the 1960s, which has had both positive and negative effects. The construction of weekend homes has been very common in the Balaton recreation area, as it offers the most concentrated water-side recreational possibilities in the country.

The above mentioned facts have resulted in the recreation area becoming more intensively built-up than was either planned or would be regarded as rational, causing environmental and land use problems. Agricultural land use itself has changed unfavorably, while new construction has not followed the original concepts of the Balaton development plan. The *settlement* pattern of the area now takes on a linear form, which follows the configuration of the lake. The functional structure of settlements has also been transformed. The old settlements of rural character are sharply segregated from the new recreation areas in most of the Balaton district. The shoreline is almost contiguously built up, whereas it should have been for the construction of beaches, promenades, and resort houses serving the collective types of recreation activities.

The main reasons for the creation of the above situation are to be found in the lack of governmental regulation of the land market and the operation of market forces that have produced a great price inflation over a comparatively short time span. The increasing demand for building plots has induced land speculation and, as a consequence, the market value of the majority of sites around the lake contains a speculative element over and above any reasonable real price differential.

Infrastructure is relatively highly developed in the settlements of the region: the supply of water and electricity is more widespread than elsewhere, as is the public transport system. But still, it could not cope with the rapid increase in construction activity. Developments in infrastructural provision only followed with a time lag. In the 1960s serious problems concerning water supply arose, and although this problem has now been solved largely by the development of new capacities, deficiencies in sewage mains and sewage treatment still remain, so that untreated or partly treated effluent is still discharged into Lake Balaton. One reason for this is that the system for co-ordinating common and private interests in the provision of public utilities has evolved only slowly and in an unsatisfactory manner, while central funds cover only part of the needs and cannot be increased.

As far as the *agriculture* of the recreation area is concerned, good quality land has been overburdened with the infrastructure of settlements, recreation, and tourism because these functions provide a higher rent than agriculture. Even in marginal cases, recreation is still able to outbid other uses. Because of this, the continuation of agricultural cultivation in certain areas has become less advantageous, and the sale of plots or a switch to tourist activities has been regarded as more beneficial.

During recent decades, the structure of agriculture in the recreation area has changed as the large-scale production of certain types of fruit and table grapes, together with vegetables, flowers, and other kinds of ornamental plants, have become more important. On the other hand, agriculture in the general catchment area has developed traditionally in a non-specialized manner with wheat, maize, potatoes, fodder crops, fruits, vegetables, grapes, and beef-cattle the main enterprises. At the same time, however, agriculture in this area has developed rapidly as mechanization and the use of chemicals have increased, contributing to the deterioration of water quality in the lake.

The catchment area influences *the quality of the water* in a number of ways. The methods of cultivation are one of the causes of soil erosion; the increasing use of fertilizers leads to more P and N nutrients getting into the lake and similarly with pesticides containing toxic components and the liquid wastes from large-scale animal husbandry.

Environmental protection of Lake Balaton as a case of solving a conflict situation

From the end of the 1960s, an increase in levels of eutrophication could be observed that reached a critical level primarily in the south-western basin of the lake. The research carried out stated that the main reason for the phenomenon was the increasing quantity of nutrients, mainly phosphorous, carried into the lake. As stated previously, the main source (approximately 70-80%) of phosphorus was derived from the fertilizers utilized in agriculture and washed into the water. The rest of it found its way into the lake as a result of non-satisfactory sewage treatment. The phosphorus leaking into the lake from individual septic tanks in several settlements is significant because of the low level of sewage network. Though considerable, the amount of nitrogen finding its way into the lake is not critical. In addition, the water of the lake is burdened by a lower volume of untreated industrial sewage, too. The decisively agricultural origin of the nutrients is demonstrated by the fact that 60-70 per cent, as shown by the measurements, come from non-point sources.

The acceleration of the process of eutrophication threatened to render the lake unsuitable for bathing within the foreseeable future (Figure 8). That would result in grave economic and social consequences, namely the following:

—although difficult to interpret from the point of view of economics, *one of the most significant natural resources of the country* would be damaged;

—*a significant part of the resort and hotel capacity of the country would become under-utilized;*

—*the market value of the real properties in the area would drop dramatically,* which would cause significant losses to both individual and collective properties;

—*the country would lose a significant hard currency revenue;* moreover, as a consequence of the recreation claims being left unsatisfied, significant foreign currency needs would be raised because of claims to recreation opportunities abroad instead of Hungarian ones.

The lake providing for mass tourism and recreation has recently become over-crowded, which undoubtedly reduces the conditions of enjoyment. On a hot summer weekend sometimes as many as 5-600,000 people stay in the resort belt. The negative effect that the loss of the recreation function of the lake caused in the general public cannot be interpreted from an economic point of view, but is important from a political point of view.

For the essentials of the phenomena, and from the point of view of environmental economy, the lake and its catchment area can be considered to be a closed system in which all those present wish to maximize their activities (the hotel industry, the catering industry, the owners of weekend houses, commerce, agriculture, etc.). *Their decisions are isolated from each other, following their own interests and neglecting the interests of the environmental protection of the lake.* The diversity of interests was manifested in the catchment area as a multitude of conflicting interests. It may be added that as a consequence of the lake being in danger, the major conflict of interests occurred between those using the lake and the catchment area (*individual and micro-economical interests*) and the whole of society.

The causes of aggravation can be summarized as follows:

(i) The establishment of infrastructure fell behind the rapid increase in building. A characteristic feature is that while the consumption of water increased 8-9 times in the course of 20 years, only 40 per cent of the sewage coming from the supplied water found its way into the lake through sewage network and treatment plants. Moreover, the treatment plants were only equipped with secondary technology, and so the infrastructure was unable to contribute to maintaining the ecological balance of the lake.

(ii) In areas jeopardized by erosion, farmers did not become interested in elaborating a production structure and utilizing an agrotechnology, which is necessary to decrease the washing of fertilizers into the rivers. No measures were taken either to take care of the treatment of the fluid waste produced on several large animal breeding farms on the catchment area: a smaller proportion entered the lake directly, and a greater part entered indirectly, through the rivers flowing into it. In fact agricultural activities were increased by neglecting a great number of environmental protection requirements, thus avoiding significant expenditures.

In order to avoid catastrophe and save the lake, it became necessary to intervene at the highest government level. As a result of the resolutions, activities were begun in two areas. *One was to launch integrated interdisciplinary research in the following main fields:*

—to establish a new system of regulators with the aim to resolve conflicting interest, so that the societal interest should prevail over the individual and micro-interests;
—to investigate and model the biological processes occurring in the lake in order to gain a better understanding of eutrophication;
—to elaborate a variety of technological interferences serving to improve the quality of water;
—to reveal the sanitary conditions of the lake and search for upgrading;
—to elaborate an optimalization programme for the long-term development of the resort belt of the lake, including a new regional plan.

On account of the urgency of interference, the government made resolutions on providing the necessary financial funds in order to stop eutrophication and to reverse the process. The objective is to return water quality of the lake to its state in the year 1960 within the foreseeable future. This project and its financial funds were incorporated in the two national five-year-plans (the sixth and the seventh) of the 1980s.

The government resolution indicated the following main fields of interference:

—in the field of regulation, further regional differentiation of waste water fines with an extremely high fine set for the catchment area of Lake Balaton;
—to reinstate the function of the Little Balaton by conducting River Zala in its original way through water basins covered with reeds that are under construction. It is hoped that after the completion of that system, the majority of the phosphorus of agricultural origin carried by the river can be arrested;
—to establish regional tertiary sewage purifiers equipped with dephosphorizers (there are plans to develop the public drainage network, too, but for some time it will be below the level of realistic requirements);
—to stop the planting of new vineyards;
—long-term plans to reduce the quantity of phosphorus of agricultural origin, including structural changes, melioration, and other solutions directed against erosion. As a first step, the large animal breeding farms were stopped while others were forced to perform appropriate fluid waste treatment;
—temporary ban on building in the settlements of the resort belt

Clearly, the form of government interference was selected by taking into account environmental protection and societal interests, but concentrated primarily on technological solutions. In spite of the results hoped for and expected, a great number of problems remain that require new actions. Among them are the following:

—*for the time being the interference does not ensure that the crowdedness will not increase further* and that the burden on the lake will be eased so as to remain within the limits it can suffer;

—it does not provide for the formation of a balanced situation among the different interests by better ensuring the environmental protection of the lake; it does not prevent the formation of new conflict situations as a consequence of the above;

—the majority of the measures taken are of a defensive nature (to stop eutrophication and reinstate the earlier situation); explicit development purposes are rarely considered;

—*the financial requirements of the investments are very high;* they constitute such a heavy burden on the Hungarian national economy that it will be necessary to divert other investment funds that are important from the economic and social points of view because they might provide greater profit by quicker returns. Therefore, we are facing a special case of opportunity cost as a consequence of the investments connected with Lake Balaton.

In relation to the above, a number of macro-economic questions can be raised, e.g., the following:

How can the efficiency of investments requiring extreme financial burden be interpreted from the point of view of economics? Are there solutions for returning a part of the sums invested to the national economy? Today it is not yet possible to give a satisfying answer to the questions raised because they require very thorough investigation and high level political decisions. It will be attempted, however, to develop a few ideas here. There are different opinions concerning government actions in the Lake Balaton region. Some people believe that the interventions may be looked upon as identical with restoration. In practice, it is nothing else but the restoration of an earlier carrying capacity. In opposition, others believe that it is the case of investing extremely high sums that might promote the development of another, more significant economic activity and therefore the restoration analogy cannot be interpreted. Furthermore, the present situation is not the result of a natural process but is the consequence of mistaken interests that violate the interests of the society.

Again, others are of the opinion that in the case of intervention one can only speak of societal efficiency, the formula of economic efficiency does not apply. That view is actually bringing us closer to reality but it is dangerous because it excludes the possibility of ever returning at least a part of the sums invested.

The third viewpoint is much more complex. All the individuals, micro-economic units using the Balaton or deriving profit from it (including the recreation of individuals), enjoy the benefits of a specific public utility. If it is so, an opportunity must be found for the state to tax such benefits (the underlying idea is that the benefits will increase as a consequence of the intervention). In simple economic terms this means that the users of the Balaton should pay for using it: the prices of goods and services in the resort area must be increased, including the use of infrastructure, water and sewage fees, and increased taxation of real estate values must be introduced, etc.

Those measures would also decrease the crowdedness. The above opinions do contain a great number of realistic requirements.

However, the introduction of the recommendations hides a number of conflicting dangers as well. It would primarily violate social policy interests, for a more general price increase in the Balaton area might exclude the lower income strata from using the lake for recreation. One of the explicit objectives of the collective recreation organized by the trade unions is that those of lower income also have access to recreation in this area.

There is no doubt that the solutions will be born as a result of a great number of considerations and debates, the objective of which is that, while also taking into account the interests of society, those of the national economy should also be manifested.

Notes

[1] The Balaton Recreation area is an area designated by the authorities for the purposes of long-term planning and environmental protection decisions and regulations. A total of 49 settlements are found within the recreation area, of which only three—Keszthely, Balatonfüred, and Siófok—possess the rank of town.

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RECENT TRENDS IN MIGRATION BETWEEN CORE AND PERIPHERAL REGIONS IN DEVELOPED AND ADVANCED DEVELOPING COUNTRIES

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KEY-WORDS: *convergence; core regions, counterurbanization; divergence; industrialization; migration,* in- ~, internal ~, interregional ~, net ~, out- ~, ~ rate; *nonmetropolitan* growth; *peripheral* regions; *population* concentration; *post-industrialism; urbanization.*

Introduction

With the front page headline "Populations's Rise in the Northeast Reverses a Trend," the New York *Times* (Stevens 1985) announced the findings of Rogerson and Plane (1985) that out-migration in the northeast U.S. has slowed since 1980. Not only has out-migration in this core region decreased in recent years, but the total population of the region began increasing again in 1981 following almost a decade of decline and, by one measure at least, new migration in the northeast was positive in 1983 for the first time since 1970. The strong shift during the 1970s of interregional population movements in the U.S. towards the south and west appear to have subsided. This is the first such indication since Vining and Pallone (1982) put forward the thesis that, in the developed world at least, the century-long migration towards the high density core regions is over.

Plane (1984) suggested that the pattern of core-periphery dispersal of population should begin to reverse itself through an increase in out-migration from the peripheral areas as newly expanding urban areas become more integrated in the national economic system and rise in the functional national urban hierarchy. Net migration into the south and west regions of the U.S. has indeed begun to decrease in the first half of the 1980s. Out-migration is generally increasing from the western region, but more migrants are moving from the west to the south than to either the east or the midwest.

Along with these new interregional migration trends, the location of growth within regions in the U.S. appears to be shifting as well. The 1984 U.S. population estimates confirm results from earlier studies (Engles—Forstall 1984) that growth of the nonmetropolitan population since 1980 has been slower than that of the metropolitan population, again reversing the situation of the 1970s (Engles—Forstall 1985).

Some similar trends also have been reported recently for several countries of Western Europe. There has been a slow-down of deconcentration in Denmark during the 1980s (Illeris 1984), although no return to the concentration of former times is seen. Internal migration trends favoring the peripheral regions of Norway in the early 1970s were reversed later in that decade (Hansen 1978). In Japan as well, Yamaguchi (1983) observed a process of population reconcentration.

In light of these recent findings regarding migration trends in the United States and elsewhere, it is appropriate to return to the data of Vining and Pallone (1982), to update their migration figures for as many countries as possible and observe any overall trends that may appear across several countries. This paper is essentially empirical, the purpose being to study internal migration trends in the 'developed' countries of Europe, North America, and Japan, and the rapidly developing countries of South Korea and Taiwan, in light of the recent migration trends described above. In their paper, Vining and Pallone examined internal migration statistics for 22 countries, grouped into five categories and covering a period from the 1950s to 1978-79. Data have since become available up to 1983-85 for 17 of these 22 countries, representing each of the five categories originally defined by Vining and Pallone:

1) Northwestern Europe: Belgium, Denmark, France, the Netherlands, and the Federal Republic of Germany (FRG). This paper updates the migration data for all of the countries in this category.

2) North America: Canada and the United States. Recent migration data are available for both countries.

3) Countries on the periphery of western Europe: Finland, Iceland, Italy, Norway, Spain, Sweden, the United Kingdom, and including Japan and New Zealand. Data since 1979 are available for all except Iceland, the U.K.[1], and New Zealand.

4) Eastern Europe: Czechoslovakia, the German Democratic Republic (GDR), Hungary, and Poland, of which recent data are available for Czechoslovakia and the GDR.

5) Two advanced developing countries of east Asia: South Korea and Taiwan.

The definitions used in this paper for core and peripheral areas are those of Vining and Pallone. The core regions are defined specifically to be 'over-bounded' to ensure that they are fully contained within the specified boundaries. Two indicators are used to trace internal migration and regional growth trends: 1) Net Migration Rate; and 2) Regional Differential Growth Rate. The Net Migration Rate is the quotient of regional net internal migration during time period t and total regional population at the beginning of t, multiplied by 1,000.

$$NMR_{rt} = (NIM_{rt}/POP_{rt}) \times 1000$$

NMR_{rt} = Net Migration Rate for region r, period t.

where NIM_{rt} = Net Internal Migration for region r, period t.

= In-migration - Out-migration.

POP_{rt} = Total Population of region r at the beginning of period t.

Net Migration Rates and regional population growth are not necessarily directly, or positively, correlated, and so to compare net migration with regional growth, the Regional Differential Growth Rate also has been calculated for each of the regions studied. The RDGR is calculated by subtracting the annual national growth rate from the annual regional growth rate (each multiplied by 1,000).

$$\begin{aligned}
&\text{RDGR}_{rt} &&= (\text{RGR}_{rt} - \text{NGR}_t)\\
&\text{RDGR}_{rt} &&= \text{Regional Differential Growth Rate for period t.}\\
\text{where}\ &\text{RGR}_{rt} &&= \text{Regional Growth Rate for region r, period t.}\\
& &&= [(\text{POP}_{r,t+1} - \text{POP}_{rt})/\text{POP}_{rt}] \times 1000.\\
&\text{NGR}_t &&= \text{National Growth Rate for period t.}\\
& &&= [(\text{POP}_{t+1} - \text{POP}_t)/\text{POP}_t] \times 1000.
\end{aligned}$$

A summary of migration trends to 1978

Vining and Pallone (1982) described the following trends to 1978. The countries of northwestern Europe had experienced a long-term decline in net in-migration to their core regions since the 1950s and experienced net out-migration to the peripheral regions during the 1960s and 1970s. The decline in net in-migration to the core regions was more abrupt in Canada and the U.S. and amounted to very substantial losses in the 1970s. The countries on the periphery of western Europe, including Japan and New Zealand, experienced stable or rising net in-migration to their core regions between the 1950s and 1960s, followed by a sharp drop in net in-migration to these regions beginning around 1970, but not to the point where sustained net out-migration was observed. The eastern European countries had experienced sustained, though moderate, net in-migration to their core regions without exhibiting any real decline. Net in-migration to the core regions of both Taiwan and South Korea was very large and showed no signs of abatement in 1978.

Recent trends

A brief examination of the most recent trends, from the late 1970s to 1983-85, follows with a presentation of graphs depicting the migration trends during this period.

NORTHWESTERN EUROPE

In brief, the net migration flows of Denmark, the Netherlands, and Belgium have already reversed their previous trends and now flow in the general direction from the periphery to the core regions (Figures 9, 10 and 11). FRG continues to show out-migration from the core region, but at quite moderate rates, and only France continues to have significant net out-migration from its core region.

In the Federal Republic of Germany, the moderate net out-migration from the core area of Rhine-Ruhr (west region) to the periphery, which began in the 1960s, continues through 1984. The southern region of Bavaria continues to have the largest net migration rate, and all other peripheral regions (north, central, and Baden-Württemberg) had modest positive net migration rates between 1978 and 1982. In 1984, however, Baden-Württemberg surpassed Bavaria with a rate of 2.1, and the center region dropped to a rate of -0.9. The total population of the country as a whole has been stable between 1970 and 1984. Bavaria is the only region that has shown consistent population growth since 1970 (Figure 12).

In Belgium, a similar migration trend was evident between 1970 and the early 1980s, with the southern, less prosperous region of Wallonia experiencing moderate net in-migration from the core Brussels Metropolitan area and the northern region of Flanders. The rate of in-migration in Wallonia during the late 1970s was approximately double that of the early 1970s. Although several years of data are not available, it is apparent that migration to the core region became positive again in the early 1980s, and net migration in Wallonia was near zero in 1983 and 1984. Flanders, however, even with a slightly negative migration rate, remains the only region of the three that has grown consistently at an annual rate greater than the country as a whole (Figure 11). Flanders has the highest birth rate and lowest death rate of Belgium's three regions.

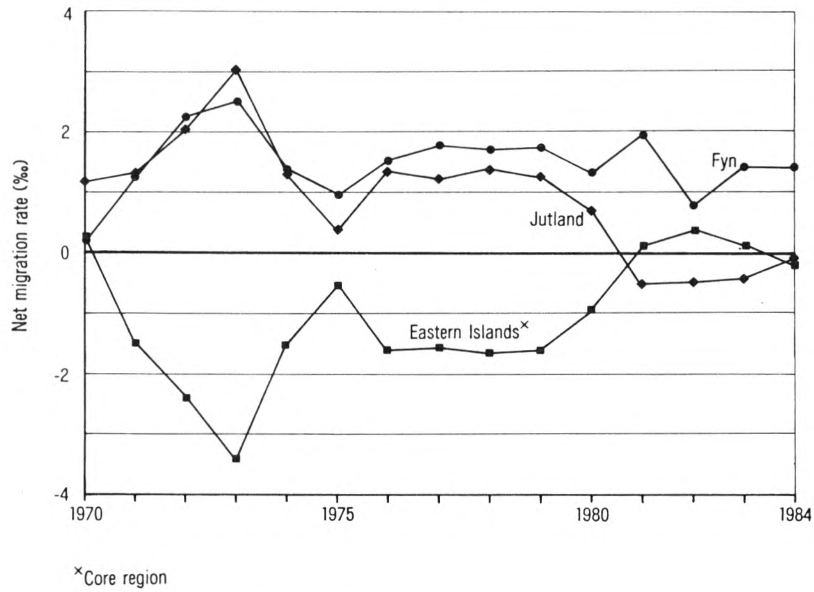

FIGURE 9 *Regional net internal migration in Denmark*

Migration trends in Denmark were similar to those in the FGR and Belgium through the 1970s, with the eastern islands region (Copenhagen) experiencing out-migration to the peripheral regions Fyn and Jutland. The core region had small but positive NMRs, however, from 1981 to 1983 (Figure 9). The entire country has exhibited general stability since 1980, with all migration rates between -1 and +2. Even though the eastern islands experienced net in-migration in the early 1980s, the total population of the region declined slightly during the same period, and Fyn and Jutland both have positive differential growth rates, due to higher birth rates.

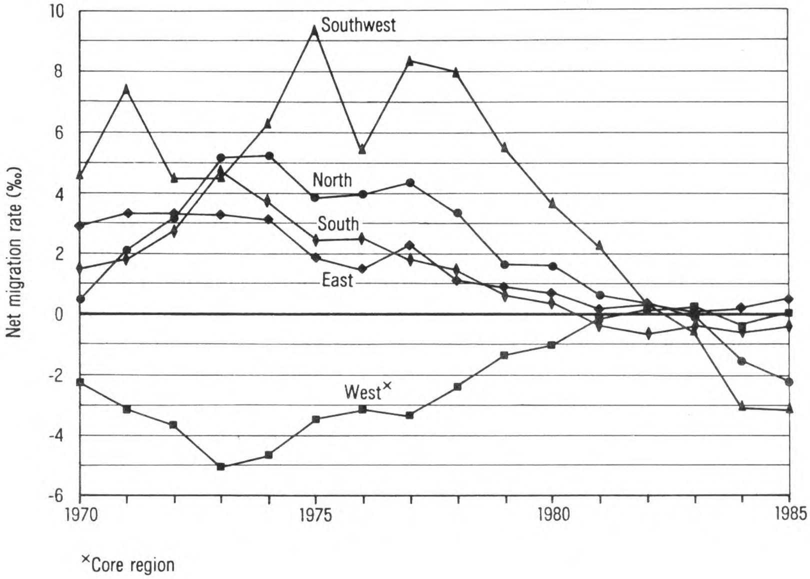

FIGURE 10 *Regional net internal migration in the Netherlands*

A similar convergence towards zero is seen in the Netherlands, although it is much more pronounced, since net internal migration rates reached as high as 9.4 in the southwest region in 1975. From the mid-1960s to the mid-1970s, all of the peripheral regions had positive migration rates at the expense of the core western region. Beginning in 1978, there was a rapid convergence towards zero, with the core region recording a slightly positive rate in 1982, 1983, and 1985[2]. Net out-migration began in the southern region in 1981, and in the north and southwest in 1983 (Figure 10).

Migration data for France is available only for seven year intervals. France is distinguished from the other countries of northwestern Europe in that the net migration rates of its regions, rather than showing a general trend of convergence towards zero, are diverging away from zero, with the Paris, north, and east regions showing increasingly negative rates, and Mediterranean, south, and southwest regions showing increasingly positive rates (Figures 13 and 14). Although the total population of the Paris region continues to increase (at a rate below the national rate), its negative annual net migration rate during the period 1975-82 (-3.0) was more that twice the annual rate during the previous period of 1968-75 (-1.2). The south, southwest, and Mediterranean regions continue to experience net in-migration at the expense of the northern and eastern regions of the country. A more recent study, however, indicates that the slowdown in non-metropolitan growth seen in other countries seems to be appearing in France as well (Courgeau 1986), although this result, obtained from a survey, needs to be corroborated. If so, this could indicate that out-migration from the core region may have already reached its peak.

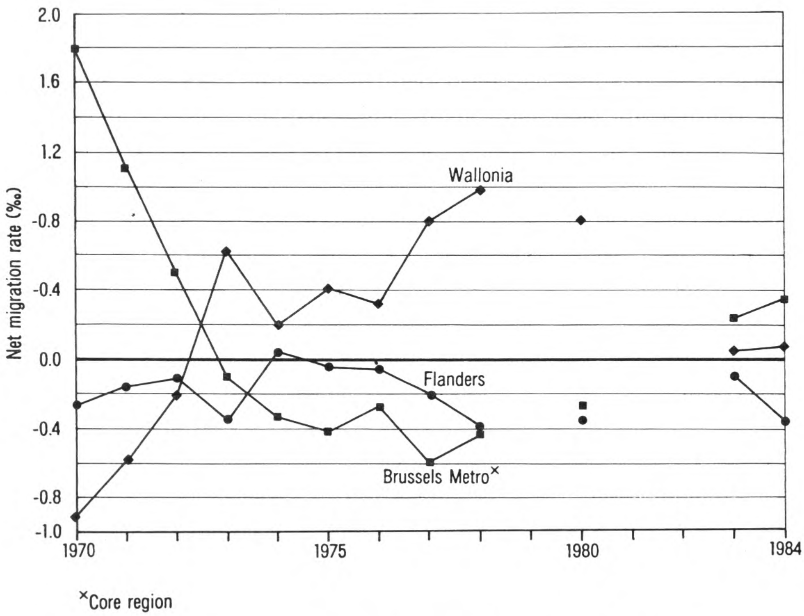

FIGURE 11 *Regional net internal migration in Belgium*

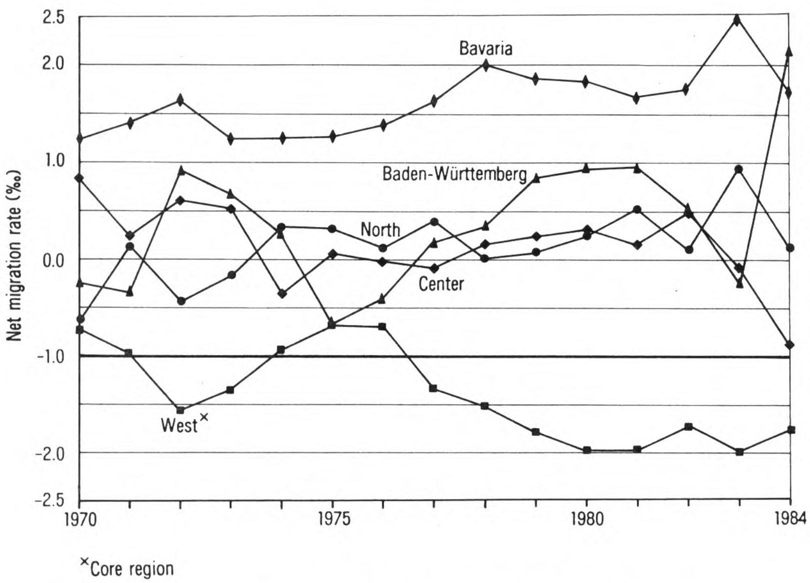

FIGURE 12 *Regional net internal migration in the FRG*

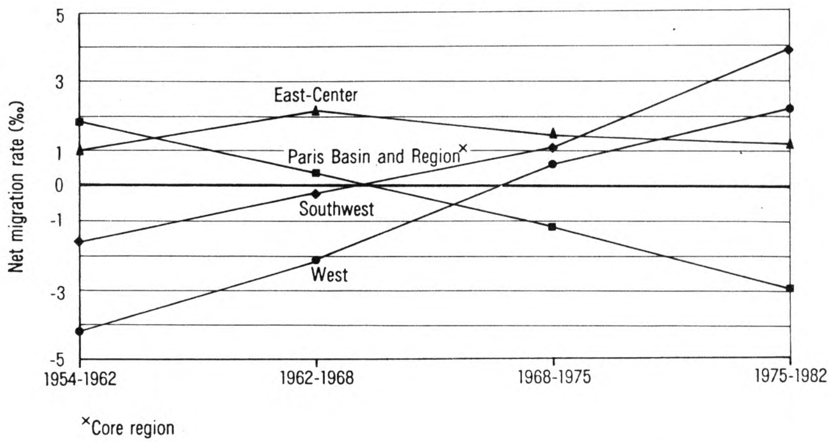

FIGURE 13 *Regional net internal migration in France: Regions 1-4*

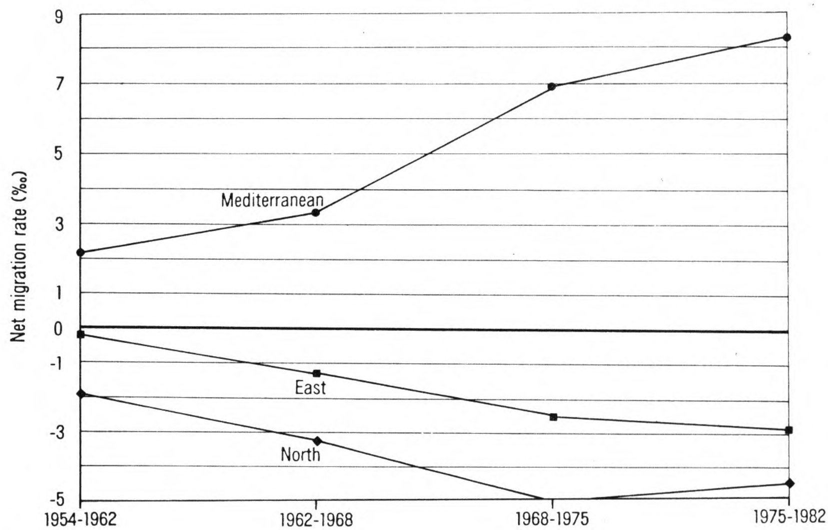

FIGURE 14 *Regional net internal migration in France: Regions 5-7*

NORTH AMERICA

Figures available for the U.S. for five year periods during the 1970s and for annual periods for 1980-83 indicate a decrease in net out-migration from both the northeast and midwest regions since 1980, and decreasing in-migration to the south. U.S. Census reports for net internal migration actually show an NMR of -1.2 for 1983[3]. These data generally reflect the findings from Internal Revenue Service data reported by Rogerson and Plane (1985), with the exception of the midwest (Figure 15).

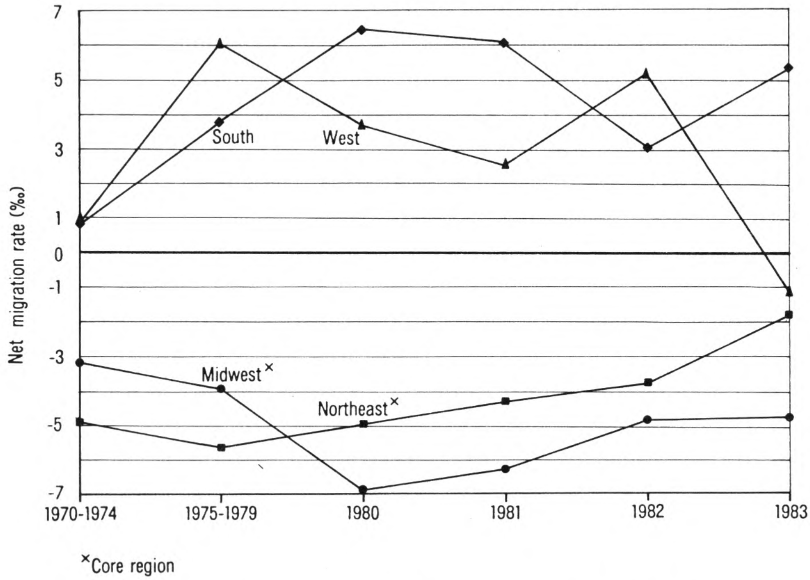

FIGURE 15 *Regional net internal migration in the USA*

Perhaps more useful figures for the U.S., over a longer time series, are annual total migration figures, which are calculated as a residual from the difference of population growth and natural increase (Figures 16 and 17). These figures show net out-migration from the northeast decreasing steadily since 1978, turning positive in 1983 with a net total migration rate (NTMR) of 1.1, dropping to -0.4 in 1984. The northeast's population began growing again in 1981 following five years of decline, although the region's RDGR was still a low -8.0. Out-migration from the midwest increased continually during the same period, with its NTMR changing from -2.5 in 1976 to a low of -7.9 in 1982. Since then, however, the NTMR has increased to -3.8 in 1984. The observation of Rogerson and Plane (1985) that the south and west may have passed their peak periods of in-migration and growth has been confirmed by the most recent data. The NTMR for the west increased from 6.9 to a high of 12.7 between 1970 and 1979, then decreased to 9.4 in 1984. Migration to the south peaked two years later in 1981 with an NTMR of 12.4, declining to 6.7 in 1984.

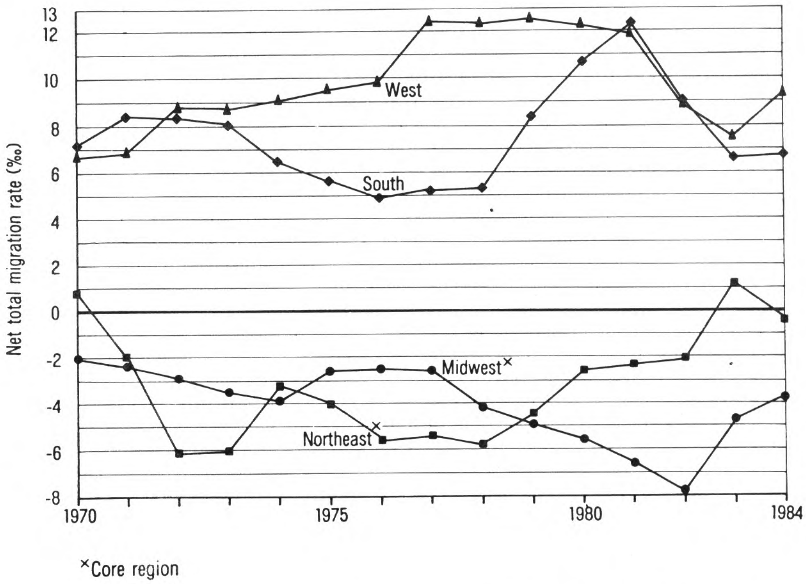

FIGURE 16 *Regional net total migration in the USA (Estimates)*

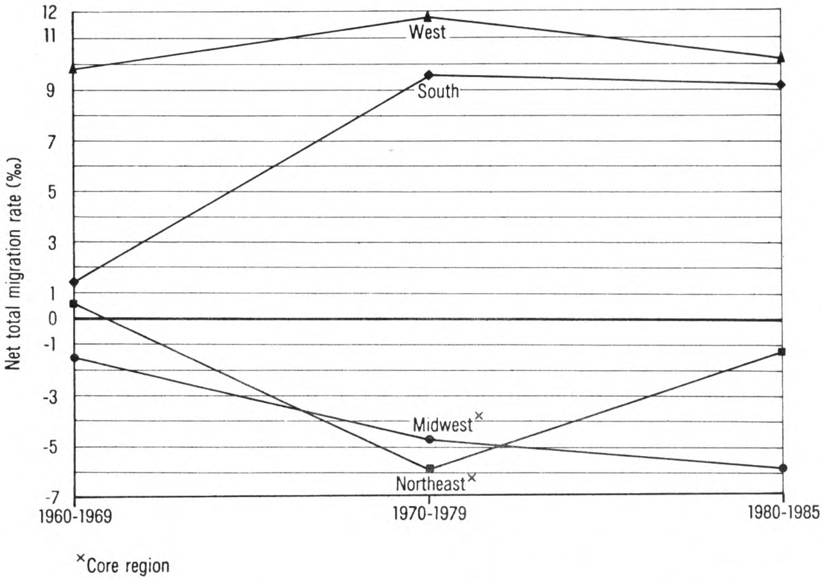

FIGURE 17 *Regional net total migration in the USA (Census)*

Recent trends in Canada (Figure 18) are similar to those of the U.S. The core region of Canada (Ontario and Quebec) experienced steadily increasing out-migration after 1971 with a maximum negative NMR of -3.8 in 1980. The trend then reversed, with positive NMRs of 1.2, 1.7, and 1.8 in the years 1983 to 1985. The opposite trend is seen in the west region, where the NMR gradually increased to a peak of 10.0 in 1980, followed be a sudden drop between 1982 and 1985 to -2.6. The speed with which net migration first rose and then declined in the west most certainly can be explained by the performance of the oil industry. In 1976, the population of Alberta accounted for only 29% of the west region; but during the period 1976-1981, in-migration to this oil-producing province accounted for 48% of total in-migration to all of the provinces of the west[4]. Net migration in the maritimes has been anomalous to the other regions, increasing in the early 1970s to a peak of 5.4 in 1975, then decreasing to -5.7 in 1980, increasing again to 4.4 in 1982, declining again to -3.9 in 1985. In 1984 the migration pattern of Canada returned to that previously seen in 1970, with a net gain of migrants in the core region and a net loss in the two peripheral regions. What is most dramatic is that in 1985, every province and territory in the two peripheral regions experienced net out-migration. In the core region, however, Ontario gained 33,562 net migrants and Quebec lost only 5,349 net migrants, which is a very low figure compared with the net loss of 46,429 in 1977.

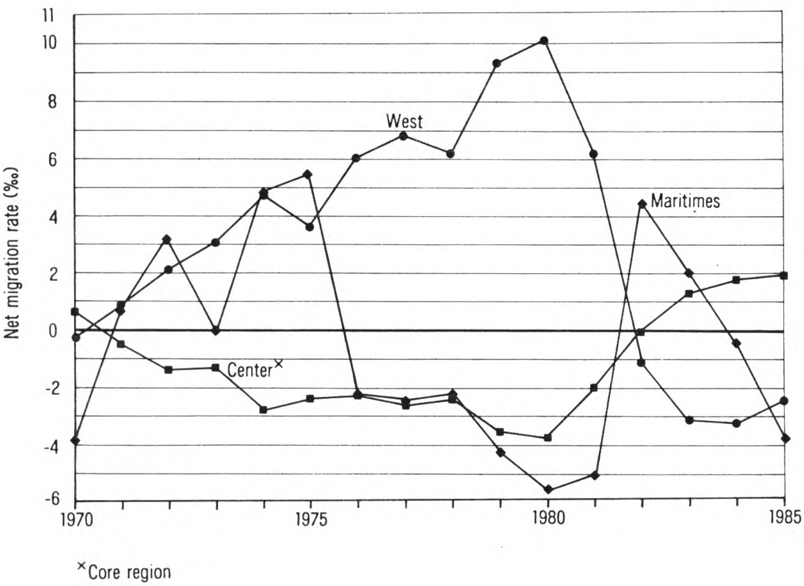

FIGURE 18 *Regional net internal migration in Canada*

PERIPHERAL WEST EUROPE AND JAPAN

The historical migration rates for the countries in this group exhibited a significant drop in net in-migration to the core regions beginning only after 1970, with maximum net flows into the core regions and away from the peripheral regions occurring during the 1960s. Since 1980 the rates of net migration have shown a slight divergence away from zero, with the core areas again attracting migrants from the periphery. In no way, however, are the net flows to the core regions approaching the levels of the 1960s.

Finland is the only country in this category that has never reversed the negative net migration rates in any of its peripheral regions during the study period, although the net flows have been reduced greatly from their maximum in 1970 and nearly approached zero in 1977 (Figure 19).

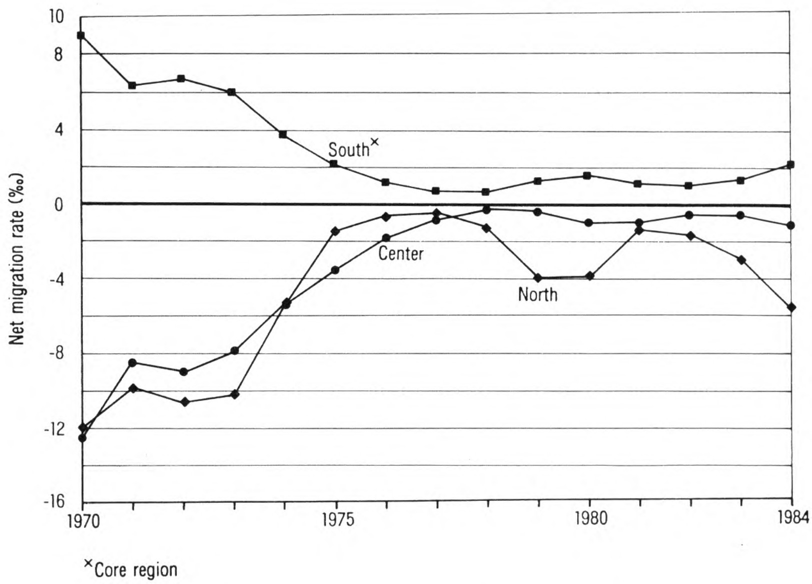

FIGURE 19 *Regional net internal migration in Finland*

Between 1979 and 1984, the north region again experienced increasing outflows to the core region. Norway shows a similar trend, with net flows out from the north region approaching zero in 1979, but increasing (negatively) to an NMR of -8.1 in 1984 (Figure 20). This is the greatest level of net out-migration in the north region since 1970. The net migration rate in the core (east) region has increased steadily between 1979 and 1984 from 0.1 to 2.7. The south region, which consistently has had the highest net migration rate since 1971, had NMRs of only 1.6 in 1983 and 2.1 in 1984, its lowest levels since 1966.

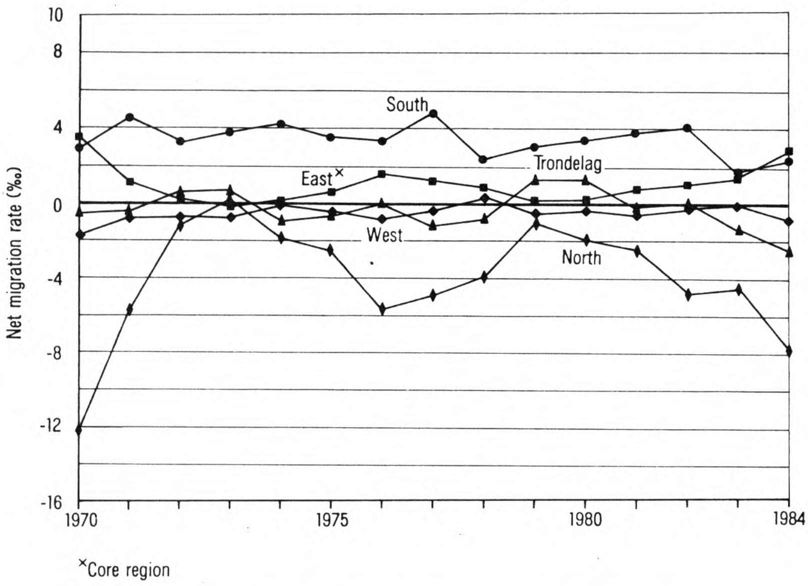

FIGURE 20 *Regional net internal migration in Norway*

A much more abrupt change has occurred recently in Sweden, reversing the trend of net flows out from the core to the periphery seen during the 1970s. From 1971 to 1980, the Stockholm Metropolitan Region had a net outflow of persons to other regions. In 1981 this trend reversed and continued increasingly positive through 1985 (Figure 21). The opposite is seen in Sweden's peripheral regions, which exhibited generally positive net migration rates in the 1970s, peaking in 1975. Net migration dropped abruptly and continuously for these regions beginning in 1981, with all peripheral regions having negative NMRs between 1982 and 1985 (Figure 22). By this time, the three core regions all had positive net migration rates.

No such sharp change is seen in Japan after 1980, the migration rates of which remain relatively small and steady when compared to their pre-1980 rates. Net migration out of the peripheral regions dropped practically to zero in the mid-1970s, but the three core regions have since been gaining gradually in their attraction of migrants (Figures 23 and 24). The NMR of the Kanto region (containing Tokyo) has increased from a low of 1.7 in 1976 to 3.5 in 1985[5]. The NMR of Tokai, the second core region (containing Nagoya), was 0.7 in 1985, the first positive NMR for that region since 1974. Overall, since 1980 the core regions of Japan have begun to attract more migrants once again as net out-migration from all of the peripheral regions has increased.

The net migration rates for Italy also continue to hover near the zero mark, but differ from Japan and other countries in this category in that it is still in the long process of convergence that began in the 1960s (Figure 25). It is significant to note that the net migration rate of the core region (northwest) became negative for the first time in 1982. In 1985, the core region's

NMR stood at -0.8, identical to that of the south region. The NMR for the south has increased steadily from a low of -13.0 in 1961. Moreover, the population of the northwest has been declining since 1979, whereas the growth of the south has been the highest in the country since 1971, due in part to higher birth rates and returning international migrants (Fielding 1982).

Vining and Pallone (1982) described a rapid decline in net in-migration to the four core regions of Spain in 1974 (Figure 26), and a rapid decline in net out-migration from the peripheral regions of the south and west (Figure 27). At the time it was difficult to call this a long term trend, given the recession that struck the country around this time. More recent data, however, confirm this trend to 1984. The net migration rates of all of the regions continue to converge towards zero, with some reversal of migration trends. Two of the four core regions, Cataluña and Vascongados y Navarra, have had net outflows of migrants since 1980 and 1978 respectively. As of 1982, all of Spain's peripheral regions had positive net migration rates with the exception of Asturias and Baleares (Figure 28). Population estimates following the 1981 census reflect these recent migration trends, with current estimates for the core regions reduced up to 1.9% over earlier estimates, while those of the peripheral regions increased up to 4.8% over previous estimates.

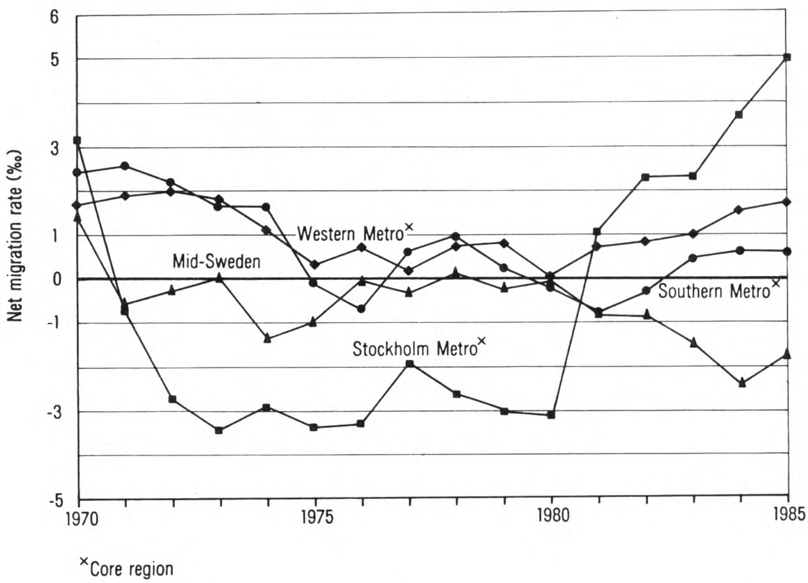

FIGURE 21 *Regional net internal migration in Sweden: Regions 1-4*

In the United Kingdom, changes of registration with National Health Service Central Register were used by Ogilvy (1980) to estimate migration flows for the U.K. during the 1970s. The trends show several of the northern peripheral areas (Scotland, Yorkshire and Humberside, and the north district) all with reduced net out-migration in the mid-1970s. The core region (East Anglia, southeast, and southwest areas) had a small net out-migration in 1974-75, but has become increasingly positive in the latter half of the decade, while the peripheral regions, except for Wales, all showed net out-migration from 1975 to 1979. Later data from the Central Statistics Office[5] shows the southeast (London metropolitan) area with positive net migration in 1980-82. This represents a major turnaround.

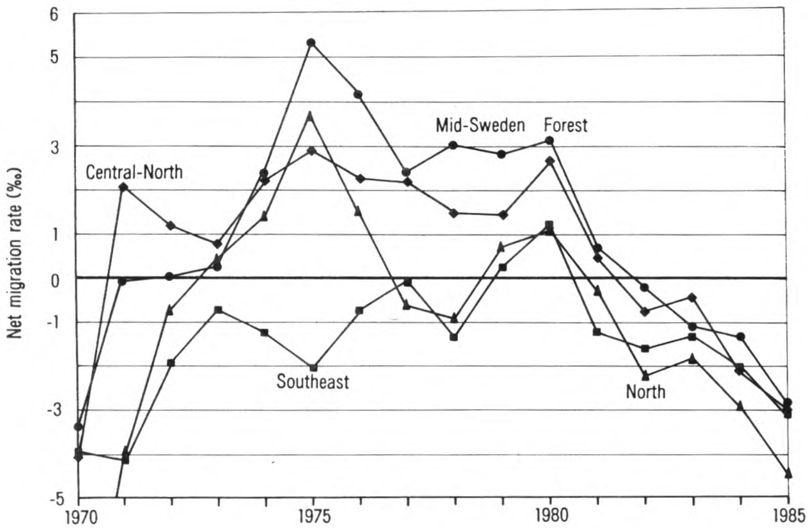

FIGURE 22 *Regional net internal migration in Sweden: Regions 5-8*

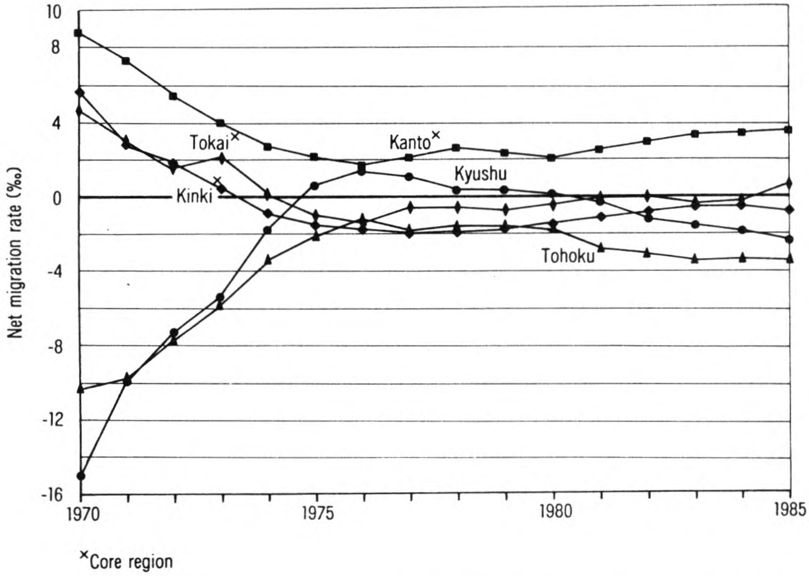

FIGURE 23 *Regional net internal migration in Japan: Regions 1-5*

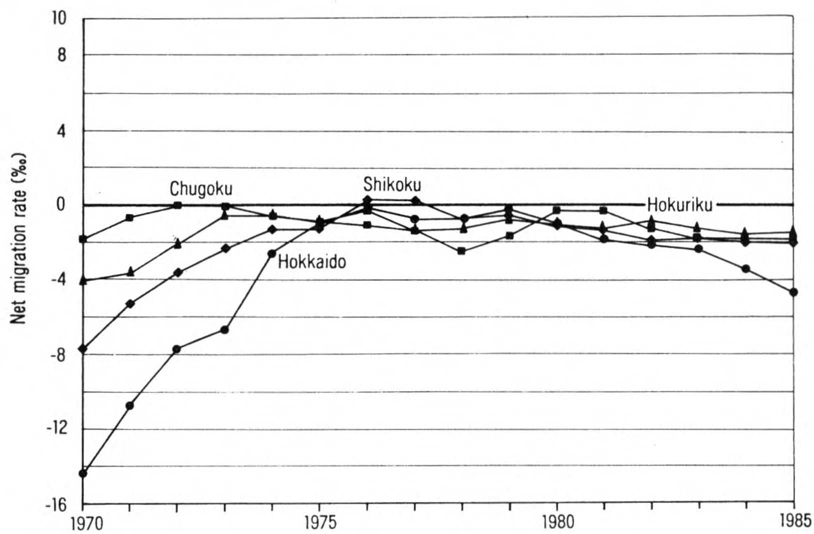

FIGURE 24 *Regional net internal migration in Japan: Regions 6-9*

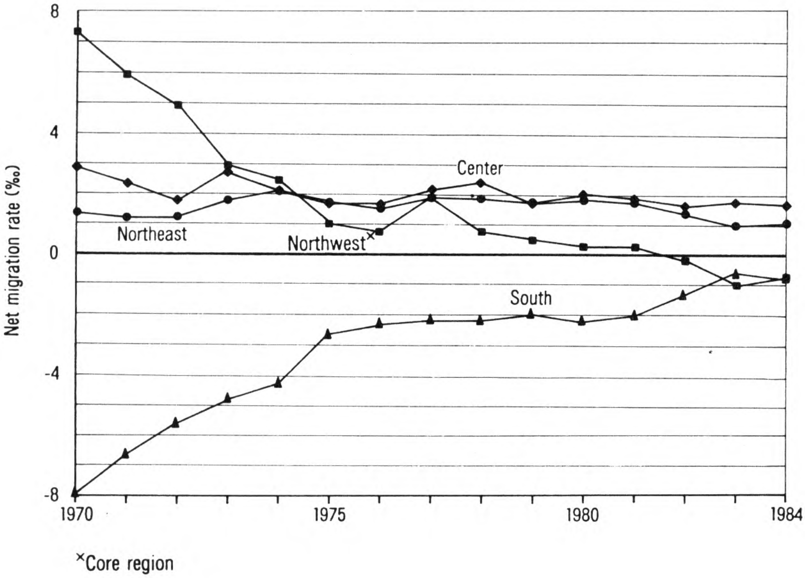

FIGURE 25 *Regional net internal migration in Italy*

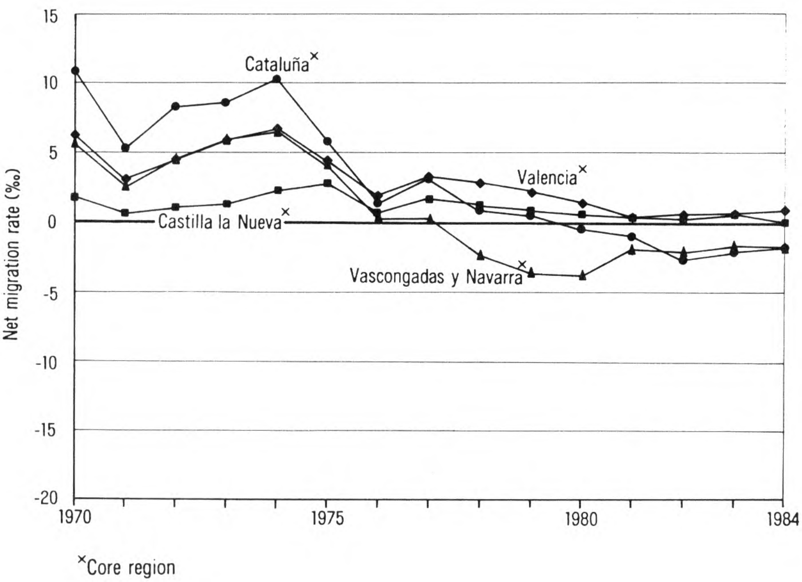

FIGURE 26 *Regional net internal migration in Spain: Regions 1-4*

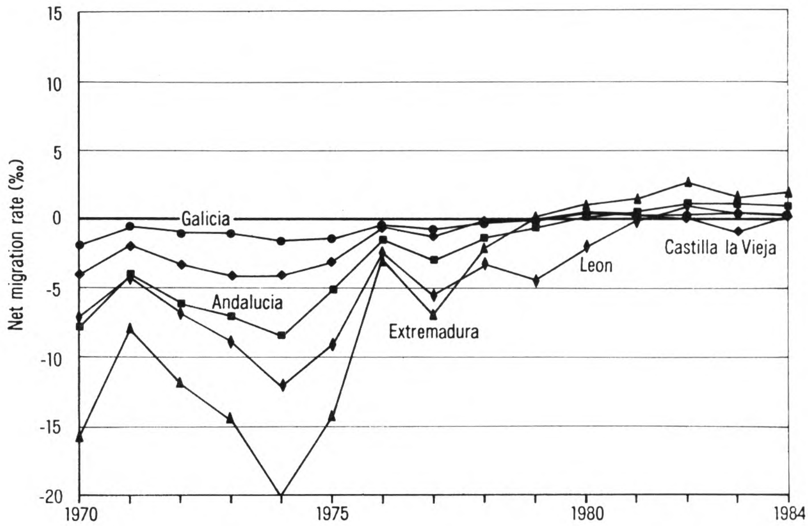

FIGURE 27 *Regional net internal migration in Spain: Regions 5-9*

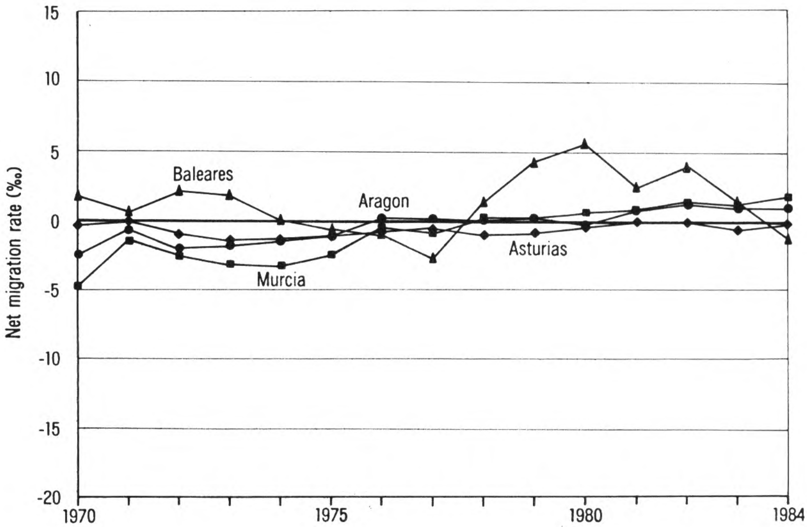

FIGURE 28 *Regional net internal migration in Spain: Regions 10-13*

EAST EUROPE

There is little change in the constant rate of net migration towards the core areas in Czechoslovakia or the GDR (Figures 29 and 30). The high rate of net migration into the Berlin region achieved in the mid-1970s continues through 1984 with little change. Net migration towards Prague continues, but at a more moderate rate than Berlin. The NMR of Czechoslovakia's core region has fluctuated between 1.5 and 6.8 during the period 1980-1985, but none of the three peripheral regions of Czechoslovakia have experienced positive migration rates since 1976. Neither country shows any sign of a systematic or sustained decline in net migration towards their core regions.

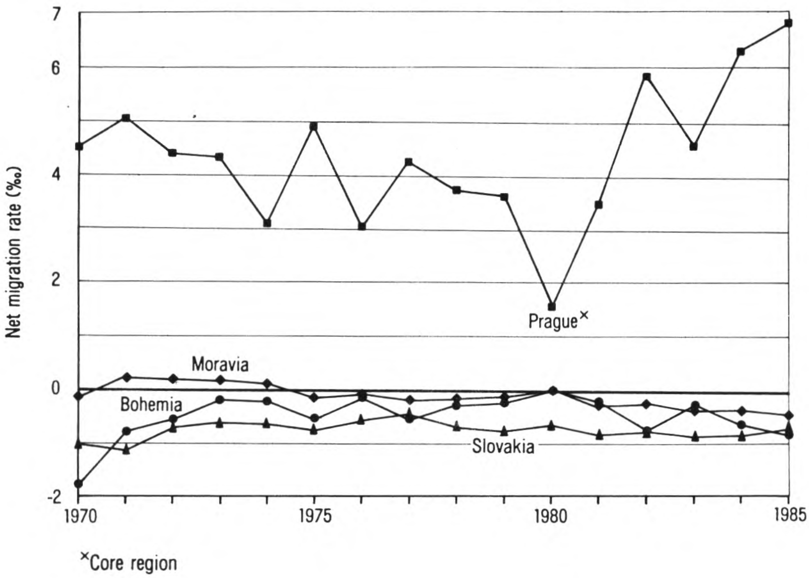

FIGURE 29 *Regional net internal migration in Czechoslovakia*

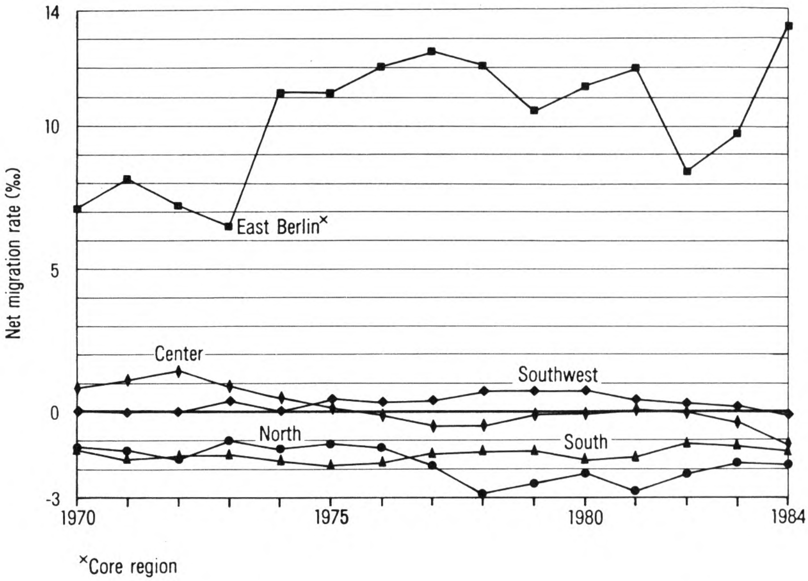

FIGURE 30 *Regional net internal migration in the GDR*

TAIWAN AND SOUTH KOREA

The north region of Taiwan continues to attract migrants from all of the other regions of the island, but its NMR has declined from 19.8 in 1979 to 10.0 in 1984. During the same period, out-migration from the center region (containing Taichung City) subsided, with its NMR changing from -5.7 in 1979 to -0.6 in 1985. The other regions still have NMRs less than zero, but with that of the north region declining by 50% in 5 years and the NMR of the center region near zero, Taiwan may well be on the verge of breaking with its past migration patterns (Figures 31 and 32).

During the period 1978-81, it appeared that migration trends in South Korea, like Taiwan, might begin to converge towards zero, but net migration rates to the core area during the 1982-84 period returned to levels previously seen in the mid-1960s (Figure 33). Seoul attracted 427,000 net migrants in 1983, nearly as many as in 1978, which is the highest year since 1969. Then in 1985, the NMR for the Seoul region declined to 19.4, its lowest level since 1972 and nearly half the rate seen in 1978. The general trend of migration into Seoul has been downward since 1978, but the fluctuations in the rates make it difficult to determine whether the country is making a break with its past migration patterns. South Korea has had plans since 1977 to control Seoul's population and growth and to obtain a more appropriate national population distribution pattern (Kim—Donaldson 1979). Government policies have tried to promote deconcentration away from Seoul (Rondinelli 1984), but at the same time have promoted concentration in urban centers in areas adjacent to the capital city within the Seoul metropolitan area (Smith *et al.* 1983).

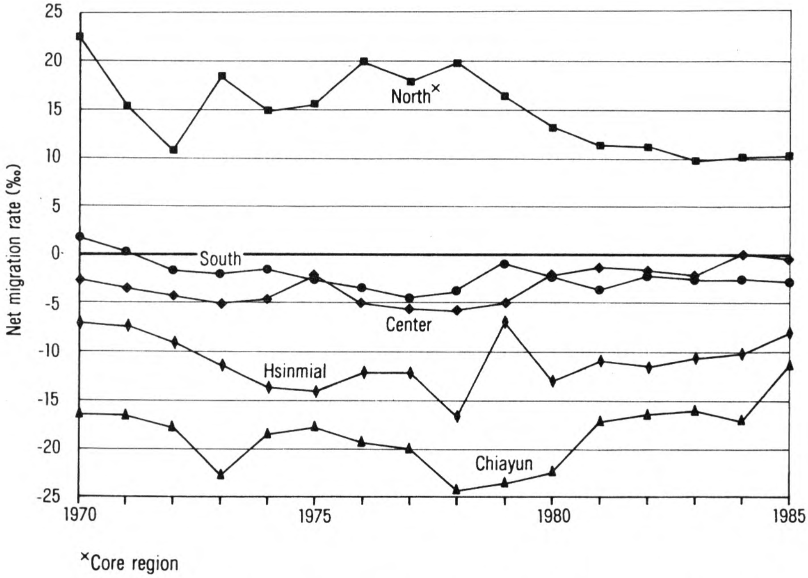

FIGURE 31 *Regional net internal migration in Taiwan: Regions 1-5*

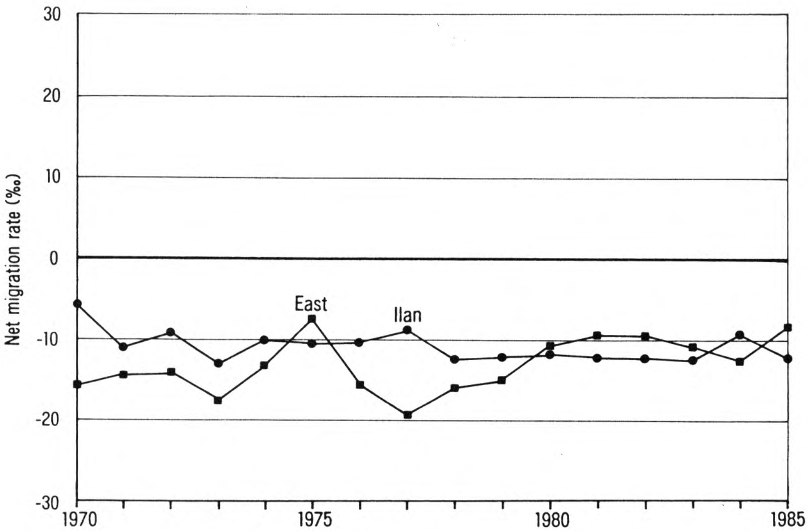

FIGURE 32 *Regional net internal migration in Taiwan: Regions 6-7*

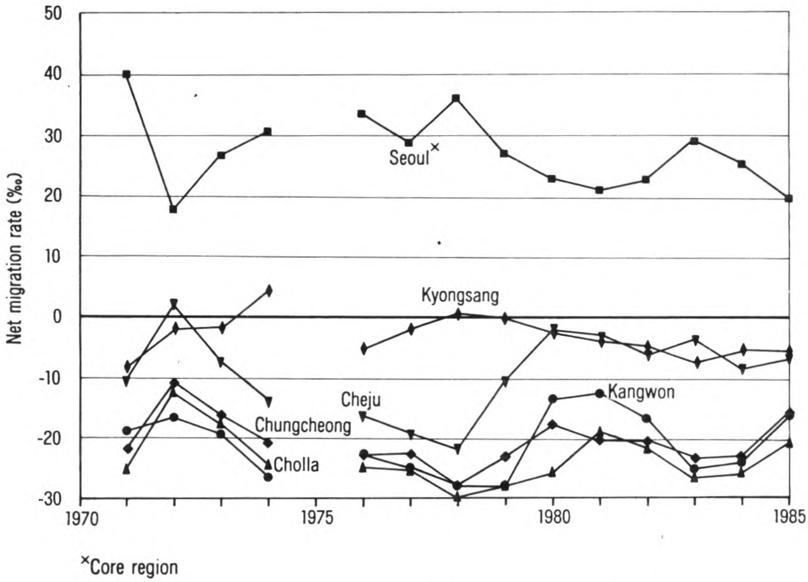

FIGURE 33 *Regional net internal migration in South Korea*

Summary

The countries of northwestern Europe show the most moderate rates of net migration examined in this paper. Only France continues to have increasingly divergent rates of migration, with the Paris Basin, the east, and north regions losing increasingly more people to the other regions. Migration rates in the FRG are fairly steady, with the core region still losing migrants, primarily to Bavaria. Two countries, the Netherlands and Denmark, have generally shown net in-migration to their core regions during the first half of the 1980s, a reversal of trends dating to the 1960s in the Netherlands, and to the 1970s in Denmark. Overall, migration in the smaller countries of northwest Europe appears to be quite stable, with core regions once again attracting small though positive migration flows.

Interestingly, between 1978 and 1983 the total number of migrants decreased in Denmark by 5.6%, while total migrants in the Netherlands increased by 4%. A decreasing supply of new dwellings may have contributed to the decline of migration levels in Denmark, although growth in the primary and tertiary economic sectors in the eastern islands region appears to have led to net in-migration into the core region in the early 1980s (Illeris 1984). The Netherlands has been particularly hit by unemployment in recent years. Although total movement has increased, perhaps as job seekers search for opportunities in other areas, no single region dominates the internal migration patterns. In Australia, internal migration surveys have shown consistently that, during the 1980s, unemployed persons have rates of mobility that are twice as high as those who are employed (Smailes—Hugo 1985). This may also be the case in the Netherlands, as long as unemployment benefits are portable throughout the country.

The peripheral European countries and Japan show larger rates of migration during the past decade than the countries of northwestern Europe. Although converging towards zero in the mid-1970s, a slight divergence is now seen generally during the late 1970s and early 1980s. Norway, Finland, and Japan are examples whose core regions had net migration rates approaching zero in the mid-1970s, but again are now increasing slightly. The core regions of Sweden have also attracted more migrants since 1981, following a decade of net out-migration (which better fits the pattern of the smaller countries of northwestern Europe or North America). The trends in Spain and Italy lag behind those of the other peripheral European countries by about a decade, perhaps because of the large size of their own peripheral regions (the Mezzogiorno of southern Italy; Andalucia and Galicia in Spain) and their relatively wide historical disparities in regional development; but they are following the general trend of the other countries in this category.

As in northwestern Europe, a change is seen in the migration trends of the past two decades in the United States, with net out-migration decreasing in the northeast and midwest regions since 1979-80. Government migration statistics do not show a complete reversal of trends as in the Netherlands or Denmark, but total migration rates estimated by the authors show NMRs near zero for the northeast in 1983 and 1984. Migration in the U.S. may be approaching a new stability, as efficiencies of agglomeration begin to decrease in the south and west, and service industries take hold in the northeast. Changing migration patterns in Canada are similar to, but more dramatic than, those in the U.S. The drop in migration to the west region is much more abrupt than seen in the U.S., due to the dependence on oil for much of the growth of the Canadian west during the 1970s, but the general pattern shows migration trends converging towards zero in 1982, followed by net movement toward the core through 1985. Several more years of data will be needed for both countries to confirm whether the trends of the two countries are indeed following the same general course.

In eastern Europe, the German Democratic Republic and Czechoslovakia still show no sustained trend away from long term moderate migration from the peripheral regions to their core regions.

Taiwan shows signs of convergence towards zero during the early 1980s, although the north region still dominates all others. The government has provided incentives and encouragement to many industries to locate outside of Taipei City, which "has resulted in a high concentration of manufacturing companies and their official buildings in a few major urban areas such as the Taipei metropolitan area and Kaoshiung City" (Tsai 1978). The south (Kaoshiung) and central regions had net migration rates of -2.9 and -0.6 respectively in 1985; while the other peripheral regions all continue to have rates beyond -8.

In South Korea, development policies seem to have had a significant impact on the movement of industrial activities from Seoul to its suburbs, but relatively little effect on the movement of industry or the creation of new industry in the peripheral regions (Smith et al. 1983; Kim—Donaldson 1979). Seoul is still the predominant region, with its migration rate increasing from 20.8 in 1981 to 28.6 in 1983 then declining to 19.4 in 1985. The wide fluctuations in the migration rates make it difficult to predict whether Korea will soon break from its migration patterns of the past.

Rogerson and Plane (1985) observed that the large loss of migrants from the U.S. industrial core is a phenomenon of the 1970s, and "that the imminent demise of the industrial core states, predicted by many, is far from certain." The data indicate that this is true not only for the U.S. but for northwestern Europe as well, with the notable exception of France. They suggest that the high growth rates of areas of the U.S. that are rich in high-tech jobs may already be slowing because the in-migration of firms to these areas is bidding-up wages and causing the growth areas to lose some of their advantage over the industrial core.

'Counterurbanization' has been a theme of European migration literature in recent years. Fielding (1982, p. 13) concluded from a study of migration trends in France and other European countries that " 'Urbanization', used in the sense of a positive relationship between net migration and settlement size, has ceased in almost all of the countries of Western Europe in the period 1950-1980.... In seven out of the nine countries in which it can be shown that urbanization had ceased, the metropolitan and principal industrial cities showed, during the 1970s, signs of net migration loss, and rural regions containing small and medium-sized towns showed signs of net migration gain."

Do the trends of the early 1980s of the Netherlands, Denmark, the U.K., Sweden, and Norway, as well as the U.S., Canada, and Japan, indicate an end to counterurbanization in these regions of the world? As Fielding said, there is an immense complexity of regional and local situations in Western Europe, which makes conclusions from empirical analysis difficult; but contrary to the period of the 1970s, many of the metropolitan regions of Europe, the U.S., and Japan are losing fewer migrants, or are gaining population through internal migration.

It has been shown clearly that all countries go through major shifts in settlement patterns as their economies undergo shifts from agriculture to industrialization, and from industrialization to post-industrial activities (Alonso 1968; Fielding 1984; Mera 1973; Plane 1984; Vining—Pallone 1982; Williamson 1965). Out-migration to peripheral regions at the expense of the core regions seems only to be, however, a temporary phenomenon that occurs while an economy adjusts to the new spatial location requirements of post-industrial economic activity. If this is true, we might expect that the Paris region of France and the Rhine-Ruhr region of the FRG will decrease their flows of new out-migration as their economies adjust further to post-industrialism. Over a decade ago, when out-migration trends from the U.S. core regions were becoming apparent, Mera (1973, p. 320) wrote: "The relative advantage of urban concentration is greater in less developed countries than in developed countries. However, this statement should not be taken as implying that the advantage of urban concentration disappears once a country reaches a certain stage of development. The findings of the United States and Japan show that there are still observable advantages in concentration."

The countries of Eastern Europe must still be excluded from the pattern seen in Western Europe, Japan, and the U.S., as they show no likelihood of shifting their trends from a pattern of steady net in-migration to their core regions. The rapidly developing countries of South Korea and Taiwan are more difficult to generalize as they show divergent trends from one another. The migration trends of Taiwan show signs of convergence towards zero, although several more years of data are required before a reversal of movement towards the north region can be confirmed. In South Korea, continuously high migration rates into the Seoul region indicate that the adjustment to industrialization in that country is still continuing. Regardless of programs and policies of the government to encourage the development of the peripheral regions, Seoul still dominates the country's settlement and migration patterns.

The divergent trends that may be emerging for Taiwan and South Korea may be the result of different approaches to industrialization policy. Oshima (1986) describes the industrialization pattern of Korea as being more like prewar Japan than postwar Taiwan, with an emphasis on heavy industry, militarization, large firms, and authoritarianism. He comments that Korea's growth has been a notable achievement, but their policy of favoring large firms over small ones has resulted in unbalanced and uneven regional development. Taiwan, on the other hand, focused early in their development on increasing agricultural output, improving agricultural institutions, and encouraging agricultural mechanization, while simultaneously promoting labor intensive industries. There will be important implications for developing countries if, indeed, Taiwan and Korea are generating divergent migration and settlement patterns.

Notes

[1] Vining and Pallone reported data for Scotland only. Migration trends for the U.K. have been studied by Ogilvy (1980) using figures from the National Health Service Central Registry. His results are described briefly in this paper.

[2] The negative net migration rate for the west region in 1984 appears to be due to a large movement of migrants to the newly developed IJsselmeerpolders area.

[3] U.S. Census Bureau reports provide estimates of net interregional migration figures based on sample surveys of civilian noninstitutional households and members of the armed forces living off base, or with their families on base. These data must be interpreted with caution, however, because of the nature of the survey. Migration into the south may be biased downward because of the large number of military bases located in this region. Soldiers from other regions assigned to bases in the south may not be counted as in-migrants, yet when they are discharged and return to their home regions as civilians, they will be counted as migrants from the south to their home region.

[4] "Canada Yearbook 1985," Statistics Canada (Ottawa), Table 2.54, p. 78.

[5] Within the Kanto region, the NMR of Tokyo Prefecture was positive in 1985. This was the first time Tokyo had experienced net in-migration since 1966.

[6] "Regional Trends," Central Statistics Office, Government Statistics Service, HMSO (London), 1982, Table 2.5, p. 60; 1983, Table 2.10, p. 51; 1984, Table 2.7, p. 51.

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THE PROCESS OF POPULATION CONCENTRATION IN HUNGARY

BÉLA SÁRFALVI

KEY-WORDS: *central* places; *concentration,* ~ field, genuine ~, population ~, potential ~, uninterrupted ~; *densely* populated areas; *employment* restratification, sectoral structure of ~; *investments,* geographical distribution of ~; *socio-economic* transformations.

The socio-economic background

The major characteristics of the present Hungarian economy—its state of development, sectoral, and spatial structure—are the product of a lengthy historical process. Also, the impact of the distant past can be found in some respects, but the decisive developments took place during the recent decades.

Following World War II, between 1949 and 1970, within the frameworks of important socio-economic transformations, the economic activity rate of the population gradually increased and economic structural changes sped-up. Industry became the dominant sector in the national economy, producing more than half of the national income. At the same time, as a result of rapid industrial growth, the relative contribution of agriculture to total national income dropped to one third, though the absolute value of agricultural production has been increasing continuously. Up to 1960, agriculture employed the most people, but by 1970 both industry and the service sector left it far behind with regard to the number of employed. That was the period of collectivization in agriculture, which involved the release of manpower in large numbers. At the same time, as a result of labour-intensive (so-called 'extensive') industrial development, the number of industrial jobs were multiplied.

In the course of these concurrent processes, nearly one million (979,000) active earners left agriculture between 1949 and 1970. Most of the agrarian surplus labour was absorbed by industry, since the sector of services made only a modest employment increase at that time (see Tables 25 and 26).

In the 1970s, the so-called 'intensive' mode of industrial development gained ground: the earlier increasing absolute and relative number of industrial employment started to decline. The drop of agricultural employment slowed down but continued, amounting to 277,000 people between 1970 and 1980. This time all released labour was absorbed by the tertiary sector. In spite of substantial transformations in the sectoral structure of employment, the weight of industrial production within the total national income continued to increase and the value of agricultural production also increased, though the number of those employed became substantially smaller.

TABLE 25

THE SECTORAL DISTRIBUTION OF EMLOYMENT AND NATIONAL INCOME 1949—1980
(National total = 100%)

	Employment			National income		
	Agriculture	Industry Constr. industry	Other sectors	Agriculture	Industry Constr. industry	Other sectors
1949	53.8	21.6	24.6	48*	35*	17*
1960	38.5	34.0	27.5	29	47	24
1970	24.4	43.7	31.9	17	55	28
1980	18.6	42.1	39.3	17	60	23

*1950 data

Source: Publications of the 1949, 1960, 1970 and 1980 census of population.

TABLE 26

THE SECTORAL GROWTH OF EMLOYMENT AND NATIONAL INCOME 1949—1980
(1949 or 1950 = 100%)

	Employment			National income			
	Agriculture	Industry Constr. industry	Other sectors	Agriculture	Industry Constr. industry	Other sectors	Total
1949	100.0	100.0	100.0	100*	100*	100*	100*
1960	83.4	183.0	130.0	106	228	180	177
1970	55.4	247.0	158.0	103	456	290	300
1980	42.8	242.0	198.0	121	802	415	476

*1950 = 100

Source: Compiled from census publications by the author.

During the three decades between 1949 and 1980—apart from occasional fluctuations—an average of 20-30% of the national income was spent on investments. During this period, the sectoral distribution of accumulations was more or less stable: agriculture used 16%, industry 40%, while the rest of the 'productive' sectors (transport, communication, trade, water manangement) used nearly one fourth of all investments and the 'non-productive' sectors (medical, social, cultural, services, etc.) received the remaining one fifth.

As for the geographical distribution of investments, they were largely concentrated in the northern part of the country; otherwise, only the south-eastern part of Transdanubia benefited to a significant extent. The redistribution scheme of the means of production involved a respective geographical redistribution of jobs and, subsequently, of population. This complex process, parallel with employment restratification, led to comprehensive changes in the demographic and settlement geography of Hungary reflecting a clear-cut population concentration process. This concentration process took place at various levels:

(a) Rapidly developing areas attracted masses of in-migrants, who were mainly young and economically active people. In-migration thus also contributed to the natural increase of population in these areas.

(b) Population concentration was also remarkable among settlement classes. Large settlements, mainly towns, were explicitly favoured. Urban population increased by almost two million people, thus pushing the proportion of urban inhabitants from 41.4% to 54.7% between 1949 and 1984.

Methods

The process of population concentration was analysed in three time periods: 1949-1960, 1960-1970 and 1970-1980. Three approaches were followed in investigating the phenomenon: (a) the study of intercensal migration; (b) the delineation of 'densely populated areas' that were formed as a result of regional population moves; (c) the study of differentiation within the settlement network.

The analysis of the migration process can only serve to detect potential concentration areas or to provide a general scheme for the geographical differentiation of economic growth. So far, as a matter of fact, population accumulation only reached the threshold of genuine concentration in the cores of in-migration areas. Genuine concentration areas were delimited with the help of population density indicators. Finally, the spatial aspects of socio-economic development are demonstrated by an analysis of the concentration process within the settlement network. This approach enables us to explore small-scale, local concentration processes even within zero growth- or depopulating areas.

The temporal and spatial rhythm of population concentration in the light of migration processes

Net migration data were used to delimit population attraction zones or potential concentration areas: the group of settlements with positive net migration during a decennial period was considered as a concentration field (Table 27).

Population concentration processes during the three decades investigated had two general characteristic features. Between 1949 and 1980, the concentration field was moderately expanding and the number and proportion of population concentrating there was growing relatively rapidly. Changes in the expansion of the concentration field were much more powerful than can be revealed from the figures, though. During the second period, between 1960 and 1970,

TABLE 27

THE PROCESS OF POPULATION CONCENTRATION

	Concentration field, area (A)	Concentrating population (B)	Growth Rates (A)	(B)
	in % of the respective national totals		(1949—1960)=100%	
1949—1960	18.75	43.20	100	100
1960—1970	17.05	51.70	91	120
1970—1980	21.20	61.30	113	142

Source: Compiled from census publications by the author.

previous positive net migration disappeared on 4.5% of the national territory and almost as large an area (4.2%) entered the concentration field. The shift in the concentration field is even more remarkable when compared to the second and third periods. Again, 4.5% of the national territory dropped out of the group of settlements that formed the concentration field and a new process of accumulation started on 8.2%.

Therefore, while the temporal rhythm of population concentration has been relatively even, its spatial rhythm has—more than once—changed significantly. In the second period, the spatial extent of the concentration field became somewhat smaller parallel with certain changes in its constituent settlements. Basically, two circumstances produced this phenomenon. First, during the period between 1949 and 1960, large-scale, mainly labour-intensive ('extensive') investments were made in the extractive industries that induced massive population migration into mining districts. During the next period, the need for manpower was somewhat mitigated by mechanization gaining ground but also because of reduced production. At the same time, the area of bauxite and oil production shifted gradually from exhausted sites to new ones. The second reason for changes in the population concentration field is the fact that vigorous development of several country towns started in the second period and thus they exerted the most intensive attraction at that time.

Between 1970 and 1980, the previous concentration field continued to shrink, but the process of accumulation spread to a new area that was twice as large. New concentration areas mainly covered settlements classified as future central places located in regions poorly supplied with towns as well as resort centres. This explains a characteristic feature of the period, namely: in contrast with the earlier, relatively contiguous concentration field in mining districts, this time the sporadic appearance of detached isles of population concentration dominated.

During the three decades investigated, the total area of the population accumulation field ranged between 17-21% of the national territory. The spatial disparities of development, however, can be described better by the fact that the uninterrupted concentration process covered merely one tenth of the national territory. As a matter of fact, only this portion can be regarded as genuine concentration field, not the whole of the area showing positive net migration in temporal and spatial variation (Table 28).

TABLE 28

POPULATION CHANGE IN THE REGION OF UNINTERRUPTED CONCENTRATION PROCESS

	Area	Population	Population Change
	National Total = 100%		1949 = 100%
1949	10.37	36.52	100
1960	10.37	38.60	106
1970	10.37	44.38	122
1980	10.37	51.00	140

Source: Compiled from census publications by the author.

From among the five important agglomerations (Budapest, Miskolc, Pécs, Győr, and Lake Balaton), the region of the capital stands out with almost half of the total population in the concentration field. The other four agglomerations are much smaller. The remaining constituents of the concentration field only cover single settlements. They are more densely spread in Transdanubia and in the northern hilly regions than in the Alföld, where large areas are left without dynamic urban centres (Table 29).

TABLE 29

IMPORTANT AGGLOMERATIONS WITHIN THE REGION OF UNINTERRUPTED CONCENTRATION PROCESS (RUCP = 100%)

	The agglomerations of				
	Budapest	Miskolc	Pécs	Győr	Lake Balaton
Area	20.4	4.97	2.16	2.56	6.47
Population					
1949	54.32	3.85	2.72	2.16	1.26
1960	54.13	4.57	3.25	2.36	0.80
1970	52.44	5.22	3.38	2.35	0.90
1980	47.24	5.24	3.29	2.44	1.00

Source: Compiled from census publications by the author.

The location of 'densely populated areas'

The internationally used threshold for delimiting 'densely populated areas' is 200 persons/km². This limit cannot be applied strictly to Hungary since towns and most rural settlements in the eastern part of the country are—for historical reasons—unusually overbounded. Even towns with 20-30,000 or exceptionally with 50,000 inhabitants do not reach the 200 or, in some cases, the 100 persons/km² threshold. In Hungarian circumstances, one can easily delimit relatively densely populated areas with a 100 persons/km² limit, that a large number of towns, particularly in the Alföld, would still fail to pass (Table 30).

TABLE 30

'DENSELY POPULATED AREAS':
POPULATION DISTRIBUTION BY DENSITY CATEGORIES 1949 AND 1980

Density categories persons/m²	over 1,000	500–999	200–499	150–199	100–149	under 100	Total
				Towns			
1949	49.67	7.19	17.89	3.47	13.64	8.14	100
1980	40.80	17.94	27.14	3.44	7.63	3.05	100
				Villages			
1949	—	0.10	4.77	5.37	16.68	73.08	100
1980	0.42	2.56	7.54	5.32	17.40	66.76	100
				Total			
1949	18.30	2.72	9.60	4.67	15.56	49.15	100
1980	21.92	10.75	17.97	4.32	12.20	32.84	100

Source: Compiled from census publications by the author.

Nevertheless, the geographical pattern of population concentration in Hungary was also determined by the spatial expansion of the urbanization process. Whenever the process of agglomeration reached an advanced stage around an urban core, a contiguous zone of villages was formed with an 'urban-like' population density. The expansion of densely populated areas was more pronounced among villages than among towns. This is not really surprising if one considers the large number of old and new, extremely overbound, towns; namely, the former rural market towns. Between 1949 and 1980, the proportion of village population living in areas with over 200 persons/km² population density doubled, while the respective change was only a 10% increase within the group of towns. Altogether, more than half of the country's total population now lives in areas with more than 200 persons/km². The same proportion only surpassed 30% three decades ago. These densely populated areas are more or less precisely coextensive with the Region of Uninterrupted Concentration Process, i.e., the group of settlements with positive net migration throughout 1949-1980.

Population redistribution by settlement classes

Besides the macro-regional redistribution of population, rapid and significant structural changes have taken place among settlement classes as a result of the socio-economic development during the past three decades. Following the spatial restructuring of production, population moved from small settlements to large ones thereby also fostering a concentration process. In some cases, macro-regional and inter-settlement processes were linked together and speeded-up general tendencies or endowed them with specific structural features. Rapidly developing concentration zones and the relatively large settlements of local systems represented counter-poles to the majority of the national territory demonstrating permanent out-migration and significant population decrease. This double concentration process brought about a rapid drop of population, particularly in regions where small and tiny villages predominate.

In developing agglomerations—parallel with the evolution of a peri-urban ring—a contiguous zone of large settlements has been formed. These settlements do not function as central places within their environment; rather, they attract in-migrants primarily from all over the country, not only from small settlements in their vicinity. The structure of settlement networks in the agglomeration regions differ significantly from the settlement hierarchy in other parts of the country. Agglomerations are dominated by large settlements that function under the control of their close connection with the core city of the population concentration.

The declining proportion of population living in settlements with less than 3,000 inhabitants is a nation-wide tendency; the smaller the settlement, the stronger the decline (Table 31). On the national average, the proportion of population living in settlements with 3-5,000 or 5-10,000 inhabitants has also decreased. But the process was more complex and multi-dimensional within these size-groups. Settlements in the 3-5,000 size-group increased the number of their inhabitants in regions dominated by small and tiny villages but made a selective development in regions where large settlements are predominant: those in favourable locations have grown while the others lost population. The small relative decrease of population in the 5-10,000 size-group is due mainly to the regrouping of several settlements into larger size-groups.

The population retaining capacity of small settlements is not expected to improve due to local employment problems and even more so for an advanced ageing of the population. If macro-regional population movements become more balanced—as a result of further expansions in the concentration field—it would contribute also to decreasing population redistribution among settlement categories.

TABLE 31

POPULATION DISTRIBUTION BY SETTLEMENT SIZE-GROUPS 1949—1980

Size-groups, inhabitants	1949	1960	1970	1980
— 499	2.1	2.1	2.2	1.7
500— 999	7.1	6.0	5.6	4.7
1,000— 1,999	13.7	12.3	11.0	9.8
2,000— 2,999	10.4	9.7	7.7	7.0
3,000— 4,999	12.4	12.0	9.3	8.8
5,000— 9,999	11.2	11.1	10.0	9.9
10,000—19,999	9.5	9.3	9.3	10.0
20,000—	16.3	19.4	25.4	28.5
Budapest	17.3	18.1	19.5	19.6
Hungary	100.0	100.0	100.0	100.0

Source: Years 1949 to 1970: Langerné Rédei (1983);
1980 : compiled from census publications by the author.

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CHANGES IN THE SPATIAL ORIENTATION OF INTERNAL PERMANENT MIGRATION IN HUNGARY

ETA DARÓCZI

KEY WORDS: *economic* development; *hierarchical* level; *migration,* demographic efficiency of ~, ~ by distance, dynamics of ~, ~ flows, ~ frequency, gross ~, ~ intensity, internal ~, inter-regional ~, inter-settlement ~, intra-regional-inter-county ~, ~ motives, net ~, permanent ~, spatial patterns of ~, temporary ~; *mobility,* residential ~, spatial ~; *moves*, horizontal ~, vertical ~; *population* redistribution; *pull; push*.

Decreasing long-distance residential mobility

Two major groups of residential moves can be identified. Short-distance or intra-settlement moves are usually motivated by family events or improvements in the individuals' financial situation and, in most cases, are aimed at changing one's living conditions. Inter-settlement moves within Hungary, particularly those covering long-distances to environments differing from the place of origin, have, for the most part, economic motives: employment; better working conditions; income and career prospects or expectations.

According to Hungarian statistics, migration is defined as a residential move crossing the administrative border of a settlement. Migration rate or migration intensity is defined as the *annual* total of migrations related to the mid-year resident population and is expressed in thousandths. Census data only cover net migration calculated as a residual of the total and the natural population change during the intercensal period, and therefore are unsuitable for migration flow analysis. Statistical data, on the other hand, are based on the regular registration of permanent and temporary changes in residence.

Hungarian citizens may have only one permanent and one temporary residence at a time. Consequently, permanent migration occurs when one gives up his permanent residence, moves to another settlement, and has his new address registered as his permanent one. In cases of temporary migration, the migrants keep their permanent residence when they move, and declare their new location in another settlement to be a temporary residence. Temporary re-migration occurs when the migrant gives up his (or her) temporary residence and returns to his (or her) permanent dwelling.

Temporary re-migration data, though, are not very reliable. For various reasons, people are not interested in reporting their return to the permanent residence, or just neglect to do so. The effect of this tendency shows up in the regular overestimation of the urban resident population based on annual birth-, death-, and migration registers.

The intensity of migration is influenced by the interaction of multiple subjective and objective factors. The relatively high frequency of migration due to economic considerations usually points to substantial spatio-economic differences or dynamic socio-economic changes. Under such circumstances, several good reasons and 'golden opportunities' to move exist and, characteristically, the number of migrations covering long physical or cultural distances is high. This situation was typical generally throughout Europe in the 1950s and 1960s, but was particularly significant in the socialist countries, which experienced radical societal transformations: revolutionary political change, the collectivization of agriculture, and large-scale industrialization. Later, the widespread, continuous decline of long-distance spatial mobility in these countries (Compton 1976) reflected at least three distinct and successive processes: political consolidation; decreasing spatial inequalities; and, more recently, a general economic stagnation.

Establishing the 'normal' level of distant residential mobility within a country is rather difficult, if at all possible. Still, the attempt will be made to put forward a rough estimate for Hungary. As a rule of thumb, the level of migration frequency for Hungary can be considered high if, on average, people make more than five moves to another settlement in the course of their lifetime. This conclusion takes into account both normative and empirical considerations, explained as follows. The personal development of individuals and the maintenance of a societal dynamism require that most people leave their native town or village and spend some time in a different environment. One migration by major lifestages (childhood; youth and education; active age with children; active age when children are no longer at home; retirement), that is, five moves per person on an average could, in principle, meet the requirements in the Hungarian context. (Countries with much larger territory or a higher level of urbanization would probably have a higher 'normal' level of spatial mobility due to the greater variety of options open to migrants). If one takes five migrations as 'normal', the lower limit of relatively high migration intensity is 66.7 per thousand population in the case of a 75 year life expectancy, and 62.5 per thousand in the case of 80 years. (In the first case one person moves 5/75 times a year, in the second, 5/80 times a year. Taking life expectancy constant, this results in an annual average migration rate of 66.7 or 62.5.). In Hungary the number of permanent migrations per 1,000 population exceeded 30 up to 1967, and of temporary migrations (always together with the temporary re-migrations) was over 50 up to 1970. The sum of the two, therefore, exceeded the above mentioned threshold. Spatial mobility decreased rapidly until the mid-1970s, and has been falling slowly ever since: between 1975 and 1983, the rate of permanent migration dropped from 20.9 to 19.1; and of temporary migration from 38.0 to 34.1 ‰. Thus the period from the mid-1970s, usually characterized as one of moderate residential mobility in the literature, had a total population migration rate under 60 ‰ (Figure 34).

Intra-settlement moves, that is, changes of residence not included in the concept of migration, had the highest intensity in 1975; since then, the rate has been fluctuating between 56-60 per 1,000 population. Only a much higher level of intra-settlement movement would result in a better match between the quality of the dwellings and families' changing needs for homes of a particular size or in a given location. At present, the lack of variety in the properties available—mostly prefab dwellings—and their prohibitive price for the middle income group, as well as the cumbersome mechanism of the housing market and of tenement swapping, are obstacles to increased intra-settlement mobility.

The continuously declining trend of (inter-settlement) migration is due primarily to the levelling of spatial inequalities: i.e., to the growing deconcentration of industry, and to the close approximation of urban and rural family incomes. The slow-down can be best explained by the economic recession, but it is also possible that the level of *spatial* mobility has, by now,

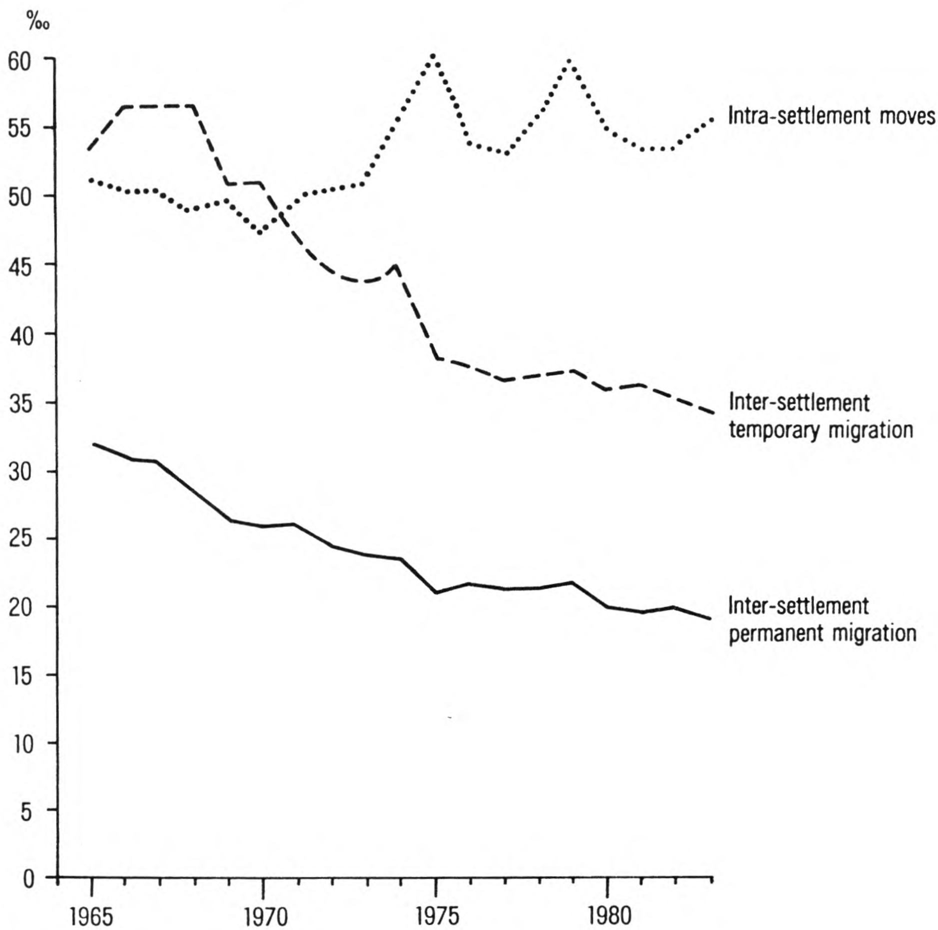

FIGURE 34 *Moves*

dropped to the minimum requisite *individual and social mobility* even in periods of economic stagnation. A future period of economic boom is expected to raise the level of spatial residential mobility, and will show, besides economic motives, the increasing role of environmental quality considerations.

The stagnation of migration intensity at a moderate or low level is closely related to the fact that industry is no longer the major job-creating sector at the national level. The time of huge investments requiring the relocation of masses of people is over, and the number of industrial workers is increasing only in some areas. Employment in the service sector has increased, but in a much more decentralized manner than in the case of industry; thus, no important regional population redistribution followed.

Still, the primary reasons for stagnation is a slow-down in economic development and the levelling or deterioration of living standards. A recession in the market and in production decreases the need for displacement: less new investments are needed; the spatial distribution of production remains unchanged; fewer new companies and affiliated firms come into being; fewer labourers or experts need be transferred; fewer directors are appointed; etc. No promising income prospects elsewhere are worth the risk of moving; jobs as pull factors have either lost their strength, or have altogether ceased to operate. Not only the antecedents, but also the consequences of migration are capital-intensive. The worsening economic situation, however, has led to cuts in state expenditures, while growth in family income is modest or negative in real terms. People tend to use their money economically; their cost-sensitivity increases and they are less disposed towards risky ventures such as distant migration. The relative value of their current residence thus increases.

Beyond all this, demographic factors have also contributed to the stabilization of a low level spatial residential mobility: ageing, and the reduction of demographic pressure as the result of a low overall birth rate; and a more even regional distribution of births. Another, rather general and well-known factor concerns the drop in the number of spatial administrative units, or, in other words, the enlargement of each, which diminishes the *statistical* number of moves *registered as migrations*. For this reason, of two otherwise similar settlements, the one having larger territory will probably have fewer in- and out-migrants than the smaller one.

Comparisons over time are also distorted by the changes in the 'urban-rural' composition of settlements. The number of towns is growing by the accession of relatively small ones, while the largest and most dynamic villages are lost via their promotion into towns. This process has certainly played a role in the significant drop in inter-village migration. The effect of this statistical distortion can be reduced by giving migration data per 1,000 inhabitants, but, unfortunately, the problem cannot be eliminated.

The discussion to follow will deal with the changing spatial patterns of migration. The analysis will deal only with *permanent* migration, which, by definition, does not fluctuate as much as temporary migration, is less influenced by occasional or seasonal job opportunities and housing speculation, and, therefore, better reflects more stable tendencies. The direct link of permanent migration with the economic situation is, nevertheless, well demonstrated by the fact that employment is also the major motive for permanent migration.

Migrations made by dependents—wives, children, etc.—may be regarded as 'passive' in contrast to the 'active' moves attributable to decisions taken by the heads of households (Compton 1971, p. 87). Within the latter, an annual average of 43.9% were associated with employment and related reasons in 1965-69; 42.0% in 1970-74; 46.7% in 1975-80; and 48.9% in 1980-83. An accurate analysis of the changes in the decision-making process over a relatively long period of time is practically impossible due to the modifications in the scope and composition of the proposed reasons for migration printed on the change of residence registration forms. The modifications unfortunately have led to further losses of information.

A considerably simplified new version of the registration form—that no longer asks for the migrant's profession and education, but requires entry of the personal code number—was introduced in 1984. With the help of this code, more information can be gained, but the information is kept by the Állami Népességnyilvántartó Hivatal (State Office for Population Registration). Since the Central Statistical Office (Központi Statisztikai Hivatal) only processes migration data included in the registration forms from 1984, migration statistics do not include information on the professional and educational structure of the migrants. The need is more urgent than ever to make in-depth migration sample surveys exploring the real push and pull factors and the migrants' course of life. On the other hand, the inclusion of personal code numbers in migration studies must not be ignored, since it enables us to distinguish between migrations and migrants. So far, all statistics have related only to migrations; the number of individuals participating in migration or the number of migrations per migrant is unknown. (For example, the average age of 'migrants' in Hungarian statistics is a weighted average derived from the number of moves).

Matrices of migration flows are published by counties and by groups of towns and villages within counties. Budapest and the 19 Hungarian counties provide two 39×39 matrices, one for permanent and one for temporary migrations. The only information provided by these matrices is the number of moves. For the sake of simplicity and lucidity, the 39×39 matrices were aggregated first into six regions then into four hierarchical settlement types. The distribution and dynamics of migration by geographical distance measured in miles were derived from the analysis of inter-regional, intra-regional-inter-county, and intra-country migrations; while the cultural distance and the direction of migrations were evaluated following the analysis of vertical and horizontal moves between Budapest, cities, towns, and villages representing the four hierarchical settlement types.

The changing regional structure of permanent migrations

The number of permanent migrations has fallen by a third during the past two decades, from an annual total of 320,000 to 200,000. Migrations covering long distances dropped even more rapidly: in 1983, the number of inter-regional moves (only permanent migration will be considered hereafter) was only half of that in the mid-1960s, amounting to only 28.5% of all permanent migrations (Figure 35). Most of the decline, though, took place before 1975; subsequently, it continued at a more leisurely rate until the beginning of the 1980s, at which time the absolute number of inter-regional migrations stopped falling, thereby producing a slight increase in the ratio.

The net migration gains and losses of the six regions (Table 32) show that the Central region which includes Budapest and the North-Alföld, historically have had the greatest external migration turnover; while the least 'open' regions were North-Hungary and North-Transdanubia before 1975, and the South-Alföld and South-Transdanubia afterwards. Generally speaking, the position of the important agricultural regions, which had suffered great migration losses earlier, has improved continuously (South-Alföld), or at least has not become aggravated (South-Transdanubia and the North-Alföld); while the two typical heavy-industrial regions (North-Hungary and North-Transdanubia) have become worse-off in the process of inter-regional permanent migration. These relatively new tendencies not only demonstrate the erosion of industrialization as a determinant of economic development, but also spotlight serious problems existing in certain depressed zones of the traditionally industrial regions.

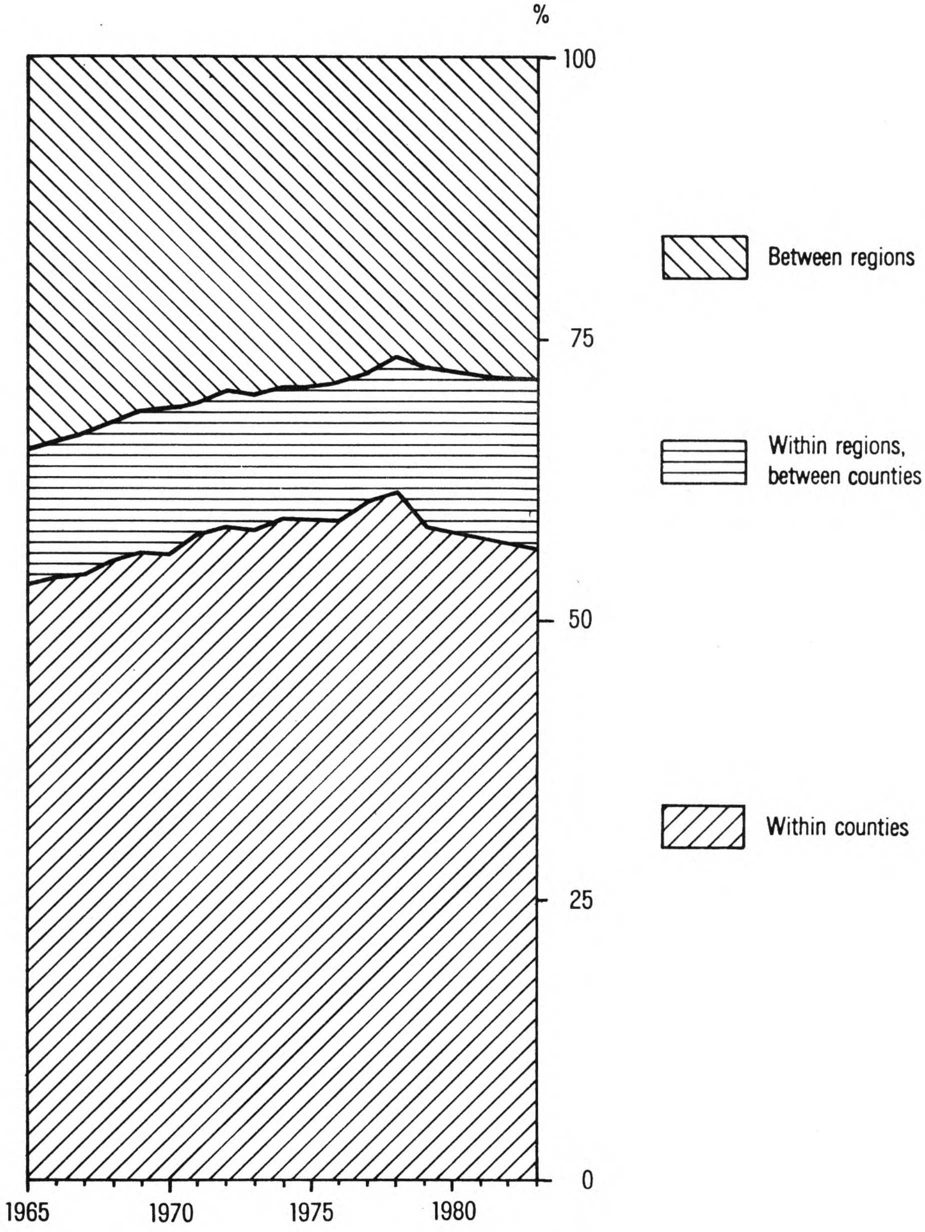

FIGURE 35 *Distribution of permanent migration by geographical distance*

TABLE 32

INTERREGIONAL PERMANENT MIGRATION (PER 1,000 POPULATION)
AVERAGE ANNUAL RATES

Region	In	Out	Net
		1965—69	
1. Central	12.92	7.67	+5.25
2. N-Hungary	8.07	9.17	—1.10
3. N-Alföld	9.14	15.39	—6.25
4. S-Alföld	8.37	11.05	—2.68
5. N-Transdanubia	9.47	8.50	+0.97
6. S-Transdanubia	8.46	9.61	—1.15
		1970—74	
1. Central	9.27	5.52	+3.75
2. N-Hungary	6.30	7.76	—1.46
3. N-Alföld	7.15	11.11	—3.96
4. S-Alföld	6.49	8.12	—1.63
5. N-Transdanubia	7.36	6.75	+0.61
6. S-Transdanubia	6.55	7.84	—1.29
		1975—79	
1. Central	7.82	4.05	+3.77
2. N-Hungary	4.83	6.72	—1.89
3. N-Alföld	5.08	9.06	—3.98
4. S-Alföld	4.98	6.18	—1.20
5. N-Transdanubia	5.95	5.60	—0.35
6. S-Transdanubia	5.17	6.32	—1.15
		1980—82	
1. Central	7.49	3.73	+3.76
2. N-Hungary	4.25	6.47	—2.22
3. N-Alföld	4.49	8.37	—3.88
4. S-Alföld	4.61	5.33	—0.72
5. N-Transdanubia	5.00	5.49	—0.49
6. S-Transdanubia	5.08	5.23	—0.15

Source: Demográfiai Évkönyvek (Demographic Yearbooks).

Such zones in North-Hungary deserve special attention. During the second half of the 1960s, this region lost six inhabitants per 100 permanent migrations across its borders; by the beginning of the 1980s, however, the figure was 21 inhabitants (calculated as the 'demographic efficiency of migration' = (net migration / gross or 'in + out' migration) x 100; see Wunsch—Termote 1978, p. 249). The rapid change resulted first of all from a lower-than-average drop in out-migrations, with a relative increase in the number of departures from North-Hungary within all inter-regional migrations (Tables 33-36). The dynamics of in-migration more or less followed the nationwide changes.

TABLE 33

INTERREGIONAL PERMANENT MIGRATION FLOW MATRIX[1]
AVERAGE ANNUAL RATES 1965—69

	1	2	3	4	5	6	Total out
1. Central	—	1.17 (3.27)	2.05 (5.70)	1.61 (4.47)	1.80 (5.00)	1.04 (2.90)	7.67 (21.30)
2. N-Hungary	4.23 (5.62)	—	2.55 (3.39)	0.72 (0.90)	1.14 (1.51)	0.53 (0.70)	9.17 (12.18)
3. N-Alföld	7.61 (11.62)	3.16 (4.81)	—	1.82 (2.76)	1.93 (2.94)	0.87 (1.33)	15.39 (23.43)
4. S-Alföld	5.02 (7.21)	0.70 (1.01)	1.63 (2.34)	—	1.93 (2.78)	1.78 (2.55)	11.05 (15.89)
5. N-Transdanubia	3.97 (6.92)	0.62 (1.08)	0.93 (1.61)	1.03 (1.79)	—	1.95 (3.40)	8.50 (14.80)
6. S-Transdanubia	3.59 (4.62)	0.43 (0.55)	0.68 (0.88)	1.60 (2.06)	3.31 (4.25)	—	9.61 (12.36)
Total in	4.92 (35.96)	1.22 (10.72)	1.62 (13.92)	1.39 (12.04)	1.97 (16.48)	1.23 (10.88)	9.90 (100.00)

[1] Figures in brackets show migrations comprising each flow as a percentage of all migrations. Figures outside brackets represent migrants per 1,000 population at place of origin.

Source: Demográfiai Évkönyvek (Demographic Yearbooks).

TABLE 34

INTERREGIONAL PERMANENT MIGRATION FLOW MATRIX[1]
AVERAGE ANNUAL RATES 1970—74

	1	2	3	4	5	6	Total out
1. Central	—	0.89 (3.35)	1.35 (5.08)	1.11 (4.18)	1.41 (5.29)	0.76 (2.88)	5.52 (20.78)
2. N-Hungary	3.55 (6.17)	—	2.13 (3.70)	0.62 (1.09)	1.01 (1.75)	0.44 (0.77)	7.76 (13.48)
3. N-Alföld	5.28 (10.41)	2.31 (4.54)	—	1.48 (2.91)	1.39 (2.74)	0.65 (1.29)	11.11 (21.89)
4. S-Alföld	3.56 (6.62)	0.59 (1.10)	1.36 (2.54)	—	1.38 (2.57)	1.23 (2.28)	8.12 (15.11)
5. N-Transdanubia	3.10 (7.20)	0.54 (1.25)	0.78 (1.80)	0.74 (1.72)	—	1.59 (3.70)	6.75 (15.67)
6. S-Transdanubia	2.68 (4.48)	0.42 (0.70)	0.57 (0.96)	1.30 (2.17)	2.85 (4.76)	—	7.84 (13.04)
Total in	3.65 (34.88)	0.94 (10.94)	1.24 (14.08)	1.05 (12.07)	1.55 (17.11)	0.94 (10.92)	7.50 (100.00)

[1] See Note for Table 33.

TABLE 35

INTERREGIONAL PERMANENT MIGRATION FLOW MATRIX[1]
AVERAGE ANNUAL RATES 1975—79

		1	2	3	4	5	6	Total out
1.	Central	—	0.66 (3.14)	0.89 (4.23)	0.79 (3.79)	1.15 (5.49)	0.56 (2.68)	4.05 (19.38)
2.	N-Hungary	3.31 (7.18)	—	1.63 (3.54)	0.50 (1.07)	0.87 (1.88)	0.41 (0.88)	6.72 (14.55)
3.	N-Alföld	4.44 (10.93)	1.83 (4.51)	—	1.22 (2.99)	1.08 (2.65)	0.49 (1.20)	9.06 (22.28)
4.	S-Alföld	2.78 (6.39)	0.44 (1.02)	0.99 (2.28)	—	1.08 (2.47)	0.89 (2.04)	6.18 (14.20)
5.	N-Transdanubia	2.77 (8.12)	0.39 (1.16)	0.53 (1.56)	0.56 (1.65)	—	1.35 (3.96)	5.60 (16.44)
6.	S-Transdanubia	2.28 (4.74)	0.31 (0.64)	0.40 (0.84)	0.94 (1.96)	2.39 (4.97)	—	6.32 (13.15)
	Total in	3.13 (37.36)	0.72 (10.47)	0.88 (12.50)	0.79 (11.45)	1.27 (17.46)	0.73 (10.76)	5.98 (100.00)

[1] See Note Table 33.

TABLE 36

INTERREGIONAL PERMANENT MIGRATION FLOW MATRIX[1]
AVERAGE ANNUAL RATES 1980—82

		1	2	3	4	5	6	Total out
1.	Central	—	0.61 (3.17)	0.80 (4.16)	0.72 (3.74)	1.04 (5.36)	0.56 (2.90)	3.73 (19.33)
2.	N-Hungary	3.32 (7.86)	—	1.50 (3.56)	0.48 (1.14)	0.74 (1.75)	0.43 (1.03)	0.47 (15.34)
3.	N-Alföld	4.26 (11.51)	1.58 (4.27)	—	1.05 (2.83)	0.93 (2.52)	0.55 (1.48)	8.37 (22.61)
4.	S-Alföld	2.43 (6.04)	0.36 (0.89)	0.88 (2.17)	—	0.80 (1.98)	0.86 (2.13)	5.33 (13.21)
5.	N-Transdanubia	2.72 (8.56)	0.38 (1.18)	0.45 (1.41)	0.56 (1.77)	—	1.38 (4.35)	5.49 (17.27)
6.	S-Transdanubia	2.05 (4.79)	0.24 (0.57)	0.35 (0.82)	0.84 (1.96)	1.75 (4.10)	—	5.23 (12.24)
	Total in	2.97 (38.76)	0.64 (10.08)	0.78 (12.12)	0.73 (11.44)	1.04 (15.71)	0.75 (11.89)	5.49 (100.00)

[1] See Note for Table 33.

The position of the South-Alföld, on the contrary, has improved. This change is attributable to a rapid decline of people leaving this region within the total number of inter-regional migrations (Tables 33-36). The greater significance of changing out-migration rates (in contrast with in-migration rates) in regional migration trends highlights an intrinsic feature of the process: recent socio-economic changes in each region have affected first and foremost the region's own inhabitants by exerting more (North-Hungary) or less (South-Alföld) 'push' on them. Changes on the 'pull' side, i.e., in these regions' attraction of potential in-migrants, are not evident.

Only the Central region retains great attractive power for distant migrants, who continue to contribute to the concentration of population in Budapest and Pest county. From the late 1960s, net migration in the Central region has remained unchanged despite the narrowing of in- and out-migration flows (Table 32). In the early 1980s, one-third of the migrants crossing the border of Pest county increased the resident population of the Central region. In the late 1960s, this ratio was only one quarter, though admittedly of a much larger number. More than one-third of all permanent inter-regional migrations now flow to the Central region; migrations among the five other regions run to hardly more than 40%. These proportions have not changed significantly since 1965 (Tables 33-36). Each region has much tighter links with the Central region than with any other, even adjacent, region, the only exception being North-Transdanubia, which represents at least as important a partner for South-Transdanubia as the Central region. Relatively close ties, though, also exist between the North-Alföld and North-Hungary, as well as between the two Alföld regions. The traditional predominance of south-north migrations over the counterflow from north to south disappeared by the beginning of the 1980s. Flows from east to west, however, continue to outbalance moves in the opposite direction. Moves crossing the Danube are far less frequent than inter-regional moves on the same bank of the river. Migration ties between North-Hungary and South-Transdanubia are distinctly and permanently weak. From among across-the-Danube flows, only those between the South-Alföld and South-Transdanubia have an around-average frequency. The relatively intensive migration links with the northern or southern neighbouring region in contrast to the eastern or western one is partly explained by closer traditional ties, and therefore greater similarities in lifestyle, and partly by the poor transport facilities across the Danube.

The average number of *intra-regional* permanent migrations dropped by 26% from over 200,000 to under 150,000 between 1965-69 and 1980-83. The South-Alföld and North-Hungary experienced the most rapid and slightest decline respectively, which again points to the radically different development trends already demonstrated in these two regions. Migration frequency rates show great variety by regions. The number of intra-regional moves per 1,000 population is more than three times higher in South-Transdanubia than in the Central region. Not accidentally, the regions with frequent external links do not have intensive internal migration and vice versa. The wide spread of migration rates presumably is due to variations in the size of the regions and in the average size of their settlement administrative areas. Unfortunately, these effects cannot be separated regardless of the desire to assess the extent to which the much higher-than-average internal migration intensity in South-Transdanubia results from its spatial structure (the predominance of small villages) on the one hand; and the extent to which it actually reflects the South-Transdanubians' high spatial mobility, or the strong adherence of this mobile population to their region on the other. The rather high intensity of intra-regional-inter-county flows in South-Transdanubia indicates the importance of the latter factor: the migrants' preference for this part of the country. (Inter-county moves are more frequent here than in North-Transdanubia, although five counties are found in the northern and four in the southern part of Transdanubia).

People move 2.8 times more often within regions, on average, than between them. (The difference was only twofold at the end of the 1960s). The overwhelming and, up to 1978, growing number of all intra-regional moves are relatively short-distance, within county. More than half of all permanent changes of residence are *intra-county* migrations, though the slow-down of the decreasing trend of spatial residential mobility during the second half of the 1970s favoured distant migrations (Figure 35). At the same time, intra-county moves, particularly within the two Alföld regions, have declined. Regional variations in the intensity of short inter-settlement migrations follow the regional disparities in settlement size structures. In Pest county and in the Alföld, where large settlements are predominant, the intensity of intra-county migrations is low, while it is medium in the two northern industrial regions, and high—as already mentioned—in South-Transdanubia.

Finally, the frequency of *intra-regional-inter-county* migrations, which can be considered medium distance, is only half of the long-distance, inter-regional moves. This contradicts the gravity hypothesis of migration fields—decreasing intensity with distance—but highlights the persistent importance of the Central region in the spatial residential mobility of the population. This importance has, nevertheless, declined, since the above-mentioned rate was only a third in the mid-1960s. Some improvement in the distribution of migrations by distance has occurred between 1965 and 1978, though: intra-regional-inter-county moves only represented 10-12% of all permanent migrations; since then, this ratio has stagnated at 14-15%.

The changing structure of permanent migrations by settlement types

The distances between the four settlement types (Budapest, cities, towns, and villages) are meant figuratively as the differences between hierarchical levels. The largest step is usually made by those who move from a village to Budapest or from the capital to a village. It follows from the characteristic features of the Hungarian settlement pattern that the smallest difference is between cities and towns. It is much more difficult to decide at this level of generalization whether migration from village to town, or from town or city to Budapest, involves the greater qualitative environmental change. Moves down the hierarchy, on average, involve smaller jumps than upward moves between the same types of settlements, since a high level is always some sort of 'rotating disc' for transit migrants. This is particularly true of Budapest (Daróczi 1981).

Net inter-settlement type permanent migration data (Table 37) show persistent moderate gains for the capital and unchanging great losses for the villages, mainly due to the rapid decline of out-migration rates in the capital and the stability of high-level rural exodus. The extremely

TABLE 37

INTERSETTLEMENT CLASS PERMANENT MIGRATION (PER 1,000 POPULATION)
AVERAGE ANNUAL RATES

Settlement class[1]	In	Out	Net
		1965—69	
1 Budapest	15.71	10.29	+5.42
2 Cities	31.92	20.14	+11.78
3 Towns	28.68	18.86	+9.82
4 Villages	8.55	15.01	-6.46
		1970—74	
1 Budapest	11.37	7.88	+3.49
2 Cities	23.56	14.15	+9.41
3 Towns	24.45	14.64	+9.81
4 Villages	7.60	14.27	-6.67
		1975—79	
1 Budapest	10.26	6.35	+3.91
2 Cities	21.75	15.66	+11.13
3 Towns	22.71	11.63	+11.08
4 Villages	6.44	15.30	-8.86
		1980—82	
1 Budapest	10.78	6.53	+4.25
2 Cities	19.14	11.93	+7.21
3 Towns	18.51	12.18	+6.33
4 Villages	7.57	14.23	-6.66

[1] According to current administrative breakdown.

Source: Demográfiai Évkönyvek (Demographic Yearbooks).

large migration gains of cities and towns during the 1965-1979 period have recently become smaller. Cities and towns, however, still show the most intensive migration activity with other settlement types. By now, the 'openness' of Budapest has significantly diminished as compared to the late 1960s, an observation that holds true for both in- and out-migration flow, and represents a major change in the inter-settlement-type structure of migrations. The smaller turnover, however, produced larger 'profits' in relative terms: two decades ago, 20.8% of the migrations affecting the capital served to increase the population of Budapest; by the early 1980s, the 'demographic efficiency of migrations' has increased to 30.6%. The undiminishing attraction and population concentration appeal of the capital is indisputable, in spite of the smaller number of migrants who come and go and despite the stagnation or negative growth of Budapest's population, which is merely due to a net natural decrease.

The process of *population redistribution among the settlement types* reached its zenith during the late 1970s, when every fifth migrant contributed to this effect. The proportion and the intensity of flows from villages to cities and towns was particularly high at that time. (As mentioned earlier, the peak for intra-county moves also fell within the 1975-79 period). Another remarkable feature of that period was a shift in the distribution of *vertical moves:* at first a sudden increase—in relative terms—of upward migrations at the beginning of the 1970s, with the ratio remaining more or less the same during the late 1970s; followed by a decline to its previous level of under 40 per cent (Figure 36). Concurrently, the ratio of downward migrations increased from 19 per cent to 20-25 percent, thus somewhat mitigating the contribution of permanent migrations to population concentration. The growing flows from Budapest and the cities to towns, as well as from towns to villages, has played the most important role in this process (Tables 38-41).

Within *horizontal moves,* inter-village migrations are the most frequent, but have a rapidly declining tendency. Village population still has the highest spatial mobility, though rural inhabitants are, on average, much older than urbanites and thus, at least in principle, less mobile. In the late 1960s, almost two-thirds of rural out-migrants moved to another village. More recently, only 49% remained village-dwellers, the proportion of those moving to cities or towns increasing proportionately. The ratio of migrants covering the greatest cultural distance—the village-born who try their luck in Budapest—remained at 10% among rural out-migrants, and represented 6-7% of the total number of migrations.

The low level of movement among cities further decreased during the period under investigation. The intensity of moves among towns has grown somewhat but continues to be very low. All city to city and town to town flows taken together amount only to 6.3% of all permanent migrations (Figure 36), i.e., less than the number of moves from the villages to Budapest alone, and just half the flow from villages to towns (Table 41). This fact best elucidates the relative underdevelopment of Hungary's urban network, along with its extremely top-heavy hierarchy.

From among inter-settlement-type migration flows, including both vertical and horizontal moves, inter-village migration has shown the strongest decline. In-migration to villages from each urban group, i.e., Budapest, cities, and towns alike, has significantly dropped as well. The overall decrease of distant residential mobility has had other important impacts on the settlement-type structure of migrations: the range of extreme gross migration rates has narrowed, and *step-by-step progression* has become widespread within upward hierarchical moves. This is to be considered a favourable turn, since the sudden environmental changes involved in leap-frog migrations had caused difficult adaptation problems. Equally important and timely, though, is the need to stop the drastic fall of migrations into or back to the villages.

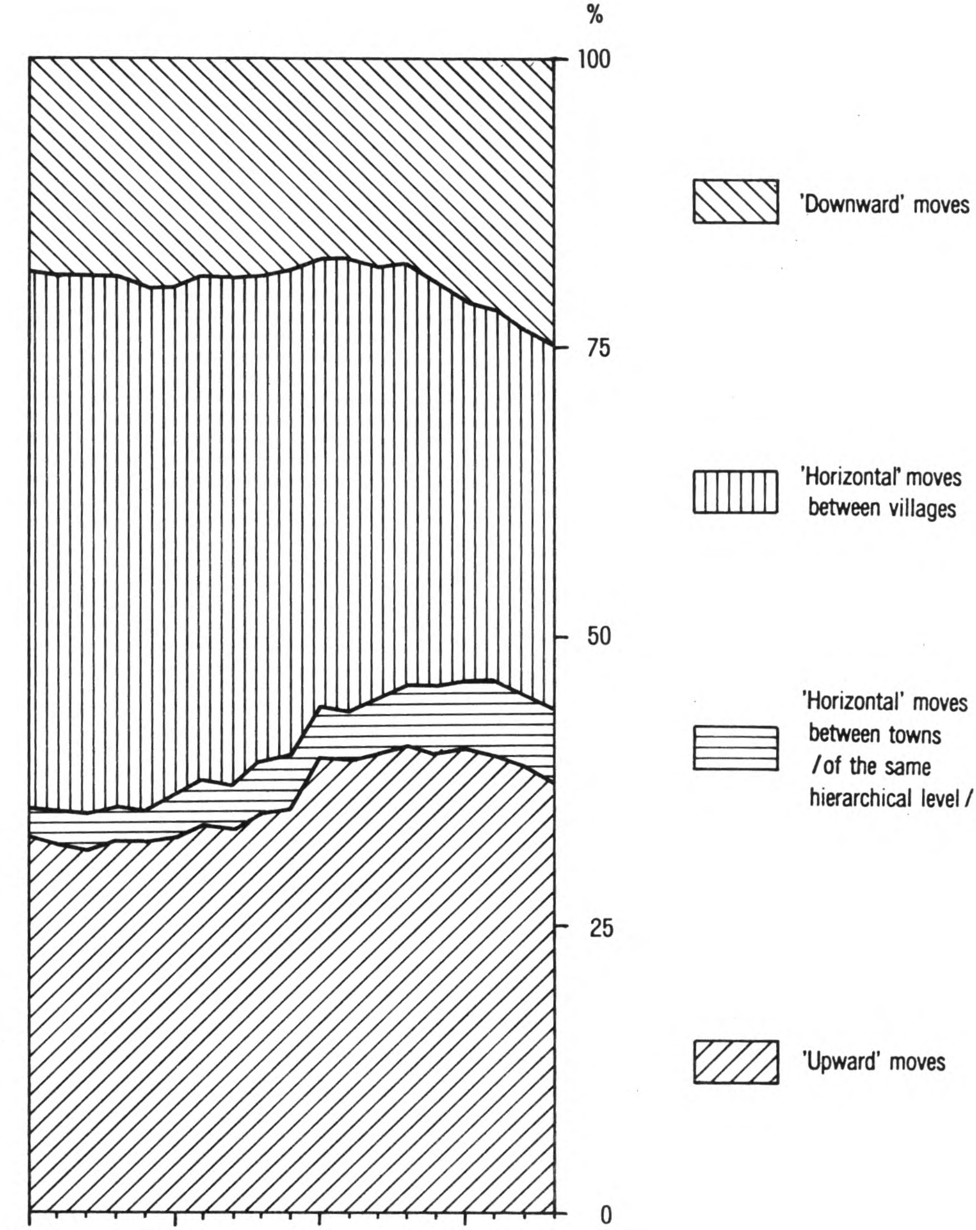

FIGURE 36 *Distribution of intersettlement permanent migration by the hierarchical position of places of origin and destination (Budapest, cities, towns and villages)*

TABLE 38

INTERSETTLEMENT CLASS [1] PERMANENT MIGRATION FLOW MATRIX 1965—69
AVERAGE ANNUAL RATES

→	1	2	3	4	Total out
1 Budapest	—	0.56 (0.37)	2.38 (1.55)	7.34 (4.78)	10.29 (6.70)
2 Cities	2.60 (0.50)	0.61 (0.12)	4.38 (0.85)	13.16 (2.54)	20.75 (4.01)
3 Towns	2.77 (2.02)	1.47 (1.08)	4.18 (3.06)	12.00 (8.76)	23.04 (14.92)
4 Villages	4.09 (7.70)	2.51 (4.73)	8.40 (15.82)	24.49 (46.12)	39.50 (74.37)
Total in	3.03 (10.23)	1.86 (6.29)	6.30 (21.28)	18.43 (62.20)	29.63 (100.00)

[1] According to current administrative breakdown.
See Note for Table 33.

TABLE 39

INTERSETTLEMENT CLASS [1] PERMANENT MIGRATION FLOW MATRIX 1970—74
AVERAGE ANNUAL RATES

→	1	2	3	4	Total out
1 Budapest	—	0.47 (0.37)	2.09 (1.65)	5.32 (4.19)	7.88 (6.20)
2 Cities	1.79 (0.52)	0.50 (0.15)	3.47 (1.01)	8.89 (2.60)	14.65 (4.28)
3 Towns	2.63 (2.13)	1.58 (1.36)	4.63 (3.96)	10.56 (9.04)	19.27 (16.49)
4 Villages	3.02 (6.28)	2.48 (5.16)	8.77 (18.26)	20.80 (43.33)	35.07 (73.03)
Total in	2.23 (8.23)	1.75 (7.03)	6.20 (24.88)	14.73 (59.15)	24.90 (100.00)

[1] See Notes for Tables 33 and 38.

TABLE 40

INTERSETTLEMENT CLASS [1] PERMANENT MIGRATION FLOW MATRIX 1975—79
AVERAGE ANNUAL RATES

		1	2	3	4	Total out
1	Budapest	—	0.44 (0.40)	1.98 (1.81)	3.93 (3.59)	6.35 (5.81)
2	Cities	1.57 (0.59)	0.47 (0.18)	3.10 (1.17)	5.95 (2.25)	11.09 (4.19)
3	Towns	2.18 (2.43)	1.56 (1.74)	4.50 (5.02)	7.90 (8.81)	16.13 (18.00)
4	Villages	2.80 (6.36)	2.68 (6.09)	9.83 (22.35)	16.37 (37.21)	31.67 (72.00)
	Total in	2.49 (9.38)	1.80 (8.41)	6.48 (30.35)	11.08 (51.86)	21.36 (100.00)

[1] See Notes for Tables 33 and 38.

TABLE 41

INTERSETTLEMENT CLASS [1] PERMANENT MIGRATION FLOW MATRIX 1980—82
AVERAGE ANNUAL RATES

		1	2	3	4	Total out
1	Budapest	—	0.40 (0.40)	2.29 (2.26)	3.84 (3.77)	6.53 (6.43)
2	Cities	1.68 (0.70)	0.44 (0.19)	3.50 (1.46)	6.76 (2.82)	12.38 (5.17)
3	Towns	2.41 (3.25)	1.41 (1.90)	4.50 (6.06)	8.36 (11.27)	16.68 (22.48)
4	Villages	2.82 (6.66)	2.41 (5.69)	9.00 (21.24)	13.70 (32.33)	27.93 (65.92)
	Total in	2.57 (10.61)	1.60 (8.18)	6.07 (31.02)	9.82 (50.19)	19.57 (100.00)

[1] See Notes for Tables 33 and 38.

Conclusions

The evolution of both inter-regional and inter-settlement-type population flows indicates the continuation of the process of population concentration resulting from permanent changes of residence. This process has, however, slowed at the regional level, due to the narrowing of the extremes in in- and out-migration rates. With the decreasing number of permanent moves, the contribution of migrations to the spatial (regional and settlement type) redistribution of population has diminished in absolute terms, but the proportion of redistributive migrations within the declining turnover has increased. This is mainly the result of the strengthening of the horizontal and of the step-like vertical moves (migrations between adjacent regions and settlement types). Traditional distant moves are becoming less frequent, while closeness and one-sidedness of the links between Budapest (the Central region) and the villages (the agricultural regions) have loosened. Nevertheless, permanent migration still enhances the population centralization in the heart of the country. The fact that migration between the northern industrial and the southern rural regions has become balanced, and the earlier dichotomy has disappeared, is one of the important changes in the regional structure of migration. This trend, however, is not simply the favourable result of the regional equalization policy but highlights recent serious difficulties in some heavy industrial zones. Moves to Transdanubia continue to dominate migrations between the regions located on the two banks of the Danube, and their preponderance has hardly changed.

As far as inter-settlememt-type migrations are concerned, the intensity of migrations in and out of the capital has diminished significantly, but this does not hold true for their proportion within the total number of permanent migrations. The step-like character of vertical migration flows has become more pronounced. The general conclusion is that those regions and villages that had great net migration losses earlier have become less repulsive, but the attraction of the Central region and the towns has not diminished. Horizontal moves, particularly among towns and counties within regions, are rather infrequent despite some improvement in their intensity. This highlights the relative underdevelopment of Hungarian urbanization and the ill-proportioned structure of the settlement network, and hence the reason why most people who finally bring themselves to migrate far from home decide to move to the Central region. This region offers, without a doubt, a variety of opportunities that differ by orders of magnitude from those available in other regions. But its extreme preference is probably also due to the poor links with and therefore lack of information about one's neighbouring counties or the other regions of Hungary.

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PATTERNS OF DEGLOMERATION IN THE HUNGARIAN URBAN SYSTEM, 1870-1980

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KEY-WORDS: *agglomeration; deglomeration; Expansion Method; industrialization; National* Settlement Network Policy; *polarization* reversal; *population* concentration; *urban systems* development; *urban turnaround.*

Introduction

This paper presents an empirical investigation into the changing levels of population *concentration* in the Hungarian urban system over the period 1870-1980. Specifically, the goal is to accurately identify the trends of *agglomeration* and *deglomeration;* that is, changes in the overall 'balance' of population distributed within the various sized cities that together constitute the urban network of Hungary. This task is accomplished through use of an initial rank-size model that is redefined or 'expanded' to account for the change or 'drift' of the parameter estimates first with respect to time, then with respect to rank and time. Results of the regression analyses on city population data reveal a portrait of the *development* of the Hungarian urban system, and thus allow for inferences to be made concerning patterns of regional economic development, population processes, and the impact of public policy. The primary aim of this study, though, is the identification of patterns rather than tests of underlying causal factors.

In order to help place the analyses into perspective and to focus attention on the pertinent questions, a brief sketch of the main characteristics and growth dynamics of the Hungarian settlement system is needed. Several important historical events have hampered the growth of Hungary's cities and economy, the first being the 150 year occupation (beginning in 1526) by the Turks. This occupation greatly retarded economic, political, and social development in the country, and tended to consolidate people into the larger market towns at the expense of the small villages. Next came Austrian domination, which further checked urban and economic development through policies aimed at limiting industrial expansion and keeping Hungary a supplier of raw materials and foodstuffs. Austria's grip did not loosen until after the Compromise of 1867, at which time Hungary experienced its first major phase of industrialization. The development, though, occurred unevenly: because of initial locational advantage, existing infrastructure, and a radial train network, most of the industrial expansion took place in Budapest. This type of development pattern, which lasted until World War I, naturally set in motion centripetal forces leading to increased concentration in the core region. The War, however, severely crippled Hungary's industrial capacity; also, the Treaty of Trianon, which reduced Hungarian territory by 67%, further catapulted Budapest's primacy and reduced the hinterlands of the next largest centers in the urban hierarchy. Economic development generally stagnated during the inter-War period.

Following World War II, and the introduction of Soviet-type planning, Hungary experienced its second major surge of heavy industrialization. This development further reinforced the position of Budapest in the urban hierarchy. In fact, the capital came to dominate the rest of the system to an extent unparalled in Eastern Europe (Kosiński 1974, p. 141); as Dienes (1973, pp. 356-357) explains, Budapest in 1970 contained one-fifth the total and one-half the urban population; two-fifths of the country's industrial employment; one-half of the value added in manufacturing; and 87% of the research personnel. Its power over the political and cultural life of the country is even more pronounced. The second tier of the urban system is composed of the five regional centers Debrecen, Győr, Miskolc, Pécs, and Szeged. These centers, which form a ring around Budapest in classical central place fashion, contain between 100-200,000 inhabitants—as compared to two million in the capital—and perform secondary manufacturing and administrative functions. The next level of cities is composed of places between 30,000 and 70,000 population. These centers generally assume administrative roles in their counties, but some are important mining, processing, and manufacturing sites. Below this level are towns of 10,000 to 30,000, which fulfill mainly local market functions (Enyedi 1976, p. 234). In addition to these categories are the so-called socialist new towns, originally quite small places that were selected for rapid expansion in the post-war period. For example, Dunaújváros grew from less than 4,000 in 1949 to over 60,000 by 1980.

The contemporary structure of the Hungarian urban system—the result of its belated and rapid industrialization and urbanization—obviously does not reflect a harmonious distribution of population and productive forces. Pressure to redirect growth of the system, and especially to curb the 'Budapest problem', mounted in the 1960s and led to the National Settlement Network Policy in 1971. This plan was intended to balance the urban hierarchy by reducing the size of Budapest and stimulating growth in the provinces, mainly in the regional centers. Essentially, the plan adopted a counterpole strategy (Enyedi 1979, pp. 116-117) based on policy instruments such as government investment in industry in outlying areas; improvements in infrastructure and housing in backward areas; tax breaks in peripheral areas; building restrictions in Budapest; and the relocation of selected industrial plants outside of Budapest (Bora 1976; Tatai 1978). These policies have of course been received with mixed emotions. On the one hand, they have undoubtedly contributed to an increase in the level of industrial activity in provincial regions and have thus helped balance the overall system and reduce rural out-migration. On the other hand, they may have helped accelerate suburbanization in Budapest (see Enyedi 1978), and commuting is still significant (Fuchs—Demko 1977). Compton (1977, p. 285) states that "...there is little likelihood of the provincial centers ever being able to counteract the pull of the capital."; while Beluszky (1978, p. 51) adds that "...the inner dynamics and opportunities of these cities themselves, are not adequate for the kind of development that would propel these cities to become counterpoles to Budapest and to fulfil the roles demanded of them in this type of development pattern."

Studies of the growth dynamics of the Hungarian cities paint a different picture, though. For example, Daróczi (1984), in her excellent study of the growth of functional urban regions, has identified several interesting trends. In particular, she found that rapid agglomeration occurred between 1870 and 1910, but since 1949 the dominance of the capital has diminished and medium and small-sized towns have experienced rapid development. It thus appears that the

Hungarian settlement system is becoming more evenly distributed. However, further investigations into the patterns of agglomeration and deglomeration are needed to better identify the trends, and thus evaluate the relationship between overall economic development and urbanization; and how each is influenced by planning. This is the task of the empirical analyses that follow.

Identifying agglomeration and deglomeration in the Hungarian urban system

THE MODEL

The basic analytical tool adopted for use in this study is the familiar rank-size function:

$$\ln P = c + q \ln r \qquad (1)$$

Equation (1) relates the natural logarithm of the population size of a city to the natural logarithm of its rank in the urban network when ordered from largest to smallest. The parameters c and q are the estimates of the logarithm of the population of the rank '1' center and the slope coefficient of the rank-size curve respectively. The parameter q is particularly useful for ascertaining the distributional characteristics of urban systems and hence for assessing growth trends.

The parameter q is the derivative of the logarithmic rank-size function, and as such evaluates the percentage rate of change in population associated with a percentage rate of change in rank. In other words, q measures the elasticity of city population within urban systems. Under 'normal' conditions, q equals —1, which means that population is, on average, evenly distributed across the various sized cities in the urban system. Values of q more negative than —1 result when the rank-size slope is steeper than normal, which in turn indicates that a greater than expected proportion of the population occupy the larger sized centers. Likewise, values of q less negative than —1 denote a situation in which the smaller sized centers are relatively more populated than would be the case given normal conditions. Leading from these observations, a further interpretation of the parameter q of equation (1) is as a measure of population concentration in an urban system: the steeper the slope, the greater the concentration and vice-versa. Furthermore, an increase in the magnitude of q through time for a particular urban system denotes an increase in the overall level of concentration. This situation is referred to here as agglomeration. Likewise, a decrease in q indicates falling levels of concentration, which is called deglomeration. By tracing the trajectory of q through time, one can gain an impression of the changing state of population distribution in an urban system.

Malecki (1975, 1980) has outlined a very useful technique for assessing change in rank-size systems of cities. His techniques makes use of Casetti's (1972) Expansion Method to redefine the parameters of the initial rank-size model in terms of linear functions of time (t):

$$c = c_0 + c_1 t \qquad (2)$$

$$q = q_0 + q_1 t \qquad (3)$$

Replacing the right hand sides of equations (2) and (3) into (1) produces the terminal model:

$$\ln P = c_0 t + c_1 t + q_0 \ln r + q_1 t \ln r \tag{4}$$

An application of equation (4) to time series population and rank data would yield parameter estimates for the various coefficients that would capture the linear trend of the rank '1' center and slope of the rank-size curve as explained by Malecki. In this study, however, the evidence suggests that the trends of development have not been linear. Specifically, preliminary analysis by the author indicated that the Hungarian urban system has experienced a switch in overall growth dynamics from agglomeration to deglomeration. The linear model expressed by equation (4) is inadequate to capture this type of trend; however, it is a simple matter to extend the basic methodology to account for non-linearities in the parameter drift. This is accomplished by expanding c and q from the initial rank-size model as quadratic functions of time:

$$c = c_0 + c_1 t + c_2 t^2 \tag{5}$$
$$q = q_0 + q_1 t + q_2 t^2 \tag{6}$$

The right hand sides of (5) and (6) are again replaced into (1) to give the terminal model:

$$\ln P = c_0 + c_1 t + c_2 t^2 + q_0 \ln r + q_1 t \ln r + q_2 t^2 \ln r \tag{7}$$

The reason for expanding q as a quadratic function of time is clear from the goal of this part of the analysis, which is to assess the changing levels of population concentration in the Hungarian urban system and especially to test for a switch in overall growth dynamics. The rationale for also expanding c into a quadratic of time is to allow for an increase of the rank '1' center (Budapest) at a decreasing rate, and also to maintain symmetry in the model. The fact that both parameters are expanded similarly, though, does not imply the necessity of doing so in all cases involving the expansion method.

RESULTS

Data for the analyses reported in this study come from the 1980 Hungarian Census of Population (KSH 1981, pp. 822-823), and consist of population totals for the 96 Hungarian towns for the years 1870, 1900, 1910, 1920, 1930, 1941, 1949, 1960, 1970, and 1980. The sample of cities are all contained within the present borders of Hungary, and population counts for each city are enumerated to constant 1980 boundaries. In the analyses, though, only those cities with populations greater than 10,000 at any given time period were used in order to help reduce the 'noisy' growth behavior of the very small places.

The actual analysis was conducted as follows. The sample of cities for each time period 1870-1980 were arranged in order from largest to smallest and assigned a rank number and a value of time: t = 0 for 1870; t = 30 for 1900, etc. The sample of 96 cities for the 10 time periods were then 'stacked' one atop the next to create a single data matrix consisting of city population, rank, and time for each city for the entire time horizon. A multiple regression procedure was then used to obtain estimates for the parameters appearing in equation (7). The actual equation for the analysis was obtained simply by multiplying appropriate variables together. For example, the q_2 parameter is the estimated regression coefficient for $t^2\ln r$, which is obtained by multiplying the square of t by rank for each case in the matrix. Equation (7) was solved through stepwise multiple regression analysis, with the criteria for entry and exit into the equation set at .1 and .05 respectively. Again, only cities greater than 10,000 were used in the analysis, which meant that the sample ranged from 45 in 1870 to 93 in 1980 providing a combined total of 712 cases. Results of the regression analysis are presented in Table 42.

TABLE 42

RESULTS OF TIME EXPANSION ANALYSIS

Parameter	Estimate	Significance
c_0	11.68684539	0.0001
c_1	0.02185144	0.0001
c_2	-0.00006056	0.0257
q_0	-0.60139862	0.0001
q_1	-0.00494327	0.0001
q_2	0.00002323	0.0047

$R^2 = 0.928$ DF = 5.707

Each of the parameters present in equation (7) proved to be significant at the 5% level or better, indicating that both c and q experienced non-linear change over the time horizon. The actual trajectories can be identified by replacing the letter parameters in equations (5) and (6) by their numerical estimates. This procedure yields the following estimated equation for c:

$$c = 11.68684539 + 0.02185144t - 0.00006056t^2 \tag{8}$$

Equation (8) indicates that Budapest grew at a decreasing rate over the time horizon under investigation, an unremarkable finding in itself except for the fact that it helps to establish the validity of the parameter estimates. The equation for q, though, is much more interesting. It indicates that the level of overall relative population concentration in the Hungarian system also increased at a decreasing rate. This behavior is captured by the estimated expansion equation for q:

$$q = -0.60139862 - 0.00494327t + 0.00002323t^2 \tag{9}$$

which indicates that the magnitude of q increased through time, but that the rate of increase itself decreased as the squared term gained significance. The pattern becomes even more apparent when the expansion equation for q in (9) is differentiated with respect to time:

$$dq/dt = 0.00494327 + 0.00004646t \tag{10}$$

Equation (10) indicates that the rate of change of q, and hence overall population concentration in the urban system, is negative— corresponding to agglomerative trends—but that its increase slows through time.

The analysis of the time expansion results up to this point has indicated that the growth tendency of the Hungarian urban system over the period 1870-1980 has been non-constant. The final step is to determine if a switch in the drift of q from increasing to decreasing magnitude occurred within the domain of the time frame under investigation. Such a switch can be determined analytically by setting the derivative of q with respect to time—equation (10)—equal to zero and then solving for t. According to the calculations, the switch in the trend of q occurred approximately 106 years after the starting point 1870, which places it at 1976. In other words, up-to 1976 the dominant growth trend in the Hungarian urban system was agglomeration, whereas since 1976 the system has been experiencing deglomeration. The trajectory of q through time is shown graphically in Figure 37.

The finding of this part of the analysis is quite interesting, since it indicates that the Hungarian urban system—and hence the structure of the economy in general—has achieved a state of maturity. The result also supports the findings of Daróczi's investigations, which also point to a switch in growth dynamics in the post-war period. Furthermore, the timing of the switch from agglomeration to deglomeration—some five years after the implementation of the government policies to achieve such change—speaks to the efficacy of the policies. Last, the finding contributes to a growing body of literature that has examined the phenomena of *urban turnaround* (Myklebost 1984) and *polarization reversal* (Richardson 1980; Townroe—Keen 1984).

Patterns of change within the Hungarian urban system

THE MODEL

The previous analysis served to identify the overall growth tendencies exhibited by the Hungarian urban system when *taken as a whole*. In this analysis, attention turns to an examination of the manner in which agglomerative and deglomerative trends have manifested themselves *within* the urban hierarchy itself during the course of development. The analysis again uses the Expansion Method to redefine the basic rank-size function. In this instance, however, the parameter q is expanded as a quadratic function of rank to capture the non-linearities of the rank-size curve at the top and bottom ends of the curve. The expansion of q is thus:

$$q = q_0 + q_1(\ln r) + q_2(\ln r)^2 \tag{11}$$

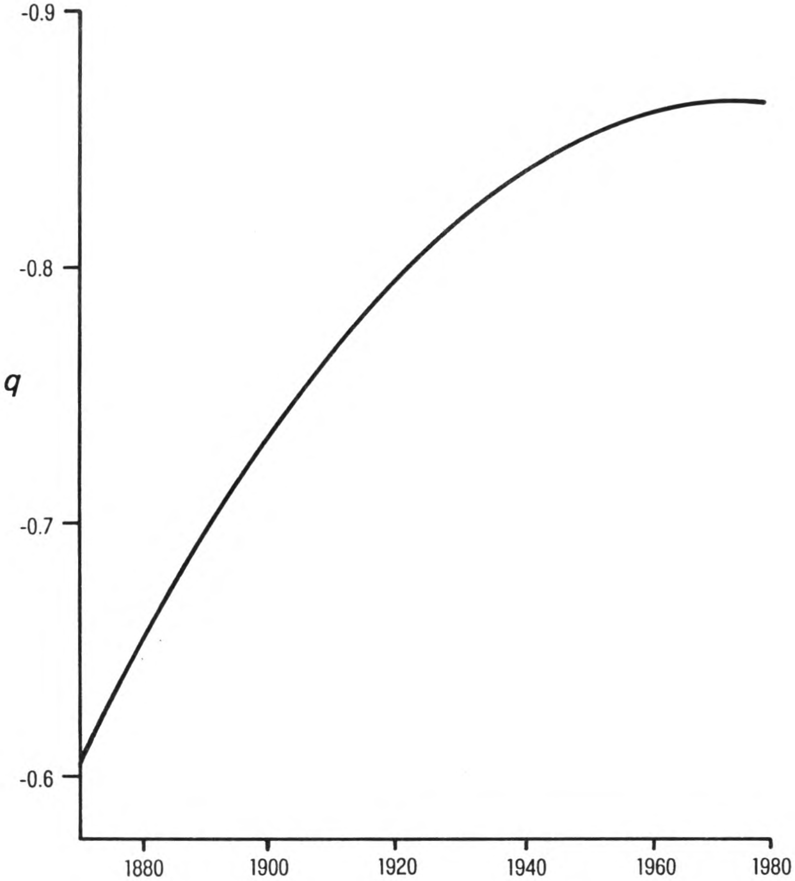

FIGURE 37 *Drift of q with respect to time*

where lnr is the logarithm of rank; and $(\ln r)^2$ is the square of the logarithm of rank. Equation (11) could be replaced into (1) to obtain a terminal model capable of assessing the drift of q across the urban hierarchy for a particular time period, or to determine the average condition from a time series of data. However, the Expansion Method once more can be applied to construct an equation that simultaneously captures the drift of q across rank and through time. This model is specified by redefining the parameters q_0, q_1, and q_2 of equation (11) as functions of time. Again, since the aim of the analysis is to identify shifts in the temporal behavior of q, the parameters are expanded into quadratics of time:

$$q_0 = q_{00} + q_{01}t + q_{02}t^2 \tag{12}$$
$$q_1 = q_{10} + q_{11}t + q_{12}t^2 \tag{13}$$
$$q_2 = q_{20} + q_{21}t + q_{22}t^2 \tag{14}$$

In addition, the parameter c is also expanded as before, yielding the following terminal model when all of the expansions are replaced into equation (1):

$$\begin{aligned} \ln P = {} & c_0 + c_1 t + c_2 t^2 + q_{00}\ln r + q_{01}t\ln r \\ & + q_{02}t^2\ln r + q_{10}(\ln r)^2 + q_{11}t(\ln r)^2 + q_{12}t^2(\ln r)^2 \\ & + q_{20}(\ln r)^3 + q_{21}t(\ln r)^3 + q_{22}t^2(\ln r)^3 \end{aligned} \tag{15}$$

Equation (15) was then applied to the Hungarian data using stepwise multiple regression as before.

RESULTS

Results of the rank expansion analysis are shown in Table 43. the results show that all of the parameters in equation (15) are significant at very high levels of confidence, and all of the signs are interpretable. Furthermore, the results are given added credibility by the fact that the parameters that overlap with the previous analysis match signs and are of similar relative magnitude.

TABLE 43

RESULTS OF RANK AND TIME EXPANSION ANALYSIS

Parameter	Estimate	Significance
c_0	12.56455872	0.0001
c_1	0.03335927	0.0001
c_2	-0.00017024	0.0001
q_{00}	-2.40835924	0.0001
q_{01}	-0.02917734	0.0001
q_{02}	0.00026774	0.0001
q_{10}	0.88136977	0.0001
q_{11}	0.01084973	0.0001
q_{12}	-0.00011725	0.0001
q_{20}	-0.12384007	0.0001
q_{21}	-0.00131912	0.0004
q_{22}	0.00001553	0.0001
$R^2 = 0.982$		DF = 11;701

The patterns of population agglomeration and deglomeration occurring within the Hungarian urban system over the study period are indicated by the estimated expansion equation for q, obtained by replacing the letter parameters of equations (12), (13), and (14) by their numerical estimates:

$$\begin{aligned} q = & -2.40835924 - 0.02917734t + 0.00026774t^2 + 0.88136977(\ln r) \\ & + 0.01084973t(\ln r) - 0.00011725t^2(\ln r) - 0.12384007(\ln r)^2 \\ & - 0.00131912t(\ln r)^2 + 0.00001553t^2(\ln r)^2 \end{aligned} \tag{16}$$

The behavior of q, and hence the characteristics and growth dynamics of the Hungarian urban system, can be determined by solving equation (16) for values of time and rank. For example, Figure 38 plots estimates of the values of q by rank for the periods 1870, 1900, 1930, 1960, and 1980. In this graph, the higher up the ordinate, the greater the magnitude of q and hence the level of hierarchial concentration existing at the particular rank position indicated on the abscissa. Likewise, the steeper the slope of the curve, the greater the rate of change of q with respect to rank, and hence the degree of non-linearity present in the original rank-size distribution. Since a straight, horizontal line on the graph would indicate equal values of q at each rank position, a tendency for the curves in Figure 38 to steepen or flatten through time indicates increasing or decreasing departures from linearity (polarization).

The curves in Figure 38 are interpreted as follows. Beginning with the curve for 1870, its steepness indicates that the Hungarian urban system was markedly unbalanced even at the outset of the study period, prior to the first wave of industrialization. Between 1870 and 1900, the intercept—which is the estimate of q for Budapest—rises dramatically, while only modest gains are registered by the small centers. This pattern is indicative of rapid polarization within the Hungarian urban system during the last 30 years of the 19th century. From 1900 to 1930, however, the curve shifts outward almost equally at each rank position, denoting proportional growth. The minimum point, though, continued to shift outward indicating further polarization effects in the small centers. After 1930, the intercept value begins to drop, while the values of q continue to increase for a segment of the curve corresponding to the lower ranking centers. The intercept value then drops rapidly between 1960 and 1980 to below the 1870 level, while the smaller sized places remain near their 1960 levels of concentration. These results clearly demonstrate the phase of rapid agglomeration, or polarization, in the larger centers up-to 1930, followed by deglomeration or trickle-down effects and a general leveling of relative population concentration within the Hungarian urban system especially since 1960.

A further analysis can be applied to these data; namely, calculating the time of the occurrence of the switch from agglomeration to deglomeration by rank from equation (16). The plot of the results of the calculations is shown in Figure 39, which indicates the estimated time (year) when a particular rank level (as shown on the ordinate) experienced the switch. The graph clearly shows that the timing of the switch from agglomeration to deglomeration was not uniform across the urban hierarchy: the switching phenomena began in Budapest in the early 1920s, and then proceeded to successively smaller centers through time. This finding confirms Daróczi's (1984, p. 73) hypothesis that "...the higher the hierarchial level of an urban centre, the sooner its growth starts to decline." This finding indicates that during the course of develop-

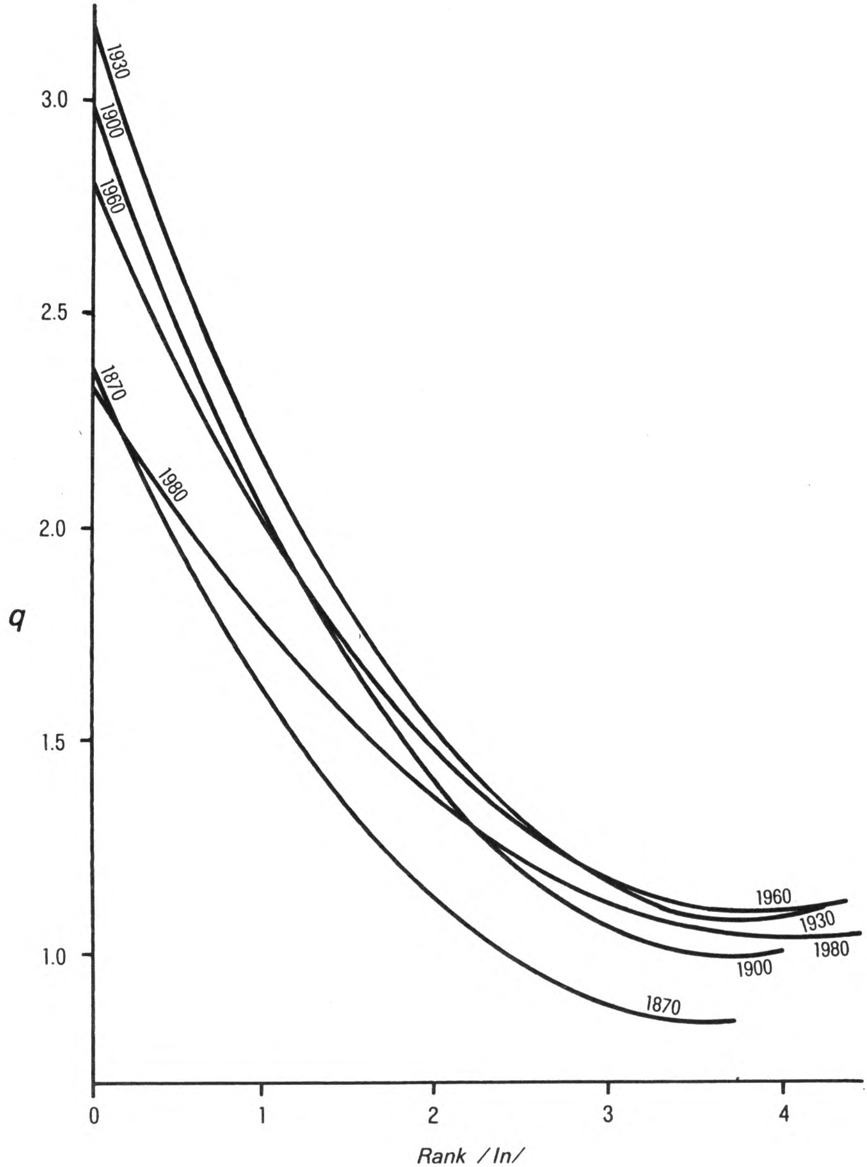

FIGURE 38 *Drift of q with respect to rank and time*

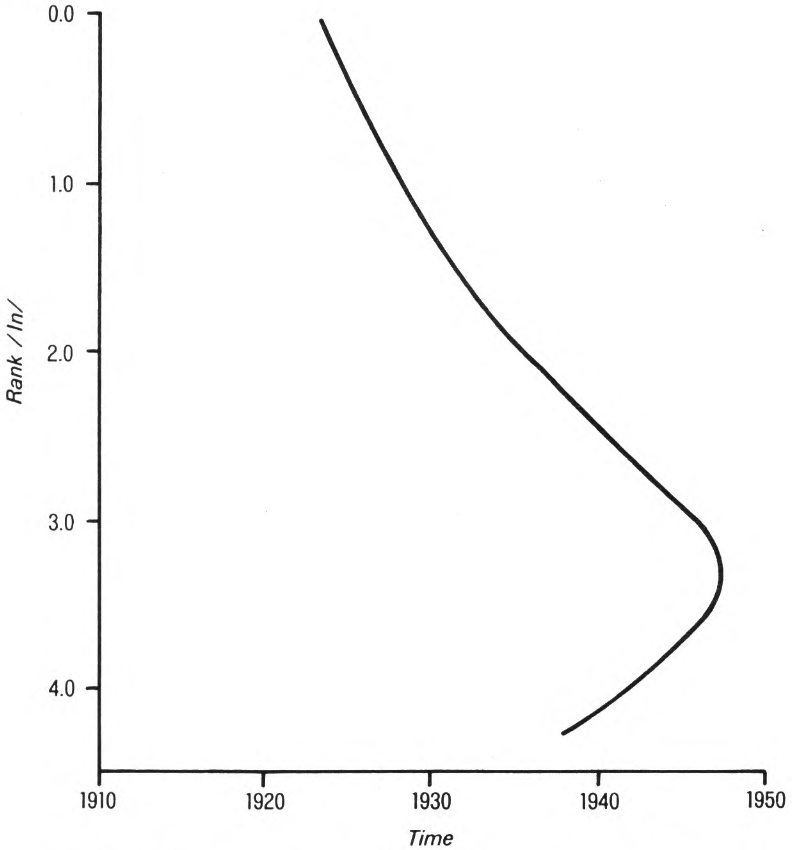

FIGURE 39 *Timing the switch from agglomeration to deglomeration*

ment, growth inducing impulses are transmitted down the urban hierarchy in cyclical fashion, causing successively smaller centers to experience relative growth then decline when compared to the rest of the system. Furthermore, the graph indicates that the switch in growth dynamics also occurred earliest in the smallest cities and then proceeded *up* the hierarchy through time. This seemingly anomalous finding can be explained as follows. During development, the smallest cities, which possess limited economic base to begin with, become even less viable due to the pull of the larger centers. The result is often rapid out-migration that reduces the population of the small cities, thereby skewing the rank-size curve downwards. This skewing, though, increases the slope of the curve and therefore the local values of q; hence, levels of concentration increase, which recall is the definition of agglomeration. After development progresses, and trickle-down effects begin to have an impact on improving conditions in the small towns, out-migration is reduced and so the rank-size curve straightens out. This process is registered as a decrease in the local levels of q, and hence deglomeration. In other words, during development both large and small cities experience agglomerative and deglomerative phases, but for exactly the opposite reasons. This type of pattern has been termed 'the cascading cycles model of urban systems development' by the author. As for Hungary, the shape of the curve in Figure 39 indicates that the rank level of about 30 (population about 25,000 in 1950) is the critical level about which the patterns are mirrored.

Conclusions

This paper has presented results of an empirical investigation into the growth dynamics of the Hungarian urban system over the period 1870-1980. The result of the temporal expansion analysis was that urban turnaround occurred shortly after various government policies were implemented to reduce urban primacy and achieve a more balanced state in the settlement system. The patterns emerging from the rank expansion analysis, however, reveal a much more complex pattern of agglomeration and deglomeration occurring differentially across the system. Specifically, the results showed that the relative levels of population concentration existing in the highest order centers, especially Budapest, have been declining since the 1920s. These results are quite significant, since they show that deglomeration and trickle-down events—usually attributed to post industrial economies—can commence immediately after the initial phase of industrialization. It would seem that the population dynamics operating within Hungary have exhibited a much higher level of vitality than was previously suspected. However, more studies of the underlying mechanisms—both demographic and economic—are needed to help confirm and explain the patterns identified here.

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SPECIFIC FEATURES IN THE DEVELOPMENT OF AGRARIAN TOWNS

JÓZSEF TÓTH

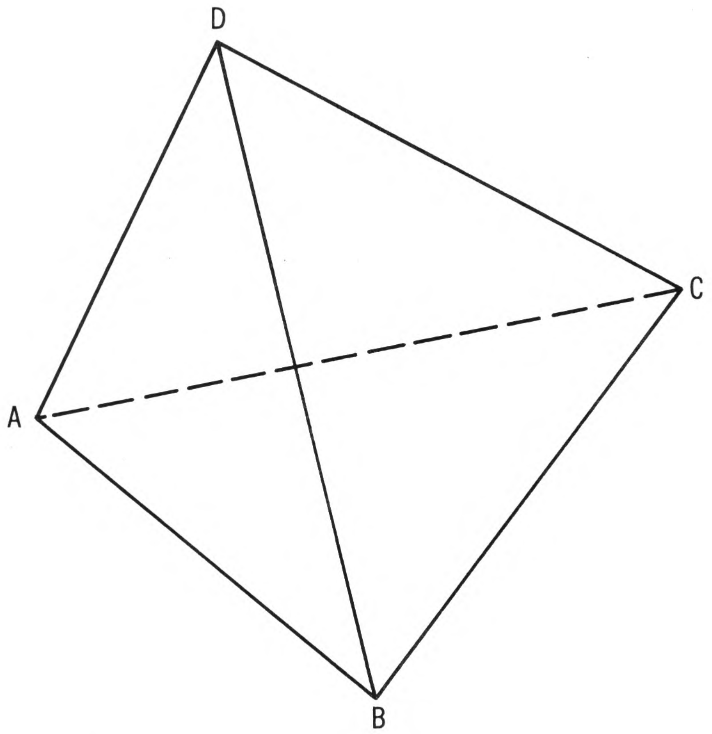
KEY WORDS: *agrarian towns,* traditional ~; *Alföld* (the Great Hungarian Plain); *differentiation; harmonic* structure; *industrialization; National* Settlement Network Development Concept; *rank* coefficient; *urbanization.*

The so-called traditional agrarian towns of the Hungarian settlement system are situated mostly in the Alföld, the Great Hungarian Plain. They represented particular formations in every earlier period of development. These settlements, with large fields and numerous farmsteads surrounding them, functioned as agrarian towns; still, they differed considerably from towns in other parts of the country. They have preserved their specific features throughout the ages up to our days. After the liberation, they played a specific role in the process of urbanization and they are expected to preserve these characteristics even in the new period of settlement development that began in the 1980s. The present study aims to review the characteristic features of these agrarian towns, their changes in the process of modern urbanization under Hungarian conditions, and the possibilities of future development; as well as to add some thoughts to the better understanding of the process of urban development.

Views of settlement geographers concerning the agrarian towns in the Alföld were rather contradictory in the past. The two extreme opinions—one stating that agrarian towns mean a dead-end in the process of urbanization; the other that they represent a specific way of urban development in Hungary with great potentials for the future—were antagonistically opposed. Interest in the developmental problems of these agrarian towns arose only in the 1970s with a series of conferences. A review of the relevant literature may convince us that the present difficulties of the old agrarian towns stem partly from their specific structure and partly from the position of the whole Alföld within the policy of regional development after the liberation (Ihrig—Tóth—Vozár 1975; Tóth 1976; Becsei 1978; Zoltán 1980).

The interpretation of the concept of settlement and the peculiarities of agrarian towns

In general, a settlement is interpreted as a system of different spheres that, in the optimal case (i.e., under the conditions of harmonic development), can be represented in the form of a tetrahedron (Figure 40). Three surfaces of this tetrahedron represent the social, economic, and infrastructural spheres; and the fourth—which includes the first three—is the natural environment. Interaction among the individual spheres is represented by the edges of the tetrahedron. These interactions can be observed among all the spheres and are the basic factors in the operation of the whole system. The system of these spheres is then considered to be a tetrahedron composed of surfaces in the shape of equilateral triangles; but if the harmony of develop-



ABD△ — social sphere
BCD△ — economic sphere
ACD△ — infrastructural sphere
ABC△ — natural environment

FIGURE 40 *The tetrahedron model of settlements*

ment is disturbed, the resulting disharmony will lead to disturbances in the operation of the whole system and the tetrahedron used in our illustration will be distorted.

The structure of agrarian towns had several particular features that distinguished them from the other towns and that can be interpreted with the help of the tetrahedron model. Within the social sphere, the differences in the class and professional composition are the most important elements. Peasantry is predominant, and the proportion of people employed in agriculture was

40-50% or higher at the time of the liberation. The development of a bourgeois lifestyle, which took place in this structure very slowly under the influence of weak industrial and functional progress, followed a special path typical of the peasantry. The society of the agrarian towns is characterized by relative immobility both vertically and horizontally. The number of labourers is negligible; the group of the civil service clerks and intellectuals is likewise very small.

A typical and determinant feature of the economy is the predominance of agriculture. Industry is only of an auxiliary character, mostly represented by food industry plants or some light industry workshops. The importance of craftsmanship and domestic industry is relatively great; there is a strong tendency for self-sufficiency. At the same time, the agrarian towns are the scene of a considerable exchange of goods since they are the market places for the surrounding area within their administrative borders and the surrounding settlements. Their administrative function has played an important part in their economic differentiation (Hajdú 1982).

As for infrastructure, these agrarian towns are far behind the other towns of the country. Their urbanized centres are surrounded by an extended belt of a rural character and farther out by farmsteads. Backwardness was characteristic both of the buildings and the level of communal supplies. These towns had no water supply nor canals; the roads were unpaved. Communication with many of the farmsteads were practically blocked in certain times of the year.

The agrarian town lived in perfect harmony with its natural surroundings; it could easily offset the harmful effects of nature that hardly tested its endurance. The environmental balance of the different spheres was practically undisturbed: the waste of agricultural production was totally recycled, and chemicals were practically unknown. The large-scale social demand for attractive recreational surroundings was missing, being unthinkable at the general standards of living.

On the whole, it can be stated that the agrarian towns were simpler systems (or more backward) in relation to the other Hungarian towns; but they functioned in harmony with the level of socio-economic development and the role they had in the national division of labour of the region where they were located. Besides backwardness, this harmony is important in another respect: it existed among the individual spheres of the structure of these towns.

The place of Hungarian agrarian towns in the urbanization process after the liberation

Because of the previously described characteristic features of their structure, the agrarian towns were not considered very important in the hierarchy of the Hungarian urban system before the liberation (Beluszky 1973). Within the Alföld a similar differentiation took place at the disadvantage of the agrarian towns with a conservative structure (Papp 1984). This seems to be confirmed by the regional rank coefficient studies on the long-range changes in the population rank sizes (Tóth 1985). The rank coefficient (R) used expresses the relative change in the rank numbers of individual towns over time based on population totals at different times:

$$R = \frac{H_1}{H_2}$$

where

R = rank coefficient,
H_1 = the rank of a settlement at the beginning of the period under examination
H_2 = the rank of a settlement at the end of the same period.

If R is greater than 1, the settlement has improved its position, has developed functionally and structurally, and has experienced positive changes within the regional division of labour. If R is less than 1, the opposite has happened; if R equals 1, there has been no change.

The findings of such an analysis show that between 1870 and 1949 the towns in the Alföld their positions in the order of Hungarian towns (established according to population totals) only gradually. After the liberation, this process accelerated: between 1949-1980 their average rank coefficient did not exceed 0.78, while the same value for towns in the other regions was above 1. This means that differentiation over the 110 years under consideration here especially intensified in the last few decades. In the period of slow, uneven capitalist development the simple, backward, and more conservative structure of the agrarian towns did not mean a great disadvantage; but after the liberation, when large-scale social and economic transformation accelerated, the backwardness of these towns became more and more significant (Table 44).

TABLE 44

CHANGES IN THE RANK COEFFICIENTS OF TOWNS BY REGIONS AND PERIODS

Region	Number of Towns	1870—1910	1910—1949	1949—1980	1870—1980
Central Region	9	1.00	1.21	1.25	1.51
North-Hungary	16	1.11	0.99	1.05	1.15
Transdanubia	48	0.99	0.98	1.09	1.06
The Great Plain	36	0.94	0.98	0.78	0.72
Total	109	1.00	1.00	1.00	1.00

Besides falling back in rank, these towns became differentiated as well. The largest and most important agrarian towns have preserved their positions, due to a more flexible or changing structure, a gradual transformation that mainly meant losing their agrarian character. The development of transport and communications, administration, medical care, education, and other functions, together with industrialization, have all contributed to the change in status that now separates these towns from the other agrarian towns. Szeged and Debrecen are especially noteworthy, but the other county seats, primarily Szolnok, Kecskemét, and Nyíregyháza are also on the way toward transformation. The administrative function is very important because it acts as a multiplier in the process of differentiating the agrarian towns (Wagner 1979).

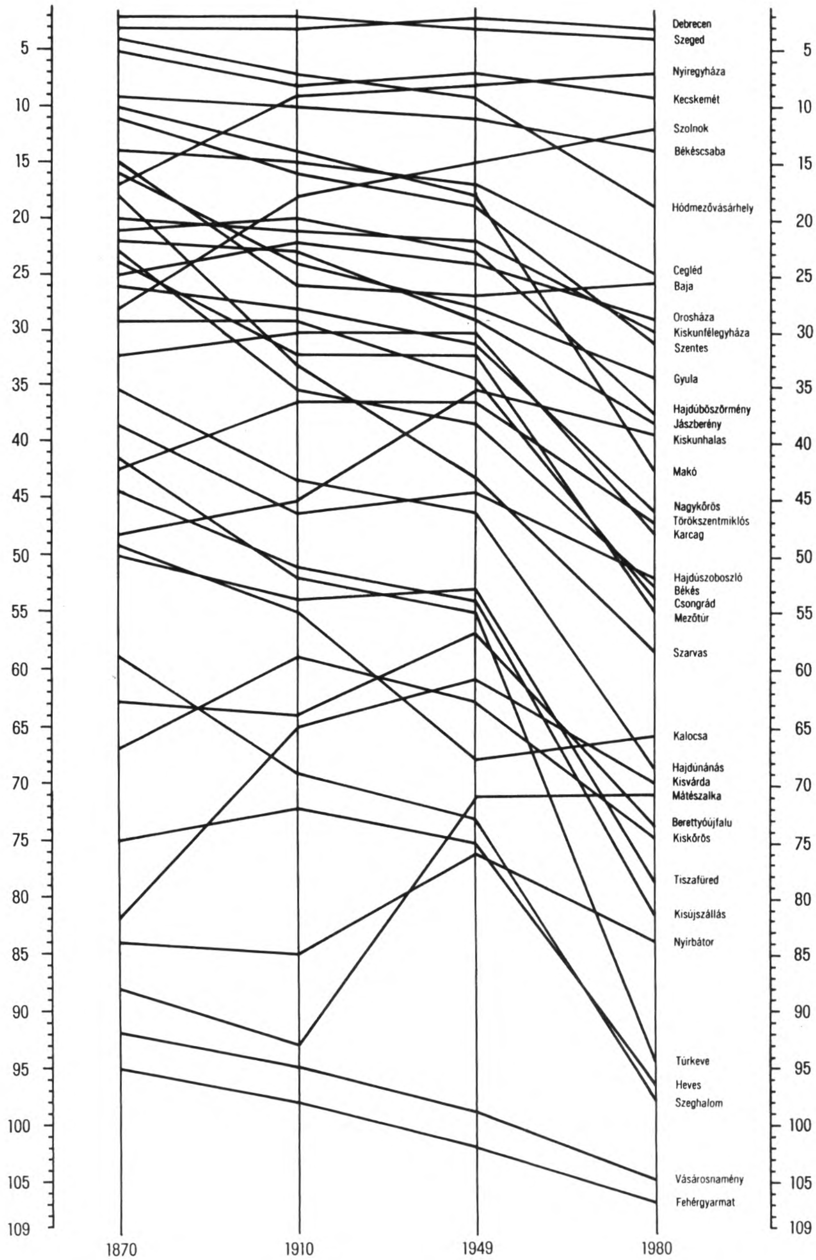


FIGURE 41 *Changes in the ranking of Hungarian towns in the Alföld between 1970-1980 in the order of population number*

The other towns in the Alföld, among them the typical agrarian towns, are quickly losing their positions. The best examples of this process are Makó and Hódmezővásárhely (Figure 41). On the other hand, some small towns in the Alföld — although they have had to face serious difficulties — have been able to maintain or even improve their positions (Dövényi 1984). Yet, the data shown in Table 45 indicate a general decline. In the national list of the towns ordered on the basis of their coefficients for the period 1870-1980, there is no one town among the first ten from the Alföld (even Nyíregyháza and Szolnok, where the number of inhabitants grew extremely fast, could not exceed a ranking of 12 or 13). The last 10 places, however, are all taken by agrarian towns (Table 46).

Besides pointing at existing backwardness, data also indicate that the quick and significant loss of population — resulting in the loss of position as well — took place after the liberation. In this period, the country experienced an unprecedented intensive and large-scale transformation of both the society and the economy, bringing about considerable changes in some regions. Although these processes have had some effect on the life of agrarian towns in the Alföld, their structrure remains immobile, incapable of keeping pace with the rate of change.

Several investigations (Krajkó 1981; Tóth 1977, 1979, 1984) have proven that the specific structure of the agrarian towns was not the only factor responsible for their lack of participation in the nationwide changes and hence their loss of importance. Another important factor is that the Alföld had a different and rather unfavourable part in the national division of labour after the liberation.

The Alföld has been at an economical disadvantage both at the time of post-war reconstruction and also in the later periods. The reconstruction of the country required concentration of resources in the regions where damages were the greatest (Budapest and the industrialized areas) and where the elimination of the bottleneck promised a fast increase of production with relatively little investment. Financial means were scarce and there was a transfer from the Alföld to these areas. Later, in the period of extensive industrial development, funds were concentrated again on the realization of the central projects and this meant that profits were drawn away from agriculture again to increase the disposable income in the industrial areas and Budapest. As a matter of fact, the new socialist towns were established (Boros 1968) and the other towns were developed at the expense of rural areas (Ruisz 1959). The reduced but inevitable development of infrastructure—mainly in the service of industrial production—also became concentrated in the industrial areas, which increased the backwardness of the agricultural regions, the Alföld being among them. All these factors, in addition to the harmful effects of the initial attempts at socialist reorganization of agriculture, led to a considerable loss of population who preferred to leave these regions. This process distorted the demographic structure, harmful effects of which are still being observed.

TABLE 45

POPULATIONS RANKS AND SIZES OF TOWNS IN THE ALFÖLD

Town	Population in 1870	Ranks within		Population in 1980	Ranks within		Rank coefficients 1870—1980	
		Alföld	Hungary		Alföld	Hungary	Value	Serial numbers in descending order
Debrecen	43,048	2	3	191,494	1	3	1,00	44
Szeged	59,851	1	2	170,794	2	4	0,50	101
Nyíregyháza	21,038	11	17	108,235	3	7	2,43	12
Kecskemét	32,471	4	5	96,133	4	9	0,56	95
Szolnok	16,115	20	28	75,362	5	12	2,33	13
Békéscsaba	27,624	5	9	68,612	6	14	0,64	85
Hódmezővásárhely	41,428	3	4	54,486	7	19	0,21	109
Cegléd	21,278	8	14	40,644	8	25	0,56	96
Baja	21,248	9	15	38,503	9	26	0,58	90
Orosháza	17,382	18	25	36,255	10	29	0,86	59
Kiskunfélegyháza	19,677	13	20	35,414	11	30	0,67	81
Szentes	26,866	7	11	35,317	12	31	0,35	106
Gyula	21,054	10	16	34,533	13	34	0,47	102
Hajdúböszörmény	19,625	14	21	32,177	14	37	0,57	92
Jászberény	19,090	15	22	31,402	15	38	0,58	91
Kiskunhalas	9,850	28	48	30,604	16	39	1,23	32
Makó	26,900	6	10	29,942	17	42	0,24	108
Nagykőrös	17,298	19	26	27,808	18	46	0,57	93
Törökszentmiklós	11,136	26	42	25,603	19	47	0,89	55
Karcag	14,486	22	32	25,230	20	48	0,67	82
Hajdúszoboszló	12,269	24	38	23,396	21	52	0,73	75
Békés	18,294	16	23	22,265	22	53	0,43	104
Csongrád	15,919	21	29	22,217	23	54	0,54	98
Mezőtúr	18,210	17	24	22,024	24	55	0,44	103
Szarvas	20,899	12	18	20,608	25	59	0,31	107
Kalocsa	9,504	29	49	18,660	26	66	0,74	73
Hajdúnánás	13,190	23	35	18,170	27	69	0,51	100
Kisvárda	4,703	35	82	17,837	28	70	1,17	36
Mátészalka	3,741	37	88	17,804	29	71	1,34	31
Berettyóújfalu	6,735	32	63	16,454	30	74	0,85	61
Kiskőrös	6,513	33	67	15,616	31	75	0,89	56
Tiszafüred	9,365	30	50	14,341	32	79	0,63	88
Kisújszállás	10,376	37	44	13,700	33	82	0,54	99
Nyírbátor	4,598	36	84	13,371	34	84	1,00	46
Turkeve	11,207	25	41	11,398	35	95	0,43	105
Heves	5,703	34	75	11,184	36	97	0,77	68
Szeghalom	7,166	31	59	10,704	37	98	0,60	89
Vásárosnamény	3,577	38	92	8,654	38	105	0,88	58
Fehérgyarmat	3,353	39	95	8,414	39	107	0,89	57

Source: 1980 census of population.

TABLE 46

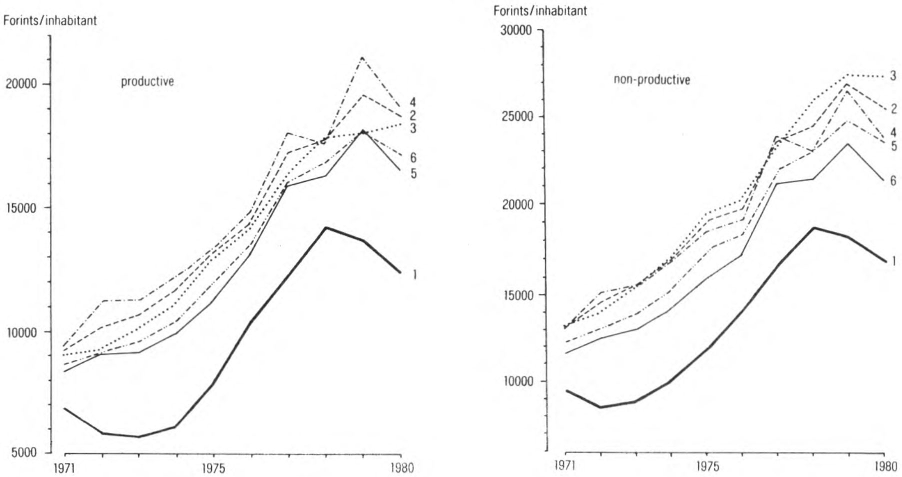
THE FIRST AND LAST TEN HUNGARIAN TOWNS IN THE ORDER OF THEIR NATIONAL RANK COEFFICIENTS 1870—1980

Town	1870—1910	1910—1949	1949—1980	1870—1980
1 Tatabánya	3.13	2.38	1.18	8.82
2 Dunaújváros	0.93	0.95	6.56	5.81
3 Érd	0.97	2.06	2.04	4.08
4 Kazincbarcika	0.97	0.99	3.85	3.70
5 Szombathely	3.00	1.20	1.00	3.60
6 Miskolc	1.75	1.00	2.00	3.50
7 Kaposvár	2.37	1.36	1.08	3.46
8 Ózd	1.55	1.88	1.09	3.17
9 Zalaegerszeg	1.08	1.20	2.22	2.89
10 Salgótarján	2.22	1.35	0.95	2.86
100 Hajdúnánás	0.81	0.93	0.67	0.51
101 Szeged	1.00	0.67	0.75	0.50
102 Gyula	0.67	0.86	0.82	0.47
103 Mezőtúr	0.75	1.00	0.58	0.43
104 Békés	0.66	0.92	0.72	0.43
105 Túrkeve	0.79	0.95	0.58	0.43
106 Szentes	0.69	0.84	0.61	0.35
107 Szarvas	0.55	0.77	0.73	0.31
108 Makó	0.71	0.78	0.43	0.34
109 Hódmezővásárhely	0.57	0.78	0.47	0.21

Source: 1980 census of population.

These national and regional processes have overthrown the balance of the previously backward but harmonic structure of the settlements in the Alföld (including the agrarian towns) thereby distorting them. The existence of disharmony by itself is not the problem, though, since development necessarily breaks up the previous harmony. Our complaint is that for more than a decade this disharmony meant nothing more than the slow, disproportionate disappearance of the earlier structure without development, the situation changing only after great delay in the late 1960s. In this critical period, the social structure of agrarian towns got seriously disintegrated (as mainly the young and well-trained people left these towns), resulting in a disequilibrium in the economy. The socialist transformation of agriculture made the historically developed system of production and organization homogeneous. No efforts were made for industrialization or to replace the considerably reduced handicraft industry; also, infrastructure did not develop, but environmental damage increased.

Increasing state subsidies granted to the large scale agricultural farms, along with big investments and the national programme initiated in the mid-60s to industrialize the Alföld, have greatly improved the situation of agrarian towns. Industry has become a factor of settlement development or at least has stopped their further decline (Krajkó—Mészáros 1978). Industrialization, however, has created new contradictions and problems since, on the one hand, it was carried out at a technical level lower than the national average and, on the other, it was not followed by the transformation of the management-organizational system. The economic units established in the Alföld were not independent, and this system contained inherently the possibility of the withdrawal of profit receipts. This value order, brought to life in the critical 15 years, somehow managed to survive in the 1970s when—under the influence of new trends in the world economy—Hungarian agriculture, and therefore the Alföld (including its settlements), became more and more valuable (Tóth 1983). Those who conceived and realized the investment policy of this period apparently did not draw the necessary conclusions from the changes in Hungary's position in the world economy, the great importance of the economic activities in the Alföld, nor the increased significance of agricultural production. The per capita investments in the socialist sector in the towns of the Alföld continued to lag behind the other towns, thus their backwardness remained unchanged during the 1970s (Figure 42). This situation causes the towns (mostly old agrarian towns) many problems, though they seem to be in a better situation in comparison with the development of rural areas in the Alföld, because it has been neglected to a greater extent. In such conditions, the trend of urbanization, which is diminishing in other parts of the country, is expected to continue for some time in the Alföld, and this means that the demographic role of the towns here will increase relatively.



1- towns in the Great Plain, 2- other Hungarian towns, 3- Budapest, 4- towns in the country with the exception of those in the Great Plain, 5- all towns in the country, 6- all Hungarian towns

FIGURE 42 *Per capita investments in the socialist sector between 1971-1980*

The National Settlement Network Development Concept, which basically determined the development of the settlements in the 1970s, was not very favourable to the agrarian towns of the Alföld (Tóth 1978). The hierarchic view it represents did not take into consideration the nearly autonomous system of agrarian towns that functioned formerly in a coordinated status.

The hierarchic view of the settlements introduced an artificial differentiation into the development of towns in the Alföld (especially unfavourable for the smaller towns) by giving priority to only one settlement among those that were at a similar level, promoting its development with funds from the national budget and thus holding back the others. These conditions did not promote the utilization of the local resources in the development of the smaller towns.

Agrarian towns in the new phase of settlement development

The new period of Hungarian settlement development or urbanization process, started in the early 1980s, is characterized by the reduction of interregional migration and relatively short-distance moves (from gravity zones into the centres) increased in proportions. The period of spectacular change is over (establishment of new towns and forced development of small towns from central funds).

The new processes are promoted by administrative means (increased settlement autonomy and increasing use of local resources). A typical feature of this new period is that all these changes are taking place at a time when economic growth is hindered by structural problems or, in other words, under conditions that are not optimal for development. The chances can still be better for the agrarian towns in the Alföld in spite of the reduced resources because:

—the whole Alföld will inevitably move out of its backwardness;

—the direct and indirect preferences made at the expense of rural towns will gradually disappear;

—now that the phase of accelerated development is over, the agrarian towns need not meet the long and costly obligation of eliminating the contradictions;

—in spite of the structural distortions, these towns have still remained communities to a greater extent than the regional centres that had to receive a large number of immigrants, so that local patriotism can be an important factor of settlement development;

—the necessity to contribute directly or indirectly to the development of the settlement is not unusual in contrast with those settlements that earlier got large central funds for development;

—industrialization plays a smaller part in urbanization than earlier;

—the towns of the Alföld have similar chances for the development of the third and fourth sectors as the other towns;

—the agrarian towns are at an advantage against the industrialized centres with respect to their ecological balance and attractive environment.

The chances of future development in the case of agrarian towns will greatly depend on national tendencies and potentials, but local factors will have an increased importance given the new set of conditions.

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QUASI-EXPERIMENTAL METHODS FOR ANALYZING REGIONAL ECONOMIC AND SPATIAL CHANGE: AN APPLICATION TO AN ENERGY BOOMTOWN*

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KEY-WORDS: *control* group; *diversification; economic* base multiplier; *employment* trends; *energy* boomtown; *ex post* assessment; *'Gillette Syndrome'; growth* pole; *input-output* model; *quasi-experimental* method; *regional* economic change; *structural* change.

Introduction

Conventional methods of regional economic analysis are of limited value when applied to situations involving major changes in industrial or spatial structure. For instance, standard applications of the input-output and economic base models assume a constant economic structure. In the former, the structure of production relationships within the economy is fixed as represented by technical and regional coefficients. In the latter, the ratio of nonbasic to basic activity is assumed to be constant. In interregional input-output modeling, the spatial structure of relationships also is assumed invariant as represented by constant trade coefficients. Even econometric models based on time series data assume that a particular set of structural relationships observed during the estimation period will not change.

Although each of these methods can be modified to incorporate structural change, they are predicated on the assumption that some observable, measurable structure will remain constant. In contrast, the method described here is designed for the study of structural change. It is a method for ex post impact analysis and can be used to study situations that involve transformations in the composition of the local economy or in economic relationships over space. These structural changes imply that both economic base and input-output multipliers are altered, meaning that pre-impact multipliers cannot be accurate predictors of the impact. Indeed, an important part of the impact is on the structure itself.

Perhaps the extreme example of rapid economic structural change is the boomtown, and the most enduring question of spatial economic change involves the growth pole. Both are examined in this paper, as illustrative applications of the quasi-experimental method. The case study areas are Campbell County, Wyoming, a center of mining activity whose population grew from 7,600 in 1966, to 12,957 in 1970, and 34,400 in 1983; and Johnson County, Wyoming, an adjoining county.

In the next section, Campbell County and its economic transformation are described. In the two following sections, steps in the use of the method are outlined. In the last two sections, empirical results are presented for Campbell County and Johnson County; changes in those rural economies resulting from the energy boom development and mining activities are identified sector by sector, year by year.

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The anatomy of a western energy boomtown

Gillette, the largest town in Campbell County, is probably the best publicized among the western energy boomtowns of the last twenty years. The problems that rapid growth brought to Gillette were called the 'Gillette Syndrome' (Mast—Tebbutt 1983) when they appeared in subsequent boomtowns. However, Campbell County's rapid growth was not confined to Gillette. Unincorporated areas grew, and Wright, an entirely new town, was created by Atlantic Richfield to accommodate energy development in the southern end of the county. By 1980, Wright had a population of 1,117, and estimates indicate that the population has since surpassed 1,500 (Mast—Tebbutt 1983).

Campbell County occupies 4756 square miles of northeast Wyoming's Powder River Basin. Despite rapid population growth between 1966 and 1983, population density remains low at 7.2 persons per square mile (2.8 persons per square kilometer). More than 80 percent of the land is in private ownership (Mast—Tebbutt 1983). Ranches (using the Census term for farms and ranches, collectively) account for 94 percent of the county's land, and livestock sales make up 90 percent of 1978's farm output. The ranches averaged 7,451 acres in 1978, slightly more than 3,000 hectares. Four out of five ranches were larger than 500 acres or 207 hectares.

A genuine energy boom began in 1967 with the discovery of the Belle Creek Oil Field, north of Gillette. Between 1960 and 1966, Campbell's population had crept upward from 3,850 to 7,600, largely due to oil and gas exploration activity. By 1970, the population reached 12,957, a 70 percent increase in four years. The first phase of Campbell's boom peaked in 1970, however.

A lull in major new construction and mining activity pushed the county's population back to 12,000 in 1974, before it began rebounding strongly, largely due to an upsurge in coal mining activity. Coal production in 1982 was more than 120 times greater than in 1972 (Mast—Tebbutt 1983). Discovery of the Hertzog Draw Oil Field in 1976, and construction of the Wyodak Powerplant, also helped fuel the second phase of Campbell's boom (Mast 1983). Linked to coal, oil, and electricity production, the population of Campbell County almost tripled between 1974 and 1983, reaching 34,400.

The changing momentum and composition of the energy boom are evident when examining data on the county's establishments with more than 100 employees. In 1966, there was one establishment exploring for oil and gas, and in 1971, there were two. By 1976, there were three oil drilling concerns with more than 100 employees, another providing oil and gas field services, and one large coal mining operation. In 1981, there were no longer any oil drilling concerns of this size, but there were eight coal mining establishments (of which two had between 250 and 500 employees), two large firms in extraction, and one in oil and gas field services. In total, the mining sector (coal, gas, and oil) expanded from 394 employees in 28 establishments to 4,337 employees in 118 establishments during the fifteen-year period.

More than thirteen years after rapid growth began, Campbell County still retains many of the typical boomtown characteristics. Mobile homes and trailers constituted 38 percent of the 1980 housing stock. Median rent is the highest in Wyoming by far, and the value of owner-occupied housing was second highest in the state, after the resort area of Teton County. Campbell has 21 percent fewer physicians per capita, 60 percent fewer dentists, 76 percent fewer hospital beds, and a 32 percent higher serious crime rate than the state of Wyoming.

The economic transformation of Campbell County will be the only concern here, however. Despite its continuing dominance of the county's land area, agriculture's role in Campbell County's economy has declined almost continuously since 1960 when it accounted for 37.6 percent of Campbell County's employment (Mast—Tebbutt 1983). By 1980, agriculture's share of county employment had slipped to 3.5 percent. Figures 43 and 44 show other major changes in Campbell's economy. Between 1966 and 1981, mining's share of earnings by industry grew from 16 to 40 percent, and construction increased from 5 to 26 percent. As expected in the boomtown syndrome, services and retail trade lag behind. Services declined from 16 to 7 percent of the economy, and retail trade from 18 to 6 percent. Farming fell from 21 to less than 1 percent, despite an upsurge in 1971 and 1972 during the mining slowdown.

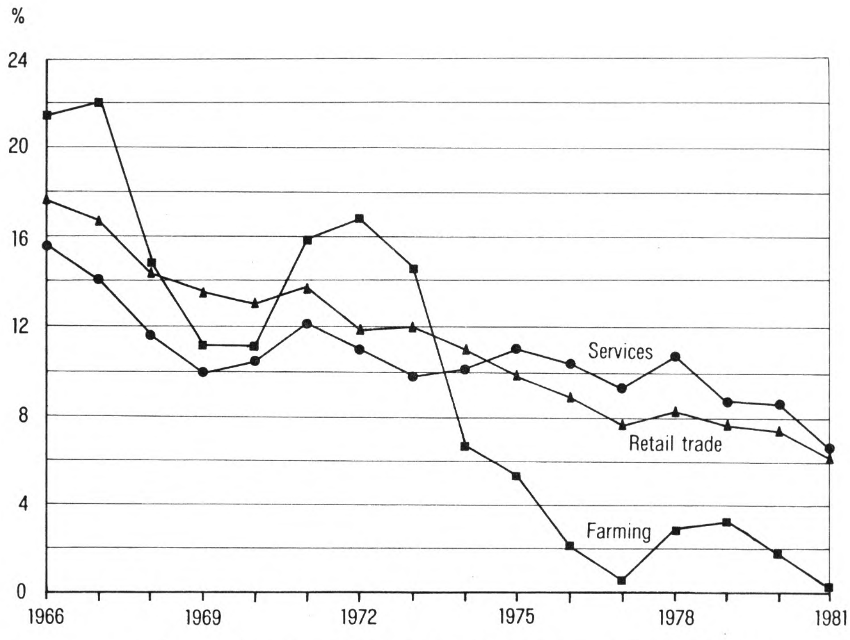

FIGURE 43 *Percent share of income by sector, Campbell County: farming, retail trade and services*

These figures can be used to show crudely the limitation of the economic base multiplier, for example, in doing an impact study of coal mining in the presence of such large scale structural change. If farming, mining, construction, manufacturing, and federal government employment were considered the basic sectors, then 45.8 percent of the economy was basic in 1966 and 68.4 in 1981. These figures translate into economic base multipliers of 2.18 in 1966 and 1.46 in 1981. Any economic base impact study that would have assumed constant basic and nonbasic proportions would have overestimated the expansion of the nonbasic sector by more than 250 percent!

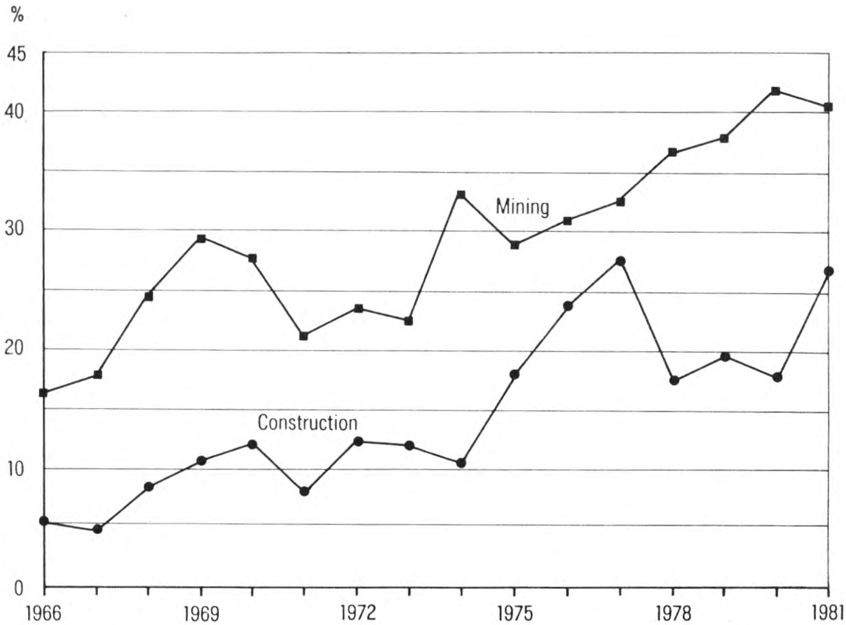

FIGURE 44 *Percent share of income by sector, Campbell County: mining and construction*

Less aggregated data paint a portrait of boomtown expansion and spontaneous, American economic growth. The number of business establishments grew from 219 in 1966, to 482 in 1976, to 818 in 1981: an increase of 274 percent (Figure 43). Employment (only that covered by social security) grew 659 percent, from 1,444 to 10,965. The average size of establishments grew steadily, too, from 6.6 employees per unit to 13.4. In 1966, there were three firms with more than 50 employees; in 1971, seven; in 1976, 22; and in 1981, 40: an increase of more than 1200 percent. Table 47 presents more detailed information.

The identity of the 40 firms in 1981 demonstrates some diversification of the boomtown economy. Eighteen are in mining, but the remainder includes three building contractors, a newspaper publisher, four trucking firms, three eating places, two grocery stores, a department store, a bank, three hotels or motels, a physician's office, a nursing and personal care facility, a telephone company, and an electric services company. In all, there are 31 three-digit industries under the standard industrial classification code that are found in 1981 government data but were not present in the 1966 data (see Table 48). They include wholesale trade in motor vehicles and automotive equipment, machinery equipment and supplies, and petroleum and petroleum products; and retail trade in lumber and building materials, cars, and clothing, as well as drug stores and department stores. Among the services are banks; miscellaneous business services including management and public relations; automotive and other repair shops; engineering and architectural services; accounting, auditing, and bookkeeping; physicians' offices, and bowling and billiard establishments.

TABLE 47

NUMBER OF EMPLOYEES AND ESTABLISHMENTS BY SIZE-CLASS: CAMPBELL COUNTRY 1966—1981

	Number of employees, mid-March pay period	Total reporting units	Employees per unit	Number of reporting units by employment-size class					
				< 20	20—49	50—99	100—249	250—499	500+
1966	1,444	219	6.59	201	15	2	1	0	0
1971	2,717	318	8.54	291	20	5	2	0	0
1976	5,792	482	12.01	419	43	16	6	0	0
1981	10,965	818	13.40	705	73	23	13	4	0
change 1966–81	9,521	599	6.8	504	58	21	12	4	0
percent change	659%	274%	103%	251%	387%	1050%	1200%	n/a	n/a

Source: County Business Patterns.

TABLE 48

NUMBER OF ESTABLISHMENTS AND EMPLOYMENT IN EMPLOYMENT CATEGORIES PRESENT IN 1981 DATA BUT NOT 1966 DATA, CAMPBELL COUNTY

Classification	Total reporting units	Number of Employees
Mining		
132 Natural gas liquids	5	56—99
Construction		
151 General building contractors	15	250—499
166 Heavy construction	21	100—249
171 Plumbing	11	108
173 Electrical	15	174
177 Concrete	10	58
178 Waterwell drilling	8	76
179 Miscellaneous special trades	10	73
Manufacturing		
271 Newspapers	1	50—99
Communication		
481 Telephone	1	50—99
491 Electric services	2	120—249

Classification	Total reporting units	Number of Employees
Wholesale Trade		
501 Motor vehicles and automotive equipment	6	110
507 Hardware, plumbing, and heating equipment	3	40—99
508 Machinery equipment and supplies	30	265
517 Petroleum and petroleum products	6	52
Retail Trade		
521 Lumber and other building materials	5	56
531 Department stores	1	50—99
541 Grocery stores	11	250—499
551 Car dealers	4	94
565 Clothing stores	6	63
591 Drug stores	4	87
594 Miscellaneous stores	11	53
Finance		
602 Commercial and savings banks	5	197
Services		
739 Miscellaneous business services	15	137
753 Automotive repair shops	18	
769 Miscellaneous repair shops	16	100—249
793 Bowling and billiard establishments	2	40—99
801 Offices of physicians	13	113
805 Nursing and personal care facilities	1	100—249
891 Engineering and architectural services	15	104
893 Accounting, auditing, and bookkeeping	8	71

The number of amployees is presented as a range for some industries because the exact number is not disclosed to protect proprietary information of individual firms.

Source: *County Business Patterns.*

(Because these industries were not listed in 1966 does not mean necessarily that such firms did not exist, but rather that, if they did exist, there were so few firms in the industry that the government did not publish the figures in fear of revealing proprietory information about individual firms. Although it is theoretically possible that all these kinds of businesses were present in 1966, it is very unlikely given the growth in the number of establishments. To illustrate, in 1966 there were 16 special trade contractors in Campbell County and the data do not disaggregate them by speciality; by 1981 there were 72 special contractors disaggregated into 5 categories including 10 specializing in concrete work and 8 in waterwell drilling).

The diversification of Campbell County partially reflects an American kind of economic nationalization. Indigenous capital probably did not spark the boom or finance much of the subsequent expansion. National or regional corporations moved into the county to provide the same grocery stores, hotel and motel chains, restaurants, and other activities found virtually throughout the nation. Individuals also undoubtedly contributed by opening businesses, sometimes but not always franchises of national corporations.

The responsiveness of American capital to market opportunity is noteworthy within the international comparative planning context of this conference. Perhaps central planners would have been unable to respond as quickly to the demand for goods and services of the booming economy; on the other hand, perhaps the boom would have been managed and controlled in such a way that many of those services would not have been needed and perhaps other human services would have been provided.

The quasi-experimental method

The population and economic figures alone suffice to demonstrate that mining activities (using the term to refer to oil, gas, and coal collectively) had a considerable impact on the Campbell County economy. Yet, some of the economic activities described in the previous section may have occurred in Campbell County had there been no mining boom. By definition, the national chains expanded in many places during the period under study. Possibly some of them located in places that had no energy boom but were very similar in 1966 to pre-boom Campbell County.

The key question in this kind of ex post impact analysis is what would have happened in Campbell County had there been no energy boom. Not all the growth and change from 1966 to 1981 should be automatically ascribed to the boom. The decline in ranching income, for example, could be related to economic opportunity luring ranchers into other jobs; on the other hand, it could be the result of changing grain prices, competition from new feedlots in California, the bankruptcy of nearby meatpackers faced by competition from other regions, or a variety of other factors not directly related to the boom. Probably all of these were factors, which means that part of the 41 percent decline in *nominal* farm income from 1966 to 1981 was an impact of mining activity, but not all of it. Thus, to estimate the impact of energy development it is necessary to compare what actually happened in Campbell County to an estimate of what would have happened without the energy boom.

A quasi-experimental approach can be useful in this context. A control group must be selected to represent what would have happened in Campbell County if the large scale energy development had not been undertaken. Then Campbell County's development can be compared to that of the control group. The difference between what happened in the control group in Campbell County is the impact of the energy boom—just as the difference between the test scores of students with and without computer-aided instruction can be considered the impact of the instruction. The qualifier, quasi, is used because no actual experiment is conducted. The selection of the control group is of utmost importance, and the procedures followed in this study will be discussed in the next subsection. Before doing so, however, the calculations involved in identifying impacts are described.

The economic impact of the energy boom on industry in Campbell County is estimated by (1) subtracting the growth rate of that industry in the control group (r_{ic}) from the growth rate of that industry in Campbell County (r_i) and (2) multiplying the difference in growth rates times the economic activity level of that industry in Campbell County just prior to the energy boom, that is, 1966. Using o to denote the base year, 1966, and t to denote a particular, subsequent year, impacts can be identified for the year t by defining growth rates over the period from o to t and calculating:

$$(r_i - r_{ic})\, E_i^o$$

or

$$E_i^t - r_{ic}\, E_i^o$$

This impact calculation and the calculation of the competitive or regional share effect in shift-share analysis are very similar. The only difference is that the control group's growth rate is used instead of the national economy or some other base. The method and its relationship to shift-share analysis are discussed further in Isserman—Merrifield (1982).

In summary, the impact on a sector in a particular year is defined as the change in economic activity in addition to or less than the change that would have occurred had that industry in Campbell County grown at the control areas' rate. Thus, the estimates of impacts depend not only on what occurs in the study area, but also on what occurs in the control areas. The crucial methodological question is whether a satisfactory control group can be selected for a place or region.

A quasi-experimental approach is sufficiently different from traditional methods of regional economic analysis that it requires different articles of faith and generates different untestable hypotheses. Therefore, it may be greeted with understandable skepticism. Yet, such a comparative approach to estimating growth and development is accepted in sociology, anthropology, and other behavioral social sciences. It is not even unknown in regional analysis. Isard (1960) discusses its use in making population projections, and Tiebout (1969) adopts it when borrowing input-output coefficients from more developed areas to represent aspects of the future economy of a developing area. The procedures used below should be considered a second, early attempt at defining control groups (the other having been presented in Isserman—Merrifield 1984). Much work is needed in this area before a set of accepted procedures will evolve.

Selection of the control group

The Bureau of Economic Analysis of the U.S. Department of Commerce annually compiles data on employment by industry, income by sources, and other economic measures for each of the more than 3,000 counties in the nation. These counties, thus, are useful building blocks from which control groups can be selected for regional analysis. The more similar the economic evolution of the control group and Campbell County in the period before the energy development, the more comfortable one can be with the assumption that the control group's evolution after 1966 represents what would have happened in Campbell County—in the same manner that a high R^2 in a time series equation is considered desirable for predictive purposes.

The first step of the selection procedure for a control group for Campbell County was to define the region from which potential control group counties would be drawn. Campbell County's dominant sector was agriculture. Although insignificant in comparison to its current role in the county economy, mining income was present even during the 1950's and early 1960's. Consequently, the appropriate region from which to select control group counties was one with a large number of sparsely populated, ranching counties. Ideally, at least some of the counties in the chosen region would have small mining sectors.

That description best fits a region roughly encompassing the eastern half of Montana, the eastern one-third of Wyoming and Colorado, and the western one-third of the Dakotas and Nebraska. Within that region, additional criteria were applied to eliminate counties not suited for the control group. Inclusion in an SMSA, and the presence of large government installations, such as universities, military bases, or large recreation areas (i.e., the Black Hills area of South Dakota and Wyoming), caused the removal of several counties from further consideration. Other counties were eliminated because they experienced major, exogenously-induced economic shocks during the pre-impact period or thereafter, such as the opening or closing of a large mining or manufacturing facility or military base. A few counties could not be considered because they had so little economic activity that the data were not disclosed.

Application of the criteria described above left a manageable number of counties, twenty-nine, for further consideration. Since impacts during the boom were defined as changes over time, Campbell County's pre-boom rates of change were compared to each of the 29 counties on the one-digit level. This process can be termed a pre-test: Do the counties in the control group have the same growth rates as Campbell County in the pre-impact period?

Data availability limited the choice of the time span for the pre-test to 1959-66 or 1962-66. The former was chosen, because an indication of long run similarity between Campbell County and the control group was preferred, especially in light of the 15-year span of the impact period (1966-81). With more time and resources, nothing precludes pre-testing with all available time periods.

Initially, an aggregation of all 29 counties served as the control group in calculating 'impacts' from 1959 to 1966. A perfect pre-test score would have been all zeros, indicating that the control group and Campbell County had identical growth rates in each sector. The large sector-specific 'impacts' revealed by the first run led to the removal of specific counties thought to be most responsible. This process of aggregating counties, pre-testing, and altering the control group was repeated several times, producing data for several possible control groups.

Three alternative control groups were retained for use in studying Campbell County, in part so that the sensitivity of the results to the composition of the control group could be examined. The three control groups are a five-county group including Sheridan (Nebraska), Baca (Colorado), Blaine (Montana), Bennett (South Dakota), and Mellette (South Dakota); a nine-county group including the five counties just mentioned plus Antelope and Box Butte (Nebraska), Adams (North Dakota), and Phillips (Colorado); and a twelve-county group composed of the nine counties plus Morrill (Nebraska), Renville (North Dakota), and Phillips (Montana). These same control groups will be used to study the impact of development in Campbell County on adjacent Johnson County, for reasons to be explained later.

The results of the pre-tests of the three control groups are presented in Table 49. The smallest 'impact' on total income is found with the nine-county control group for Campbell County and the twelve-county group for Johnson County. However, in the former case, the small total 'impact' results largely from cancellation of large, but opposite-signed, sector-specific 'impacts'.

TABLE 49

CONTROL GROUP TEST RESULTS 1959—1966

Sector	Campbell County 'Impact' Control Group			Johnson County 'Impact' Control Group		
	12-county	9-county	5-county	12-county	9-county	5-county
Farming	-2791	-2198	-1206	-295	6	509
Agricultural Services	43	44	44	31	31	31
Mining	231	1029	781	-26	414	278
Construction	-396	-402	-451	-170	-176	-214
Manufacturing	-43	-14	-17	2	93	84
Transportation, Communications, & Public Utilities	535	546	573	140	144	153
Wholesale Trade	-77	-78	-47	-50	-50	-37
Retail Trade	-238	-260	-186	-132	-143	-106
Finance, Insurance, and Real Estate	15	15	17	-6	-6	-4
Services	62	148	187	-38	3	22
Federal Government—Civilian	1	-3	2	-47	-51	-45
Federal Government —Military	53	50	54	10	5	10
State and Local Government	153	135	62	384	362	282
Residential Adjustment	437	2152	70	272	1565	-3
Dividends, Interest, & Rent	-1092	-1050	-1230	-102	-59	-239
Transfer Payments	222	214	236	35	23	54
Total	-2885	328	-1111	8	2161	775
Absolute sum	6389	8338	5163	1740	3131	2071

Deciding whether the pre-test 'impacts' are large or small is reminiscent of similar inconclusive debates regarding acceptable errors in nonsurvey input-output models or acceptable mean absolute percentage errors for regional econometric models. There are no conclusive, universal standards. The largest total 'impact' in Campbell County is with the twelve-county group and amounts to 15 percent of the 1966 total income; the analagous figure for Johnson County is 14 percent. Whether those numbers are considered unacceptably high or praised as an indication that the control group explained 85 percent of Campbell's total income may depend on the inclination of the observer. In any case, the 'impact' results demonstrate the difficulty in finding counties that form perfect control groups and suggest that there may be bias in the actual impact results and that sector-specific results should be examined cautiously.

For the Campbell County impact study, the twelve-county control group will be used, although it does not have the lowest error in total or absolute terms. It was selected because it underestimated the total impact and because the use of twelve counties rather than five may afford some protection from extraneous events affecting members of the control group. The pre-test results indicate that the twelve-county group might underestimate the impacts on farming, construction, trade, and dividends, interest, and rent; whereas it might overestimate moderately some impacts. For Johnson County the nine-county group will be used because it overestimates the total impact and because the use of the twelve-county group resulted in some questionable results.

Thus, the control groups used to produce the results presented in the next section were selected without strict criteria. As will be demonstrated, however, the impact results are not sensitive to the choice among these control groups.

The economic impacts of the energy boom

Campbell County's total income increased twenty-fold from 1966 to 1981, whereas the consumer price index only increased 2.5 times. The impact calculations indicate that 73 percent of the 1981 income level is attributable to the energy boom. Figure 45 shows the annual pattern

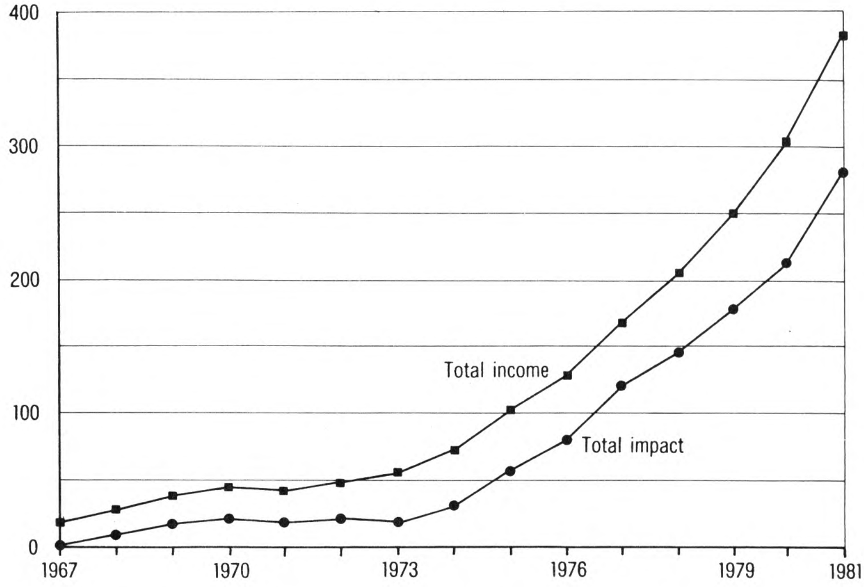

FIGURE 45 *Total income and total impact by year, Campbell County 1967-1981*

of total income (in millions of 1966 dollars) and the total impact, the latter traced out year by year, sector by sector based on the diverging growth rates of the control group and Campbell County. The impact grows from less than 10 percent of total income in 1967 to the 73 percent level, but the increase is far from monotonic. Note that the impact calculations apparently pick up the decline in mining activity from 1970 to 1973 and its consequences (Figure 46).

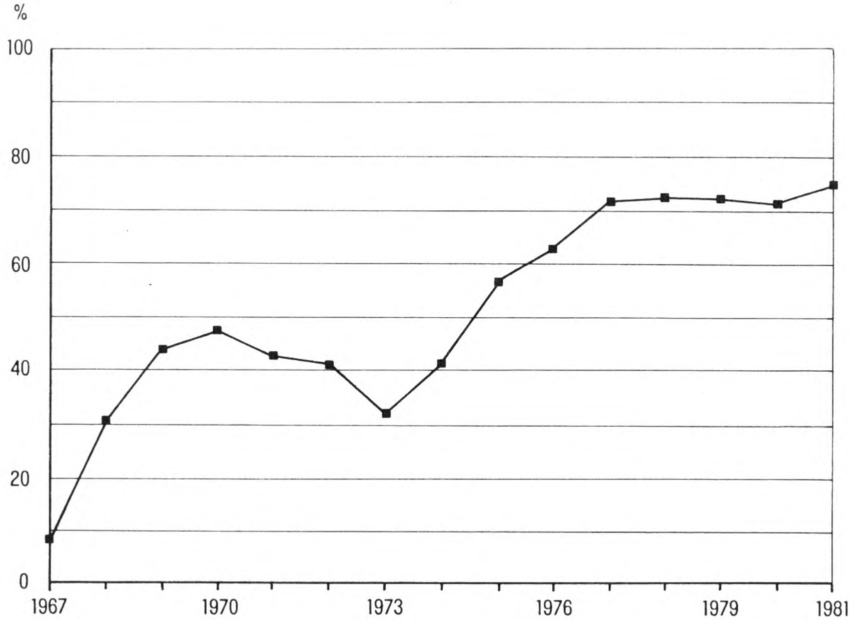

FIGURE 46 *Impact as percent of total income, Campbell County 1967-1981*

The impact varies across sectors. It accounts for 97 percent of construction income and 97 percent of the income flowing out of the county because of nonresident workers. At the other extreme, it accounts only for 64 percent of services and 49 percent of transfer payments. Interestingly, only 75 percent of mining activity is credited to the impact. To understand the latter, keep in mind that the control group contains several counties with some mining activities, just none with a tremendous boom. Thus, the impact study differentiates between what actually happened at Campbell County and what would have happened had it continued at a moderate rate of mining activity.

Some sectors exhibit interesting time patterns. The initial impact on several sectors is negative, 5 percent for both construction and services in 1967. This result is consistent with experience during expansionary periods, even in metropolitan areas, as workers are bid out of lower paying local jobs by an expanding export sector.

The complete percentage impact results follow in Table 50. Some numbers may indicate problems with the method, such as the fluctuating numbers for agriculture, the sector that declined 41 percent in nominal dollars from 1966 to 1981. This kind of result also suggests the need for follow-up research beyond the scope of this project to determine whether curious looking numbers are a statistical peculiarity or a signal of something interesting but unknown about the development of the economy in Campbell or the control groups.

In 1981, the impacts on mining and construction each exceeded 100 million dollars; the outflow of income to nonresident workers was of the same magnitude. The impacts on dividends, interest, and rent was approximately 35 million and on state and local government, transportation, communications, and public utilities, retail trade, and services was each approximately 20 million. Figures 48-50 show the time pattern of these impacts.

In summary, the impact study results are largely what would be expected in the boomtown scenario: numerous positive impacts varying by sector and dominated by mining and construction.

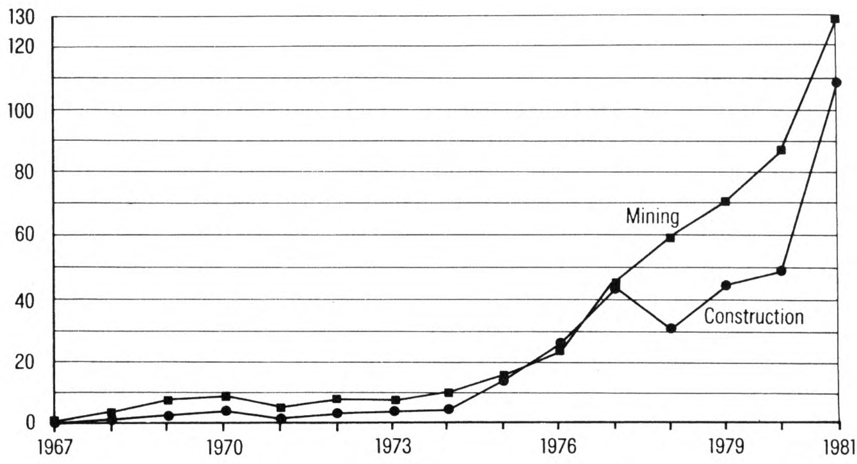

FIGURE 47 *Impacts on mining and construction, Campbell County*

TABLE 50

STRUCTURAL IMPACTS IN CAMPBELL COUNTY WYOMING, 1967—1981
TWELVE-COUNTY CONTROL GROUP, THOUSANDS OF DOLLARS

Sector	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
Farming	1089	1079	589	462	2029	1739	-4338	-2533	-600	-398	-2022	1123	2048	413	-5697
Agricultural Services	2	28	23	42	36	52	57	97	25	67	198	189	149	86	146
Mining	3415	7722	8788	114	5689	7910	7582	10504	15725	23928	44448	59915	71201	87185	129438
Construction	-41	1172	2752	3895	1625	3478	4003	4786	14122	25560	44080	30740	44722	49051	108905
Manufacturing	-3	45	61	8	56	64	236	179	818	1112	1609	1724	2027	2332	2764
Transportation, Communication, and Public Utilities	105	1201	2329	2991	2086	1449	1747	2973	5475	5816	8698	11762	14397	17191	20448
Wholesale Trade	22	415	710	600	537	381	508	675	681	978	2485	3894	5088	8071	12324
Retail Trade	-74	491	1343	1701	1158	1119	1020	1857	4496	5825	8224	11575	13347	16703	20746
Finance, Insurance, and Real Estate	-1	53	140	130	186	307	406	663	887	1430	2633	3863	4263	5081	6823
Services	-122	214	225	846	832	941	317	1556	4840	6529	9666	14298	13315	17155	18307
Federal Civilian	98	78	172	189	209	198	160	213	200	289	378	471	558	631	807
Federal Military	4	48	68	45	115	84	67	70	111	139	70	104	139	195	206
State & Local Government	203	610	950	1258	1657	2094	3722	5080	6512	8470	10752	12939	14132	18106	23236
Residential Adjustment	-7	-1394	-3180	-3822	-2774	-3744	-3720	-5311	-9448	-16459	-29028	-30645	-37669	-47596	-100815
Dividends, Interest, and Rent	9	1296	3292	3592	4107	3649	5464	8019	11106	13446	14496	19471	24170	29673	34674
Transfer Payments	3	128	151	345	505	421	376	550	942	1403	2194	3196	4413	5492	6253
Total	1804	8879	17347	21070	18053	20188	17607	29378	55892	78135	118881	144618	176300	209769	278565

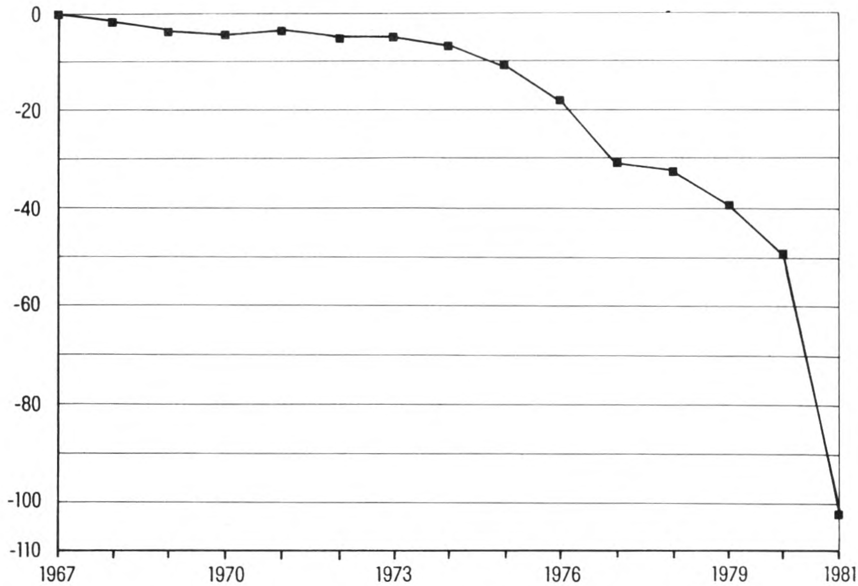

FIGURE 48 *Impacts on residential adjustment, Campbell County*

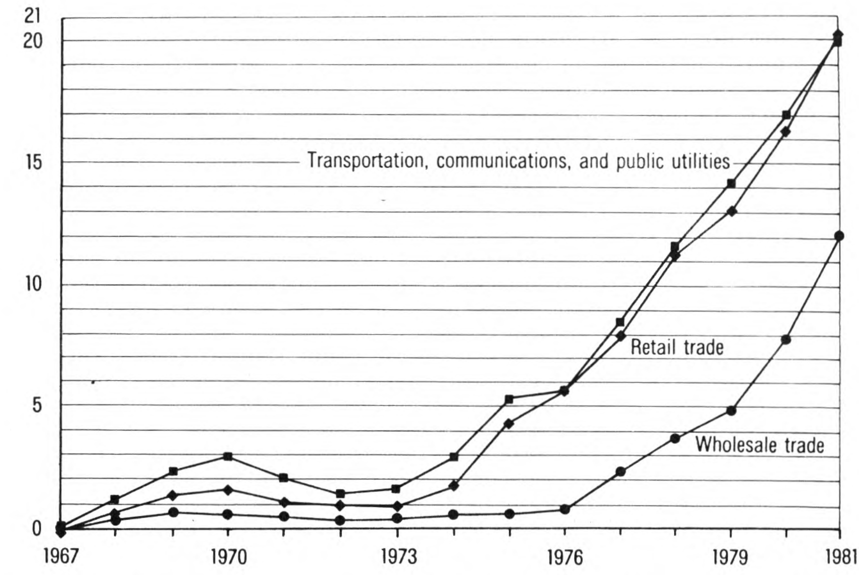

FIGURE 49 *Sectoral impacts, Campbell County: transportation, communications, and public utilities; wholesale trades; and retail trade*

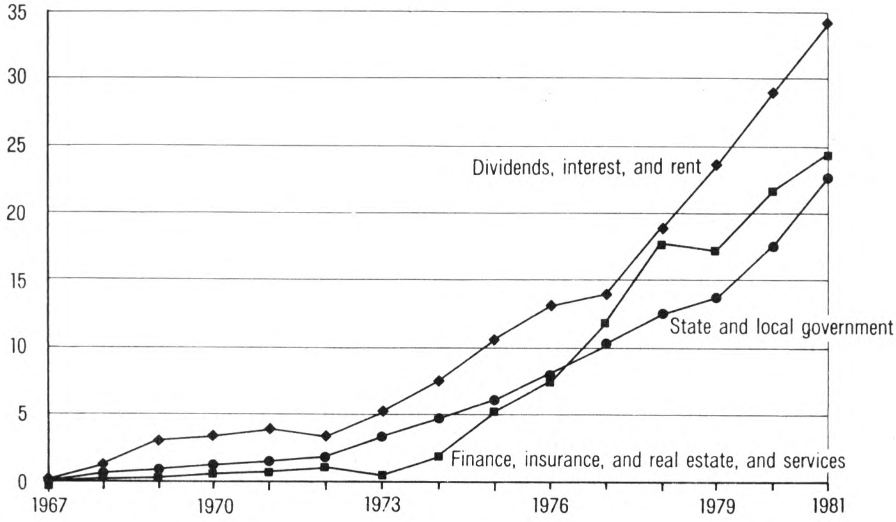

FIGURE 50 *Sectoral impacts, Campbell County: finance, insurance, and real estate, and services; state and local government; dividends, interest and rent*

A successful growth pole?

The boomtown scenario and the quasi-experimental method offer the opportunity to address an aspect of spatial economic development long discussed in the literature. Growth centers have the potential to spread growth to their hinterlands, or to retard it by drawing out both capital and labor. Policy in numerous countries sought to foster economic development by concentrating growth in selected places on the assumption that the growth would spread. Often it did not. Defenders of the concept have argued that government policy was too impatient and the infusion of investment into the growth center too shortlived to allow its spread. The energy boom in Campbell County affords the opportunity to examine the effect of its sustained growth on its adjacent jurisdiction, Johnson County.

Johnson County occupies 4,195 square miles along the southern end of Campbell County's western border. Its largest towns are Buffalo and Kaycee. Like Campbell, it is sparsely populated (1.65 persons per square mile in 1981) and spatially dominated by agriculture. In fact, a cluster analysis of counties that appeared to be similar to Campbell County prior to 1967 indicated that Johnson's economic development pattern from 1959 to 1966 most closely matched Campbell's. Oil exploration and some discoveries pushed Johnson County's population up by 13.2 percent between 1959 and 1966; but its population growth during the period of rapid growth in Campbell County was modest, increasing 15.0 percent between 1966 and 1981 to a total of 6,900 people. Their similar economic structures and histories between 1959 and 1966 explain why the same sets of control groups can be applicable for both.

To identify the impact of Campbell County's growth on its neighbor, the calculations are made using data for Johnson County and a selected control group. No data for Campbell County are used. The underlying assumption in this quasi-experimental approach is that the difference between the growth of Johnson County and its control group results from the proximity of Johnson County to Campbell County. The assumption would clearly be false if some other event unique to Johnson County had occurred during the boom period, such as the opening of a major manufacturer or construction of a major highway. None seems to have occurred.

Figure 51 shows steady growth in Johnson County's total income, but the calculated impact ranges between 14 percent and -19 percent of that income (Figure 52). It cannot be considered evidence of a spread of growth, particularly when considering that the nine-county control group had pre-test positive 'impacts' of roughly 15 percent of total income. Thus, the calculated impact and the pre-test noise level are of similar magnitude.

In such a case, one might expect the choice of control group to make a difference. Figure 53, however, shows that the three control groups predict similar impacts on Johnson County, with the exception of the twelve-county group from 1979 to 1981. It contains two counties that are inappropriate as controls for Johnson, which does not have similar energy resources. For Campbell County all the control groups show the same pattern (Figure 54).

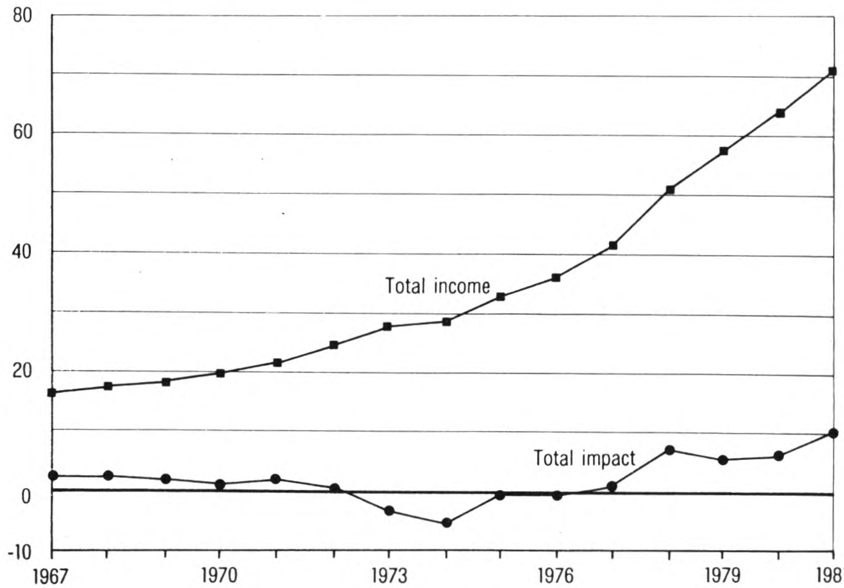

FIGURE 51 *Total income and total impact by year, Johnson County 1967-1981*

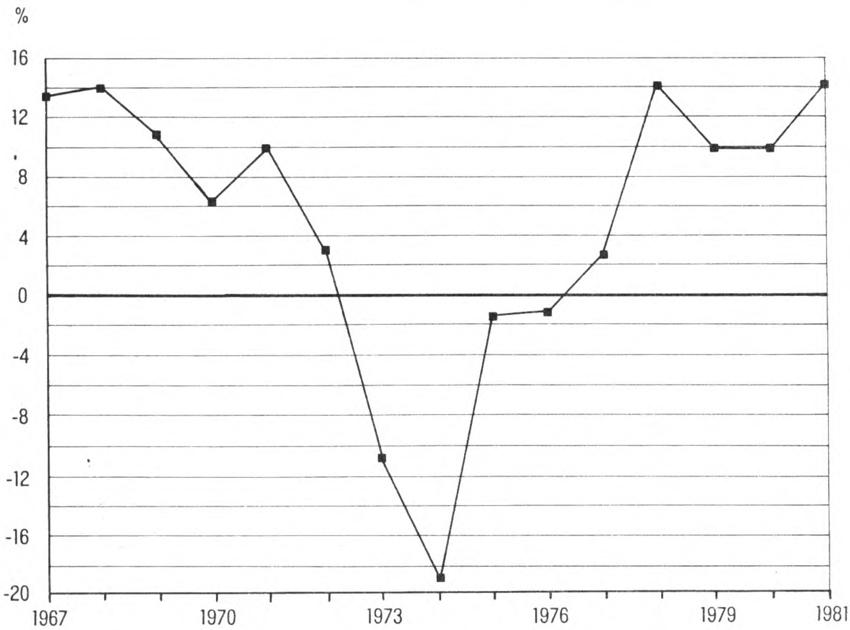

FIGURE 52 *Impact as percent of total income, Johnson County 1967-1981*

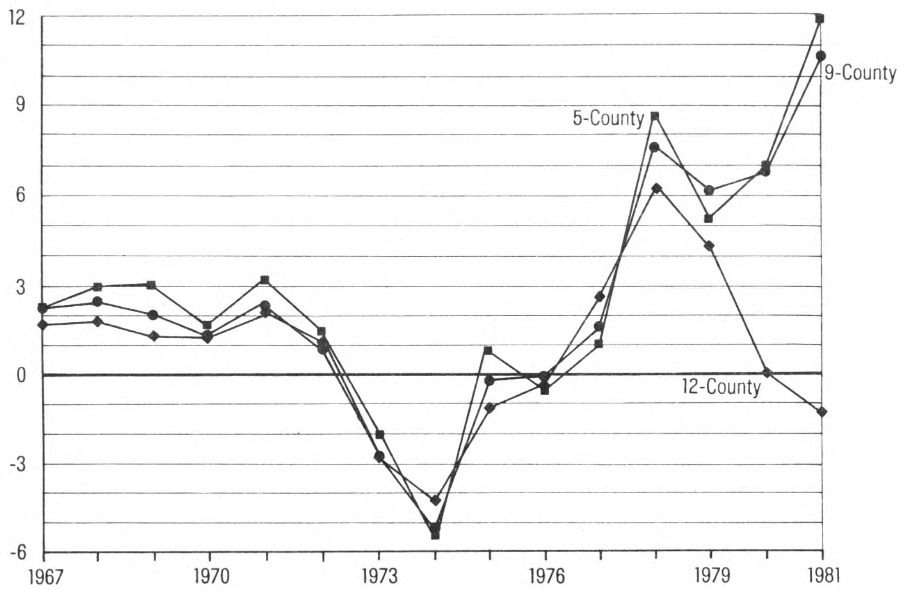

FIGURE 53 *Total impact, Johnson County: Alternate control groups*

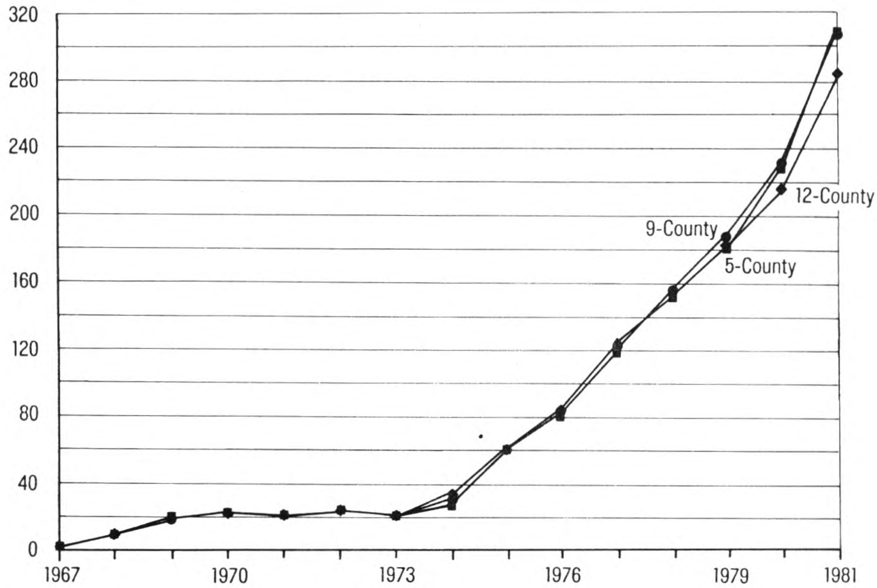

FIGURE 54 *Total impact, Campbell County: Alternate control groups*

Some sector-specific results for Johnson County are interesting (Tables 51 and 52). Services and wholesale trade, for example, which had good pre-test fits with the control group, had negative impacts for at least ten years each. The state and local government sector, which was overestimated in the pre-test, showed negative impacts from 1968 onward. These results mean that Johnson County fell behind its control group in those sectors, which quite possibly occurred because of the growth in all these sectors in Campbell County (Tables 50 and 53). Johnson County also had relative declines in mining and farming, which could be related to Campbell's emergence or which could be independent events. In contrast, two positive impacts are noteworthy: the influx of income to the county from its residents working elsewhere (residential adjustment); and through dividends, interest, and rent. The former has a high pre-test level, but the latter does not.

In summary, the Johnson County results are suggestive of further hypotheses. Campbell County may have spawned two countervailing effects on Johnson County's economy. It has harmed development of certain sectors, by becoming a higher-order place itself, but it has become a source of income and employment for Johnson County's residents. Positive impacts on Johnson County's service sector in 1978-81 may mean that the income effect will in time stimulate more growth and lead to an unambiguously positive total impact.

TABLE 51

STRUCTURAL IMPACTS IN JOHNSON COUNTY, WYOMING 1967—1981
NINE—COUNTY CONTROL GROUP, THOUSANDS OF DOLLARS

Sector	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
Farming	702	985	518	-146	1389	1346	-2053	-2540	-2039	-1313	-1507	-356	-2089	-3344	-6244
Agricultural Services	-2	76	21	23	30	-13	24	38	23	7	-17	-7	2	37	129
Mining	723	504	880	114	271	312	-47	-3310	-1019	-1905	-2739	827	-1291	-1455	2390
Construction	-12	221	-36	875	1	-1068	-427	633	3468	-120	-244	168	1063	224	-274
Manufacturing	49	-28	139	-87	-207	-198	-360	-653	-251	-510	-1041	-1267	-1233	-1403	-1244
Transportation, Communication, and Public Utilities	21	129	232	218	198	289	388	388	508	538	687	342	264	227	281
Wholesale Trade	-1	87	65	9	-19	-60	-56	-101	-471	-507	-558	-602	-646	-646	-442
Retail Trade	-37	43	118	290	260	127	-169	96	625	611	786	1111	1133	1159	1447
Finance, Insurance, and Real Estate	-19	19	42	6	91	294	153	126	176	481	429	555	688	779	864
Services	53	-117	-353	-250	-320	-420	-621	-618	-212	-274	-224	704	640	1187	1148
Federal Civilian	51	10	-38	-5	-40	-22	33	150	72	152	139	192	102	138	192
Federal Military	-12	-5	0	-12	18	3	-5	-4	12	17	-3	-1	0	4	-13
State & Local Government	153	65	-111	-306	-367	-452	-542	-659	-818	-854	-714	-608	-841	-423	-202
Residential Adjustment	-20	86	105	-25	71	-18	242	86	-1693	1489	4102	3027	4254	5071	6465
Dividends, Interest, and Rent	661	420	477	602	809	631	355	777	952	1481	1615	2431	2802	3792	4331
Transfer Payments	-39	2	-46	-15	6	12	89	177	244	338	501	718	875	972	1337
Total	2268	2497	2013	1291	2191	763	-2996	-5414	-423	-369	1212	7234	5723	6319	10168

TABLE 52

IMPACT AS A PERCENT OF TOTAL INCOME,
JOHNSON COUNTY

Sector	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
Farming	22.7	29.2	14.7	-4.1	29.7	21.3	-29.0	-88.2	-83.1	-100.6	-93.7	-8.5	-47.9	-167.3	-1132
Agricultural Services	-2.5	49.0	16.2	18.4	23.3	-12.7	15.2	19.6	13.6	4.2	-10.7	-4.1	1.1	16.7	38.1
Mining	46.7	37.3	62.6	12.9	32.7	26.7	-.9	-118.5	-32.9	-47.3	-81.0	15.2	-19.0	-15.1	22.6
Construction	-1.5	20.4	-3.8	447.9	0.1	-109.2	-32.1	26.9	63.1	-4.7	-8.4	4.1	23.1	5.9	-8.9
Manufacturing	9.2	-5.4	23.6	-14.3	-36.4	-31.5	-54.5	-77.5	-20.8	-37.7	-63.5	-109.8	-92.1	-90.9	-80.7
Transportation,Communication, and Public Utilities	6.4	28.2	40.0	35.9	31.6	36.9	40.9	38.2	44.3	41.6	44.5	23.4	15.9	13.1	15.4
Wholesale Trade	-2.1	31.0	23.0	3.8	-7.8	-27.0	-20.7	-30.9	-101.5	-105.8	-120.5	-120.4	-117.2	-100.5	-45.1
Retail Trade	2.5	2.7	6.4	14.1	11.9	5.8	-7.7	3.7	21.8	19.8	23.7	28.9	27.4	27.7	31.1
Finance, Insurance, and Real Estate	-6.2	5.1	10.2	1.4	16.5	37.4	22.8	18.8	22.3	39.4	33.3	36.4	38.6	39.3	39.1
Services	4.3	-10.3	-30.7	-19.4	-24.3	-28.8	-41.8	-37.1	-9.1	-10.4	-7.7	16.4	13.6	21.8	19.6
Federal Civilian	17.8	3.8	-17.1	-1.8	-14.7	-6.9	8.4	28.1	14.1	26.3	23.7	27.8	15.5	19.4	24.4
Federal Military	-30.0	-10.4	0.0	-20.7	18.2	3.2	-5.6	-4.5	12.5	17.2	-4.1	-1.3	0.0	3.8	-10.2
State & Local Government	-7.7	3.2	-5.4	-14.4	-16.4	-19.2	-21.2	-24.2	-27.1	-25.1	-18.1	-13.4	-18.4	-7.7	-3.2
Residential Adjustment	4.6	-21.4	-25.5	5.0	-19.9	5.3	-50.6	-10.4	62.9	501.3	163.6	237.6	248.3	219.1	185.4
Dividends, Interest, and Rent	17.3	11.1	11.9	13.8	16.7	12.1	5.9	107.7	12.1	16.5	16.2	20.5	20.1	22.5	21.6
Transfer Payments	-2.6	0.1	-2.6	-0.7	0.3	0.5	2.9	5.0	5.8	7.3	9.8	12.4	13.5	13.0	15.1
Total	13.5	14.1	10.9	6.4	10.1	3.1	-10.7	-18.8	-1.3	-1.0	2.9	14.2	10.0	9.9	14.3

TABLE 53

IMPACTS AS A PERCENT OF TOTAL INCOME,
CAMPBELL COUNTY

Sector	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
Farming	27.6	28.2	14.7	10.2	35.2	23.3	-61.3	-59.2	-12.1	-14.5	-149.0	17.9	23.4	6.9	-277.0
Agricultural Services	1.8	20.4	13.7	23.1	20.5	24.1	23.1	30.5	10.5	23.0	43.9	41.6	34.8	23.6	1.6
Mining	16.3	53.9	73.9	78.7	74.5	76.1	70.8	51.0	60.4	64.5	79.3	81.1	75.71	69.1	5.1
Construction	-4.8	53.8	73.0	79.7	56.2	64.2	70.2	73.4	87.3	90.4	93.2	88.7	92.5	93.3	97.0
Manufacturing	-2.5	26.3	34.9	4.7	24.6	25.0	50.1	36.2	72.1	73.9	79.3	78.1	79.9	80.1	83.1
Transportation, Communication, and Public Utilities	8.8	51.1	65.6	68.6	58.6	46.7	47.7	57.7	71.0	69.0	74.6	75.2	75.2	76.9	79.2
Wholesale Trade	4.1	45.0	55.6	49.3	42.6	32.1	34.8	34.8	20.7	26.6	47.1	55.1	59.4	68.2	74.9
Retail Trade	-2.5	13.3	27.6	32.1	23.0	21.1	17.6	26.7	49.3	53.3	61.2	67.9	68.9	73.5	76.3
Finance, Insurance, and Real Estate	-0,3	11.5	24.8	21.3	26.3	35.1	40.5	51.5	55.5	61.9	72.1	77.0	76.6	78.4	81.4
Services	-4.9	7.2	6.3	20.0	19.0	19.2	6.7	24.5	47.8	51.6	53.9	64.9	60.6	65.3	64.4
Federal Civilian	33.0	26.7	44.1	43.8	44.6	41.6	34.6	39.9	35.0	45.5	52.6	55.5	56.9	59.0	63.6
Federal Military	4.0	32.7	39.1	26.5	44.4	34.3	28.6	29.9	42.4	48.4	32.9	40.3	45.6	50.6	44.7
State & Local Government	12.5	28.6	36.2	40.1	45.1	49.2	61.1	66.4	69.1	72.5	75.4	77.0	77.3	80.1	82.3
Residential Adjustment	1.6	74.0	86.2	88.5	85.2	90.0	83.5	85.7	89.8	92.9	94.9	94.9	93.3	94.0	96.8
Dividends, Interest, and Rent	0.4	36.1	56.8	57.9	59.4	53.2	58.1	63.5	69.6	72.1	71.6	75.0	76.0	76.7	76.1
Transfer Payments	0.2	8.1	8.8	16.0	19.7	15.8	12.6	15.7	21.6	27.2	35.1	41.8	47.3	49.0	48.8
Total	8.6	30.7	44.1	47.4	42.7	40.7	31.7	40.7	55.7	61.7	70.5	71.0	70.8	69.7	73.1

Concluding observations

The quasi-experimental approach seems crude. Its basic premises as applied here are open to question. Why should a pre-test fit indicate an accurate impact study? How do we know that we have controlled for everything other than the issue of interest? These are troublesome points, but they should not be used to dismiss the method prematurely. Traditional methods of regional analysis have similar properties and weaknesses, and numerous scholars have expended considerable effort to overcome those weaknesses, rather than to dismiss the methods out of hand.

Quasi-experimental methods deserve more attention and serious evaluation because of their research potential. If we can develop them successfully, they can be used to test theories and for planning and policy applications. Some examples are described below:

Case 1. The State of Illinois requested an ex post assessment of the economic impacts of four dams constructed in rural areas of Illinois by the U.S. Army Corps of Engineers. The State was particularly interested in whether the substantial employment and income impacts, which were predicated by the Corps before construction, actually had been realized. The State's motivation was a pragmatic one. Proposals for additional dams were pending and had aroused considerable controversy.

Case 2. The Department of Defense provides aid to local communities suffering adverse effects from facility closings. The director of this office feels that ex ante economic impact studies drastically overestimate the actual impacts, thereby adversely affecting the community's expectations, business climate, and even future prospects. A series of ex post studies would help test the ex ante results and would generate information for planning and budgetary purposes on the actual impacts of facility closings.

Case 3. As noted, growth center theory holds that the spatial concentration of economic activity in part of a region eventually will stimulate growth of the entire region more successfully than if economic activity originally were dispersed. Several ex post impact studies like that of Johnson County can be used to measure whether diffusion from the center to the hinterland has taken place.

Case 4. The state of Wyoming instituted mineral leasing and severance taxes. Some of these funds are distributed to communities affected by the mining activity. An ex post analysis can document the impacts caused by the mining and, thus, be of value in deciding how to allocate the funds among communities.

Case 5. The state of West Virginia wishes to encourage tourism by creating additional state parks and facilities and also is considering construction of several electricity generation plants. Ex post impact studies of state parks and electricity plants that were opened in the 1960's could be used to examine concerns that these kinds of activities only have minimal effects on local economic development.

All these studies involve the comparison between places that have a particular economic change and those who do not. If we can develop better methods for selecting and verifying control groups and interpreting and evaluating the results, we shall be able to use quasi-experimental methods to improve our understanding of regional development, planning, and policy.

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INTRAREGIONAL CONNECTIONS OF AGRICULTURE IN RURAL SPACE

REZSŐ MÉSZÁROS

KEY-WORDS: *agricultural* associations, ~ production; *farm*, large-scale ~, modern ~, small scale ~; *garden-zone; Hungarian* agriculture; *innovation.*

The social and economic accomplishments that have occurred in Hungary over the last three decades have resulted largely from the successful implementation of a mature agrarian policy. Agriculture has been amongst the more dynamic branches of the economy since the mid-1960s. Its role has been upgraded as it has effectively contributed to the national food supply, as well as to balancing the budget and foreign trade deficit, which has fundamental importance to the development of the national economy. The basis of these results in agriculture stem from the *large-scale production* that comprises over 92 per cent of the cultivated area and accounts for two-thirds of total agricultural production.

The agricultural large-scale estates (state farms, agricultural co-operatives, and special co-operatives[1]) are concentrated ones with extensive lands that can apply advanced technics and technology in most branches. The level of this development can be considered high, and is the result of a characteristic development connected with a number of new phenomena. Hungarian agriculture is characterized by a multi-faceted constitutional structure. The various small-scale farms (household farms, complementary farms, granted land) and the agricultural associations of companies form an integral part of large-scale estates[2].

In the early 1980s there were 132 state farms, 1,338 co-operatives, 61 special co-operatives, and nearly 900 associations of companies in Hungarian agriculture. Twenty years earlier the number of state farms was 270; 4,200 were co-operatives; while the number of the special co-operatives exceeded 400. At that time no associations of companies yet existed. The decline in the number of large-scale farms was accompanied by an increase in the average agricultural area of the state farms, which doubled, and that of the co-operatives, which quadrupled. This process aimed at achieving the optimal scale of operation.

In the period of large-scale reorganization (1959-61), co-operatives of a small territory (300-400 ha) formed generally. To achieve a more favourable proportion of land and labour force, the so-called *territorial concentration*—being realized through the unification of large-scale estates—presented an adequate solution. This process accelerated in the early 1970s and can be considered to be essentially completed today.

It is interesting to know—also from a geographical point of view—how this process that has formed these agricultural organizations influenced the development of the settlements concerned: what are the interrelationships between the way farming is organized and the social mobility of communities.

(1) It is obvious that the large-scale estate, which enlarged in land through consolidation, is a *basically new structural element* in the rural scene considering the earlier small-scale and

even the initial large-scale conditions that followed it. In 1961, the average number of co-operatives per settlement was two, while today two-thirds of the co-operatives operate on the territory of two or more settlements. This system is characteristic of the regions with 'small-village' settlement networks (the western and southern part of Transdanubia and North-Hungary), but it is not rare on the Alföld (the Great Hungarian Plain) either, where villages with large areas are typical even though the 'one-village—one-cooperative' system is characteristic.

From the point of view of our subject, it is worth mentioning that the large-scale estate grew out of the frames of the settlement boundaries. Where one agricultural large-scale estate includes the agrarian space of more villages, a region develops in which the settlements also interlink functionally. The spatial connections between them basically are regulated by the agricultural production process. It can be said that *a new type of basic category* of the *economic spatial structure* has developed here, which is formed by agrarian development, the future of which depends also on agricultural organization. (Generally, no other significant economic sectors in the settlements of such a spatial unit exist).

(2) In the period of reorganization, the cooperation of the large-scale estates with the aim of production was only occasional and of low standard. The technical and managerial stabilization of the farms facilitated them to introduce innovations. This process can be well followed through the spread of the *production systems*[3]. The production systems represent the most common integral form in Hungarian agriculture. Their development and spread occurred as a boom. No examples in socialist agriculture are available for surveying and adopting a solution of development at such a fast rate as that accomplished by the farms in the case of the production systems.

At the beginning of the expansion of the systems, most of the large-scale estates were unable to elaborate a new system. In this way, fairly large geographical distances developed between the farms owning the systems and the partner farms. Later, more and more large-scale estates undertook the elaboration of a system. (At present, 70 production-systems operate). Thus in the early 1980s a situation developed in which the farms owning the systems competed for the attraction of the partner estates, while on the other hand the production-system of certain crops was worked out by more and more large-scale estates. Consequently, two phenomena became very definite in the relationships of the farms owning the systems ('system masters') and the partner farms ('model farms'):

—most agricultural farms (especially co-operatives) co-operate with more than one 'model farm' in their various activities; in this way agriculture formed an extremely strong and multiple inner system of relationships in which regional connections became very significant.

The effect of production systems can be followed in the development of villages. The production of a high quality system is an important local factor in the transformation of rural society.

(3) The broad appearance of *secondary activity*[4] is a very characteristic feature of the development of large-scale agriculture, which evidently took place after and as a consequence of the introduction of the New Economic Mechanism (1968). (The reform urged the affirmation of large-scale farming). The secondary activity had achieved such good results by the late 1970s

that every fourth Forint of the production value of the state farms and every third Forint of the co-operatives—produced in common farming—derived from the secondary branch. In this way secondary activity became one of the main branches of large-scale farming. At present, the necessity of this activity is not argued; it can be considered to be an integral part of farming. What does this mean for the territorial connections of the large-scale farms? Are they strengthened by the new activity?

In theory, the spatial connections of secondary activities take two directions. One remains the agrarian basic activity and the rural settlements. The other direction provides links with outside economies and societies, either with a city within the region or with a distant one. In practice, the secondary activities cover service and building industrial functions satisfying the individual and communal demands in the village, as well as the similar requirements of the agricultural large-scale estate. They involve, also, industrial production based on contract with an industrial company. Accordingly, in some places agricultural large-scale estates are an integral economic organization of rural space that plays a complex spatial organizing role through its agricultural service and industrial activity. The stable secondary activity also strengthens the ability of rural space for holding back out-migration of the population. Its presence creates a wider scale in the sectoral structure of activity that retains a part of the rural but non-agricultural labour force; moreover, it draws the labour force from the settlements within its local environment. The agricultural organization that operates the secondary branch also will likely be wide-spread and, among others, will be one of the decisive carriers of spatial connections of intraregional agriculture.

(4) The various *small-scale* farms are typical elements of Hungarian agriculture, accounting for one-third of the total production of agriculture. The number of small-scale farmers is over 1.5 million, with the circle of the participants in this activity including almost all strata of the population.

Small-scale farming formed an extremely strong micro-relation- system through its connections with the large-scale farms and by means of advisable sectoral division of labour. The essence of this integral system is that the large-scale farm supports the small-scale farm by providing machines, seeds, and livestock and by purchasing their products as guaranteed under contract. They deduct the exchange value of the services provided by them from the returns, then pay what remains to the small-scale farmers. The goods produced beyond the contract are sold on the free market. Small-scale farming is thus a significant resource for gaining extra family income.

Small-scale farming will undoubtedly survive for a long time. The expansion of the division of labour presents a good possibility of further development. It seems to be advisable to organize the whole process of agricultural production in such a way that the large-scale estates should undertake only those tasks in which concentration, mechanization, and organization is more advantageous. The small-scale farmers are to be drawn into the working processes requiring greater flexibility and considerable manual labour. In this approach, the small-scale production of an enterpreneurial nature can increase. Examples show that a part of the household and complementary farms extended their activities to such an extent that they may well be considered as independent agricultural enterprises. This distinctly free-market type of small-scale production also enjoys the large-scale background (this kind of activity is helped by the large-scale farms through hiring out machinery).

As small-scale production attracts great masses of society, it is very likely to influence the spatial mobility of the local population. The vegetable garden adjoining the house has always been a characteristic feature of the morphology of the Hungarian village, and earlier its main purpose was subsistance farming. In the last fifteen years, however, it has become commercialized, especially in the case of difficult-to-obtain vegetables (primeur), flowers, and small animal husbandry. The new rural houses also bear this functional, morphological mark.

The interior agrarian space of the village is not a negligible sector of agricultural production considering its volume and the steady demands for its goods in the market. For this reason, building housing complexes in villages in large numbers causes tension. Although the inhabitants of these buildings are typically employed in the non-agricultural sector, they still express a desire to participate in farming, at least at the garden-level (80 per cent of the rural families do small-scale farming). But since these gardens cannot be linked to the housing complexes, they fall out of the inner area and form an *exterior garden-zone* that is not united.

The appearance of *urban* tenants in the exterior garden-zone in the past few years deserves attention. The reason for this is that demand for 'hobby gardens' in large cities increased to such an extent that it cannot be satisfied from the agricultural area of the city. Therefore, the villages around the city leave an increasing part of their exterior garden zone in the hands of the tenants from the city. (For instance the neighbouring villages of Szeged sold or rented out more than 6000 hobby gardens to the inhabitants of the city in the past two years). There is a significant difference between the two types of gardens. The garden of the villagers is decisively 'commercial' while that of the city dwellers—in the same area—has more functions: it serves as a weekend recreational plot for self-consumption, and in some cases (and to a smaller extent) it produces for the market. The 'city garden' spreading in rural space is undoubtedly a novel element of the relationship between the village and city, regulating the weekend activity and spatial mobility of growing masses of urban society.

A part of the small-scale activity is therefore closely linked to the place of living, while the other part is not. Certain stages of the process of production (preparation of the production and marketing of goods) are either linked to the central settlements of the large-scale farms or to nearby or distant markets. This characteristic spatial order of small-scale agriculture of rural space basically determines the economic spatial connections—besides the main working hours—of rural society of working age. Through the operation of small-scale farming, farming has become a daily economic activity of a large percentage of the families whose main occupation is non-agricultural.

(5) The latest programmes of intraregional relation-system of agriculture have been formed by the joint *agricultural enterprises* that have been rapidly increasing in numbers in recent years. They are established by the agricultural large-scale farms and industrial and servicing companies for various purposes related to the food economy. For instance, milk processing and circulation, agro-chemical service, poultry-incubation, fattening of pigs, processing of fodder crops, meat processing, commercial activity supplying the city, repairing agricultural machines and agricultural building activity, etc. The field of operation of the joint enterprises includes an area adequate to the total of their capacity (generally equal to the area covered by 5-10 large-scale farms). It is important that they form units of space within the region.

Summary

(1) As a consequence of the expansion of farming organizations, activities, and spatial connections, the agrarian spaces—being next to each other like mosaics and linked almost exclusively to their settlements—interlink more and more. This process of integration provides a new formal frame and meaning for the structural, social, and settlement development of agrarian space.

(2) The intraregional spatial connections of agriculture are flexible and change quickly, but their system has certain hierarchical marks. The *first (basic) level* of agrarian connections is the agrarian space of a large-scale farm (including the farm, the settlement, and the local society). The *second (regional) level* is formed by the co-operation of the large-scale estates—within a particular region—with each other and with other units of the economy (these can be definable spatial units or any large-scale farms). The *third (intraregional) level* is formed by the spatial connections of intraregional co-operation brought about especially through production systems and trading.

Notes

[1] *State farm:* a socialist agricultural large-scale estate in which land and other means of production as well as agricultural goods produced are in state ownership. *Agricultural co-operative:* a socialist agricultural large-scale farm formed by voluntary personnel and financial association of its members. *Agricultural special co-operative:* a simpler type of agricultural co-operative. It has a double function: in one or more branches of agricultural production it runs collective large-scale farming activities; while on the other hand it supports private farming—in accordance with the aims of the co-operative—of its members.

[2] *Household farm:* a kind of complementary farm of the members of the agricultural co-operatives. It forms an integrated economic unit—based on the division of labour—with the collective farming of the co-operative. *Granted land:* land granted free for the use of workers in certain areas or fields of activity. *Complementary farm:* a type of farm worked by those people who are not members of the co-operative—but mostly workers, employees, intellectuals—and who produce some agricultural goods and who make a use of it as a weekend plot. *Association:* large-scale co-operation based on contract with the aim of production.

[3] *Production system:* a system in which all the most effective biological, chemical, and technical materials, equipment, and methods are united in a particular technology that is determined by industrial methods in some branches of agriculture. The partner (joining) farms contract with the farm owning the system, paying a certain per cent of the profit to the owner farm.

[4] *Secondary activity:* the activity of the large-scale farms run besides agricultural production with the aim of expanding the range of production profile (the processing of agricultural or other industrial activity, goods, marketing, and servicing).

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STRATEGIC REGIONAL PLANNING, A PORTFOLIO MODEL OF REGIONAL DIVERSIFICATION, AND REGIONAL BENEFIT-COST ANALYSIS

ROGER BOLTON

KEY-WORDS: *benefit*-cost analysis; *Markowitz* diversification; *policy* analysis; *portfolio* analysis; *regional* planning; *'strategic* planning' ~; regional policy'; *uncertainty.*

*Introduction**

It has become fashionable to talk about 'strategic planning' for regions or 'strategic regional policy'. The idea is that some of the decision-making models developed for firms and households can be applied to regions, in the sense of guiding decisions by regional governments, or by national governments that are taking regional differences into account in making national decisions.

In an earlier paper (Bolton 1985), I discussed in a general way some possibilities of application to regions of such models originally developed for firms and households. I concluded that the notion is worth considering, but the differences between regions and other economic units are very great and they limit general applications. I also explored at some length how one particular model for strategic planning by a household, the Markowitz portfolio model, may be used in regional planning.

In this paper, I go into detail on one specific application of the Markowitz portfolio model: the evaluation of a potential new 'asset' in a region, such as a major new industry or public works project. Although a number of economists and regional planners have urged that the portfolio model be used in regional planning, none has—to my knowledge—suggested the particular application that I outline here. It is, however, a natural one to consider, for one of the strengths of the portfolio model is the help it gives in evaluating a new asset that the portfolio holder does not now own, but is considering adding.

In order to lay the groundwork properly for the application, I must repeat in condensed form some of the basic theory outlined in earlier papers. I do that in the first part of this paper. In the second, I describe the application to the evaluation of a new industry or project.

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THE BASICS OF THE PORTFOLIO MODEL

In this part, I summarize the basic portfolio model of decisions by a household, and outline how it might be applied to a region. For present purposes, I am ignoring various difficulties in doing this, and the very necessary cautions that must be kept in mind, which were discussed in earlier papers (Bolton 1983, 1985).

The optimal portfolio selection model (Markowitz 1952, 1959) guides an investor's strategy to reduce instability (in the sense of *unexpected* fluctuations) in income. The application of portfolio analysis has already attracted some attention in the regional economics literature (Barth—Kraft—Wiest 1975; Brown—Pheasant 1985; Conroy 1974, 1975a, 1975b; Jackson 1984; St. Louis 1980; Prosperi—Sjursen 1980; White—Chou 1980; for a review of such literature, see Bolton 1983). However, in my opinion, previous applications have been too limited in the types of real income and the sources of risk allowed for. Nor has the portfolio approach been used in evaluating proposed new public and private investment projects in regional benefit-cost analysis. That is in spite of the fact that the approach seems, a *priori,* highly suitable for the evaluation of a new asset that is proposed to be added to an existing collection of assets.

The welfare economics basis for a regional government's concern with diversification is clear. First, *individuals'* welfare is affected by unexpected variability in the provision of local public goods. Thus, a regional government should be concerned with the trade-off between the expected value and variance of real income created by its public goods production, similar to the way individuals are concerned with the trade-off between expected value and variance of private income.

Second, a regional government may be able to reduce instability in private income more effectively than individuals can achieve on their own (e.g., by private insurance or financial asset diversification). It may be able to do this through various policies on infrastructure, incentives to private employers, tax structures, etc.

There are many sources of instability in regional income. One source is the national business cycle. Another is the whole array of region-specific cyclical causes. The increasing integration of the world economy and capital markets broadens the range of unexpected events that affect a region. In some regions, dependence on unstable energy and other natural resource markets is a cause. Instability in private incomes may be aggravated by fluctuation in public goods output, because public goods are financed by taxes on private incomes.

The portfolio model of an individual investor

An investor has some amount of wealth, K^*, that she can invest in one or more of N capital assets. There are constraints—maximum or minimum amounts—on the amounts she can invest in some assets. Each asset i has a known probability distribution of rate of return, r_i. Her utility is a function of income from the assets over a single period; she maximizes expected utility, and she is risk averse. I assume her preferences can be described adaquately by two parameters of the probability distribution of income, the expected value, $\bar{r}$, and the variance, σ^2. Recent work has shown that this traditional assumption is a surprisingly good one, so I maintain it in this exploratory effort[1].

A portfolio of assets has mean return, $\bar{r}_p$, and variance, σ_p^2

$$\bar{r}_p = \sum_i x_i \bar{r}_i \tag{1}$$

$$\sigma_p{}^2 = \sum_i \sum_j x_i x_j \sigma_{ij} = \sum_i x_i^2 \sigma_i^2 + \sum_i \sum_{j \neq i} x_i x_j \sigma_{ij} \tag{2}$$

where: $x_i = K_i/K^*$, the proportion of K^* invested in asset i ($\sum_i x_i = 1$), and, in the basic model, $0 \leq x_i \leq 1$ for all i and σ_{ij} = the covariance of returns between asset i and asset j. All sums run from 1 to N unless otherwise indicated. An omitted asset has $x_i = 0$.

Portfolio variance is the sum of all N^2 terms in the following symmetric covariance matrix:

$$\begin{array}{ccccc}
x_1^2\sigma_1^2 & x_1x_2\sigma_{12} & x_1x_3\sigma_{13} & \ldots\ldots\ldots & x_1x_N\sigma_{1N} \\
x_2x_1\sigma_{21} & x_2^2\sigma_2^2 & x_2x_3\sigma_{23} & \ldots\ldots\ldots & x_2x_N\sigma_{2N} \\
x_3x_1\sigma_{31} & x_3x_2\sigma_{32} & x_3^2\sigma_3^2 & \ldots\ldots\ldots & x_3x_N\sigma_{3N} \\
\cdot & \cdot & \cdot & \cdot & \cdot \\
\cdot & \cdot & \cdot & \cdot & \cdot \\
x_Nx_1\sigma_{N1} & x_Nx_2\sigma_{N2} & x_Nx_3\sigma_{N3} & \ldots\ldots\ldots & x_N^2\sigma_N^2
\end{array} \tag{3}$$

The matrix describes the essential structure of the portfolio as far as risk is concerned. Later I'll suggest that a similar matrix for a region is an important description of its economic structure. One possible application is to define a region's 'assets' as its *industries,* with the labor earnings in each industry being the 'returns'. A more sophisticated, but very much harder empirically, application is to add other assets, such as public goods, natural environmental assets producing nonpecuniary environmental quality returns, etc.

One asset's 'contribution to risk', or simply its 'risk', in a portfolio is defined as the sum of either its row or its column (the two sums are identical):

$$\text{risk of asset i in portfolio} = x_i[\sum_i x_j\sigma_{ij}] = x_i[x_i\sigma_i^2 + \sum_{j\neq i} x_j\sigma_{ij}] \tag{4}$$

An asset's risk depends on its own variance and on characteristics of all the other assets in the portfolio; this insight is at the heart of the portfolio approach, and is useful in regional benefit-cost analysis: the risk of a proposed project is a function not only of its own variance, but also of its covariances with existing sources of income.

Markowitz diversification

In Markowitz diversification, the investor consciously seeks out low and negative covariances in order to minimize σ_p^2 for any given $\bar{r}_p$. The first asset he chooses will be the one with minimum σ_i^2 of all those having $\bar{r}_i$ equal to his target $\bar{r}_p$. He will add other assets only if he can find ones that reduce σ_p^2. There is a limited number, however, of assets that have low or negative covariances with other assets, so the Markowitz diversifier cannot continually reduce σ_p^2 and still maintain the $\bar{r}_p$ target.

The risk-return trade-off

The trade-off between risk and return under Markowitz diversification is a crucial concept in portfolio theory. If there are many assets in the available set, all possible portfolios are represented by the area in Figure 55; each point in the set indicates a portfolio. The relevant opportunity locus is EE', and is called the efficiency frontier or Markowitz frontier. It is generated by choosing through quadratic programming the optimal set of x's to minimize σ_p^2 for each possible $\bar{r}_p$. The efficiency frontier is analogous to the budget line in consumer theory.

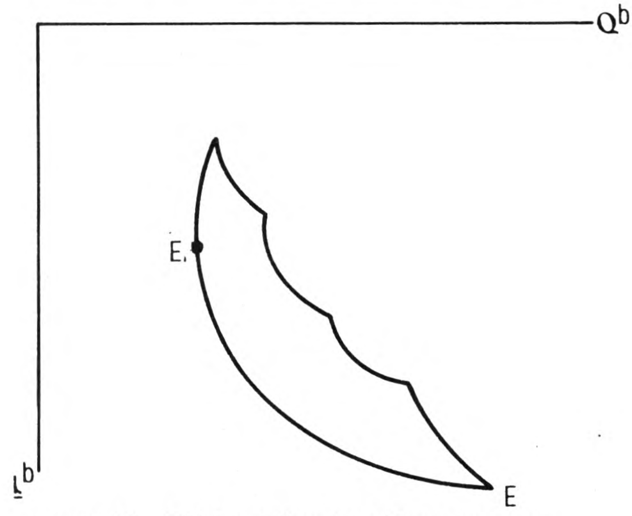

FIGURE 55 *Efficiency frontier with many assets*

In any regional application, constraints are crucial and introduce essential realism into the application. They reflect indivisibilities, nonmarketable 'assets' that produce real income in the region but cannot be changed by the government, fundamental limitations on the ability of a government to affect the distributions of private income from various kinds of industries, and distributional constraints. Policymakers may try to keep an existing employment source, for example, or existing assets producing public goods, at a certain level in order to protect a group of workers or other residents.

Gathering the data for the analysis is a formidable task. There are N variances and $(N^2 - N)/2$ different covariances. In security analysis, one can sometimes justify simplifying assumptions. For example, in the 'index model', the covariance matrix has a simple structure: each asset's returns are a linear function of one or a few indexes that are economic variables, which systematically affect the returns on all assets. In the single index case:

$$r_i = a_i + B_i R + e_i \tag{5}$$

where a_i and B_i are constant for each i, R is the index, and e is a random error term. If $\bar{e}_i$ is zero, and covariance (R,e_i) and all covariances (e_i,e_j) are zero, then

$$\bar{r}_p = a_p + B_p\bar{R} = \sum_i x_i a_i + [\sum_i x_i B_i]\bar{R} \tag{6}$$

$$\sigma_p^2 = B_p^2\, \sigma_R^2 + \sum_i x_i^2\, \sigma_{ei}^2 \tag{7}$$

Now one needs only 3N + 2 parameters: N values of a, B, and σ_{ei}^2, and $\bar{R}$ and σ_R^2. If the portfolio has many assets, the second term in (7) becomes small and, if one ignores it, one needs only 2N + 2 estimates.

This model seems less useful in a regional application, because the assumptions about covariances are less reasonable. Some empirical investigation is warranted, however, perhaps using the nation's or a larger region's income as the index; see Brown—Pheasant 1985.

For an individual investor, the portfolio approach is useful in several ways, and these turn out to be relevant for the region as well:

a. The covariance matrix describes important characteristics of the portfolio; for a region, it describes the region's economic structure;

b. The normative model of Markowitz diversification provides a standard of achievement in effective diversification, *independent ofpreferences.* If an individual is unwilling to articulate his preferences between risk and return, the distance between his actual portfolio and the efficiency frontier is nevertheless a useful measure of the effectiveness of diversification; see St. Louis 1980.

c. If the individual *does* have clearly articulated preferences between risk and return, then the distance between the actual portfolio and the optimal point (tangency between the frontier and an indifference curve) is also a useful measure.

Special problems of a regional application

Certainly, the model will have to be adapted in application to a regional government. A region is definitely not an individual investor, and many of the differences are quite obvious. However, some remarks particularly relevant to the application of a portfolio model to a region are the following.

I believe that it is valid in exploratory research to think of a single decision-maker at the regional level, one who maximizes expected utility of total real income received by the region's residents. It is easiest, and quite adequate in initial explorations, to think of industries as the assets, and income earned in the industries as the 'returns'. But a good regional model should add public goods and ideally environmental benefits. One might be able to incorporate tax bases as proxies for public goods (see Bolton 1969, 1983, 1985).

How useful the model is depends a great deal on how realistically we can model the *constraints* on the decision-maker. Unfortunately, previous research in regional economics and public finance seems to give little guidance in formulating such constraints. If the constraints are specified correctly, then the distance from actual portfolio to the frontier is a useful measure even for a region.

Although there are many constraints, in one sense a regional planner has more discretion than the financial investor has. In the financial model, the investor is a pure price taker: he accepts the $\bar{r}_i$, σ_i^2, and σ_{ij} as beyond his control. All he can do is to buy and sell assets. Many regions, however, have industries that are not price takers, so policies can affect the parameters of the probability distributions of income.

All this complicates the application of portfolio analysis enormously. It may mean that early efforts in applying the model will have to be crude, and also have to be limited to specifying only a few points on the efficiency frontier. It will also be difficult to reflect income distribution concerns; again constraints must be specified correctly.

The portfolio model has an important feature in common with other mathematical programming models: it can show the shadow price of a constraint, and that may be an especially important result of the exercise.

Estimating means and variances and covariances

The question arises: How does the decision-maker make estimates of means, variances, and covariances? Presumably she will look at past history of variability; the trick is to separate out the expected variability—for example, trend growth and a regular cycle—from the unexpected.

In some current empirical work, I am experimenting with simple trend-cycle equations for each industry, using the variances and covariances of the relative deviations from trend-cycle as inputs into the portfolio analysis. The trend equation itself gives the expected level of income, analagous to the expected rate of return. I reported some preliminary results in Bolton (1986).

EVALUATION OF A POTENTIAL NEW ASSET

Regional benefit-cost analysis is used to evaluate proposed new assets in a region, such as industrial plants, public works, and environment-augmenting public assets. Refined methods have been developed to measure the change in regional real income under certainty, and, more recently, to measure the expected value of an uncertain change. Major examples are analyses of industrial plants, in which the analyst balances expected values of damages from recurring pollution, or occasional oil or waste 'spills', against expected money income (Stokes 1982).

The portfolio variance approach is valuable in such benefit-cost analyses, but it is not used. Even if one recognizes uncertainty, one does so only to compute the expected value. For example, in evaluating an industrial development or a transportation facility, one may allow for uncertain demand, but only to calculate the expected value of benefits, and perhaps the variance, but no covariances with assets already in the region. In evaluating petroleum or hazardous waste facilities, one may look at probabilities of spills and compute the expected value of environmental damages, and one may even consider the variance, but not covariances with other activities.

Such an analysis may be very incomplete. For example, Stokes (1982) analyzed the effects of oil transport and refining facilities to be located on Puget Sound in the State of Washington in the U. S. He compared expected value of spill damages to regional income, which he assumed to be certain. He ignored variances and covariances, even though the facilities might have a significant risk-reducing effect, because of negative covariances between environmental quality and local income and tax revenue, for some regions bordering the Sound.

Although an improved version of regional benefit-cost analysis has barely begun, it may be useful at this point to develop very formally some of the underlying theoretical principles. I conclude this paper with such a development.

The basic question may be stated thus:

Assume a region has an efficient portfolio, A, of N assets. They may be industries, or other assets like individual factories or other 'projects' or 'industrial complexes'.

Now, a wholly new project or complex, B, becomes available as a possible addition to the portfolio. If added, B would be the N + 1st asset. The question is whether the decision-maker should choose to invest in B, that is to add it to the region's portfolio. The answer depends on many things, including the region's freedom to reallocate its portfolio and the maximum amount of investment it can make in B. I analyze a number of specific cases.

Case 1

In this case we assume:

—The region keeps the size of its total portfolio unchanged at K* ($K^* = \sum_i K_i$); this means that if B is added, it must *replace* one or more existing assets;

—It can invest any amount in B, and it is free to change any and all x's, which are the shares of the portfolio in each asset. It can start over, in a sense, and solve a new maximizing problem.

The decision-maker needs N + 2 pieces of new information: $\bar{r}_B$, σ_B^2, and the N covariances between B and each of the N existing assets. (I assume that the presence of B in the portfolio would *not* change the σ_i^2 and the σ_{ij} within the collection of previous assets.)

The region will re-solve the portfolio problem to see whether adding B increases expected utility. Call the new portfolio C. It may or may not include B; if it does not, C will be identical to A.

I will call the N assets in the old portfolio, A, 'old assets'. I'll also use this notation:

K_i = amounts of old assets *in A;* i = 1 ... N
K_i^c = amounts of old assets *in C;* i = 1 ... N
K_B^c = amount of B in the new portfolio, C;

The constraints for the maximization problem are as before:

$$0 \le K_i \le K^* \text{ for all i} \tag{8}$$

$$0 \le K_B \le K^* \tag{9}$$

$$\sum_{i}^{N} K_i^c + K_B^c = K^* \tag{10}$$

If the solution for K_B^c is zero, B will not be included in C. Furthermore, C will be exactly the same as A, under the assumptions made. If $K_B > 0$, then $K_i^c < K_i$ for at least one old asset. However, it may be optimal to invest *more* in some old assets than it was in A, in order to exploit low σ_{iB}, a low covariance between the new asset and some of the old assets. If so, then $K_i^c > K_i$ for those old assets. Asset B is more likely to be included if it tends to have low covariances with old assets, and those old assets are likely to have $K_i^c > K_i$.

If there is an upper limit, K_B^*, on investment in B, then K_B must be constrained: $0 \le K_B^c \le K_B^*$. Otherwise the procedure is the same.

This case 1 is not completely realistic. It is more realistic to assume that the region cannot reshuffle all assets. Those constraints on K_i^c's must be reflected in the new portfolio. I turn now to a more realistic case.

Case 2

An interesting and somewhat realistic set of constraints might be approximated by the following assumptions:

—The region maintains the total size of portfolio at K^*;

—It invests in B some amount, K_B, to be determined, up to a maximum of K_B^*, and thereby invests $K^* - K_B$ in the old assets;

—If the region decides to reduce old assets in order to make room for B, it reduces all of them in the same proportion.

In this case, the region can model the choice as between just two assets: one is a collection of old assets in the same proportions as in A and the other is the single asset B. I'll refer to the old collection as A, although the total size of A may change in the new situation. The reasons the choice is a two-asset one are these: the amount, $K^* - K_B$, to be invested in A remains to be determined, but whatever that amount is, each old asset will have the same proportion of the new A as it did of the old A; therefore, $\bar{r}_A$ and σ_A^2 are unchanged even when A is combined with B in C, because they are functions only of the x's within A and of σ_i^2 and σ_{ij}, which are also assumed unchanged.

Formally, the region chooses K_1^c, K_2^c, ..., K_N^c, K_B, subject to:

$$0 \leq K_B \leq K_B^* \leq K^* \tag{11}$$

$$K_i^c = (\sum_i^N K_i^c/K^*)K_i \text{ for all i (proportional reduction)} \tag{12}$$

Actually, only K_B is free to be chosen. Given K_B, all N values of K_i^c are determined by (12) (and that is sufficient to determine $\bar{r}_C$ and σ_C^2).

If it happens in the new solution that $K_B = 0$, then the new asset is ignored, and from (12) we see that all $K_i^c = K_i$ and so nothing at all changes. The fact that $\bar{r}_p$ and σ_p^2 don't change in that event depends directly on the assumption that the appearance of B affects no variances or covariances in the old assets.

Case 2 is particularly easy to diagram. In Figure 56 are both the Markowitz efficiency frontier and indifference curves between expected return and risk. Indifference curve U_o shows the initial level of welfare. Both the original A and the new A (as part of C) are at point A, because nothing that happens changes the location of A. A move away from A toward B on line AB represents an increase in x_B ($=K_B/K^*$) from zero. But the region can move only part way (shown by the solid part) on AB because x_B cannot exceed K_B^*/K^*. Clearly the possibility of adding B may or may not improve welfare; given the indifference curves in Figure 56, it does. It is more likely to do so the higher is $\bar{r}_B$, the lower is σ_B^2, and the lower is σ_{AB}.

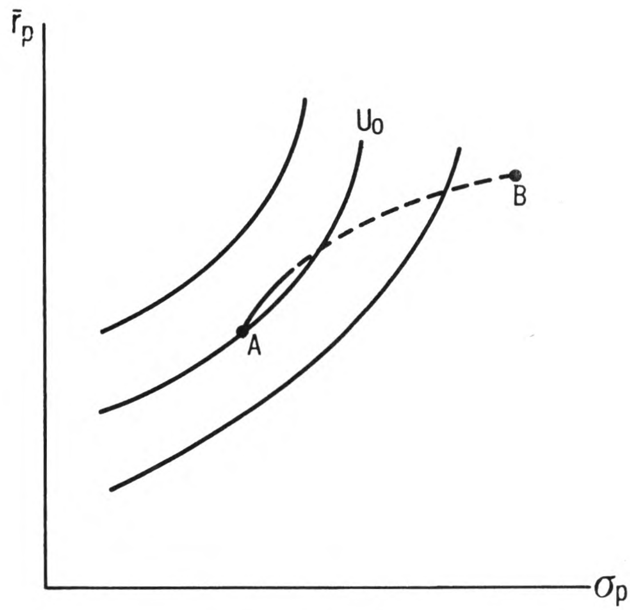

FIGURE 56 *Case 2*

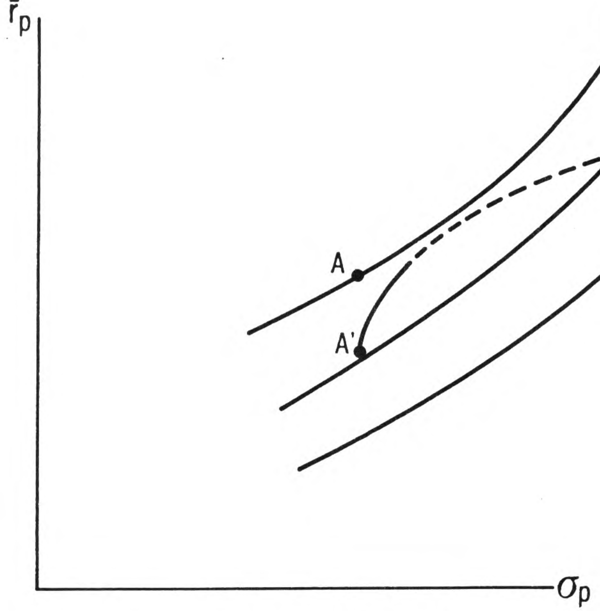

FIGURE 57 *Case 3*

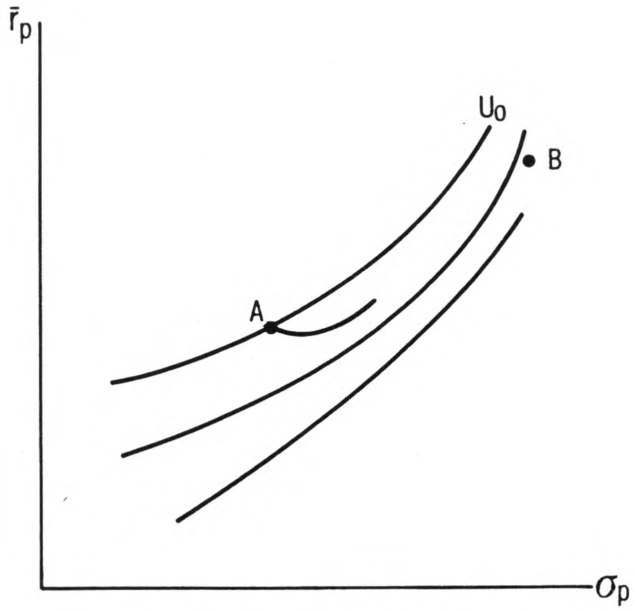

FIGURE 58 *Case 4*

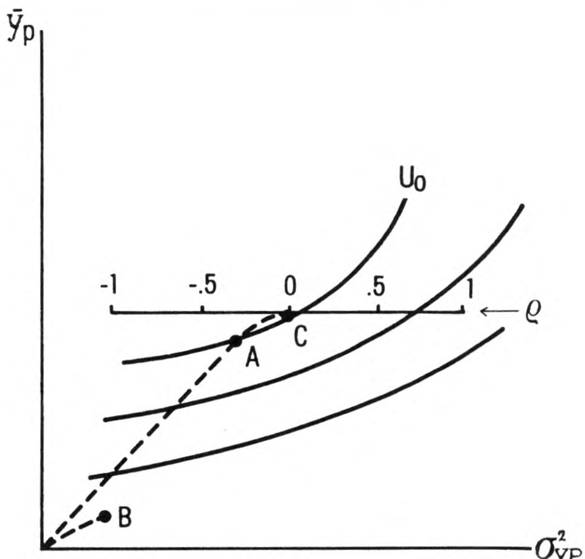

FIGURE 59 *Case 5b*

Case 3

Now consider a complication. If B is a wholly new asset in the economy, it may well affect the probability distributions of the old assets, because of various general equilibrium connections, or perhaps tax base effects or environmental effects.

Such connections are ignored in expositions of financial portfolio theory, but they must be considered in a regional application. Even if a region cannot or will not shuffle existing assets freely, the appearance of B requires a more complicated analysis than the one in the previous case.

In principle, the portfolio problem must be re-solved, incorporating the changes in $\bar{r}_i$, σ_i^2, and σ_{ij}. Little is gained by restating the problem in formal terms. Diagramatically, we can show possible effects in Figure 57, where for simplicity I assume *Case 2 holds* except that the appearance of B decreases $\bar{r}_A$ but does not change σ_A^2. (An increase in $\bar{r}_A$ or a change in σ_A^2 can be easily incorporated.) A is the original portfolio, A' is the original collection of assets after its $\bar{r}_A$ has been changed by the appearance of B. Line A'B shows the theoretical possibilities, but only the solid part is relevant due to the limit on K_B^*. In Figure 57 the parameters are such that welfare is not improved, but the contrary is possible.

Case 4

In Figure 57, the change in $\bar{r}_A$ is independent of K_B, the scale of investment in B. Now I alter this to allow $\bar{r}_A$ to be a function of K_B. On Figure 57 the downward shift from A to A' would have to be dependent on the movement along the solid part of A'B. It is hard to diagram the resulting simultaneity, but intuitively one can see that the possibilities might be along a line like the solid line in Figure 58[2]. In Figure 58 the $\bar{r}_p$ actually declines for a while, but it might not do so. Again, it is possible to show an improvement in the region's welfare, but *ceteris paribus* an improvement is less likely than in Case 2, because any favorable effect of a large K_B^* is accompanied by the unfavorable effect of a large decrease in r_A. Of course, if the appearance of B *increases* $\bar{r}_A$, then regional welfare is more likely to be improved.

Case 5

Still more complications are possible. In this last case, assume that the amount K_B is *added* to the portfolio, increasing its total size to $K^* + K_B$, and that the *absolute level of investment in every old asset is unchanged.* Assume again as in Cases 1 and 2 that B does not affect the distributions of returns on old assets. There are two sub-cases here.

a. Assume the utility function is $U = U(\bar{r}_p, \sigma_p^2)$, so that welfare depends on the rate of return and its variance, not on any absolute levels of income. This is not particularly realistic, but is of interest because it is formally identical to case 2 above: if absolute K_i's are unchanged, and sum to K^*, then each old asset obviously has the same proportions of new A as of old A. As all K_i's are frozen, the only decision variable is K_B, as in case 2.

b. More realistically, assume welfare is a function of total income. The exposition is a bit different here, and the diagram quite different. If we consider an asset's total income, y, instead of its rate of return, r, we have:

$$\bar{y}_p = \bar{y}_A + \bar{y}_B \tag{13}$$

$$\sigma_{yp}^2 = \sigma_{yA}^2 + \sigma_{yB}^2 + 2\,\varrho_{AB}\,\sigma_{yA}\,\sigma_{yB} \tag{14}$$

where ϱ_{AB} is the correlation coefficient between A and B. If $\varrho_{AB} = 0$, both the expected return and the variance are simple sums. On Figure 59, assume there is some given size to B, denoted by point B. A simple sum is shown by extending line AC from A, the line being a displacement of the ray from the origin to B. Point C thus represents the new portfolio if $\varrho = 0$. If $\varrho \neq 0$, the horizontal line through C shows the possibilities (note the scale depends on σ_{yA} and σ_{yB}, so Figure 59 is for the particular example). Again, the new asset may or may not improve the region's welfare. In Figure 59, it would do so if ϱ is no more than very slightly positive.

In all of these cases, the covariance between the new asset and the individual old assets is generally important. Covariances need to be considered in evaluating major new industrial developments. That, rather than details of any of the specific cases, is the important insight. Yet traditional regional benefit-cost analysis usually is limited to consideration of expected values of the new assets and expected values of the old assets. In some cases, the analysis may incorporate a risk-adjusted discount rate, but it takes into account only the new development's own variance.

Conclusion

Surely we need much more theoretical and empirical work to exploit the portfolio variance approach fully. But I believe it has great value. I have suggested some extensions of the concept developed by previous authors, and have sketched out possible approaches in building a model of a region making portfolio decisions. An expanded approach will build on recent work in regional modeling and regional benefit-cost analysis, and also on established theories of public finance. The portfolio model leads the researcher and policy analyst to ask different questions from earlier approaches to diversification, and to seek out different regional models and data. I hope this exploratory paper will stimulate more work that is needed.

Notes

[1] Expected utility is an *exact* function of expected value and variance if: 1. The utility function is quadratic; or, 2. All probability distributions of returns are normal. Neither assumption is very satisfactory. Fama and Miller (1972, pp. 261-7) argue that a good empirical assumption is that all returns' distributions are symmetric stable functions of the same type (that is, with the same characteristic exponent); then the investor's preferences are completely described by the mean and one other parameter, which is a measure of dispersion related to the variance but not exactly equal to it. (A normal distribution is a special case of a symmetric stable function, and for it the variance is the relevant measure of dispersion). Thus, a two-parameter model is adequate. In addition, Levy and Markowitz's (1979) empirical studies of market returns show that a function of mean and variance closely approximates a less restrictive utility function, and if an investor considers only mean and variance he can come very close to maximizing expected utility correctly defined, *no matter what his utility function.*

[2] The solid line in Figure 58 of course is not a frontier; rather it shows the shifting left-hand end of a shifting frontier.

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Technologic change, increased international economic competition, and associated reorganization of goods and service producing entities are resulting in a restructuring of economies in the developed world. In turn, this is causing changes in the interrelated socioeconomic and regional structures of nations' societies and creating new sets of social and regional problems. Ironically, included among these problems are the need for some nations, whose restructuring has yet to begin in earnest (e.g., in Hungary), to hasten the restructuring process in order to remain competitive in the international market place.

There is a clear need for regional planners to devise new types of policies to respond to the political, social, and economic challenges of the 1990s and to implement these policies in an era of lessened support and funding from central governments. This situation presents and opportunity for regional analysts to interpret pattern and process reflected in current trends in regional development in order to provide data and analysis for the policy debate.

Increasingly, it would appear that despite the appeal of broad, relatively simple theoretical notions in regional development (e.g., Williamson's inverted U-curve of regional inequalities or the core—periphery or Sunbelt—Frostbelt dichotomies), greater complexity exists in the pattern and process of development than has generally heretofore been acknowledged. Despite the relatively simple theoretical notions in regional development, there have evolved more sophisticated methodological and empirical approaches for the study of regions.

The analytic approach is exemplified by many of the papers in *Regional Development Processes and Policies*, the second volume of the *Regional Research Reports* series. Themes that emerge are: (1) sectoral structure, enterprise organization, and regional change; (2) related issues of regional inequalities and policy responses to undesirable regional change (including inequality); (3) spatial patterns of population change in response to economic change; and (4) methodological approaches to regional analysis in complex environments.

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