**Kiel Institute of World Economics**
Duesternbrooker Weg 120
24105 Kiel (Germany)

**Kiel Working Paper No. 1009**

# Globalization, Integration and Regional Specialization

**by**

**Christiane Krieger-Boden**

October 2000

# Globalization, Integration and Regional Specialization *

Abstract:
Globalization and European integration are substantially changing the interregional division of labor in Europe and the industrial specialization of European regions, thereby potentially affecting the extent of disparities between countries and regions. This paper reviews several theoretical approaches relevant for explaining regional specialization in the process of integration (such as the new economic geography, urbanization economics, and the theory of comparative advantages), surveys the empirical evidence for European regions, and outlines an agenda for future empirical research.

Keywords: Integration, regional specialization, regional income

JEL classification: F12, F15, R12

**Christiane Krieger-Boden**
Kiel Institute of World Economics
24100 Kiel, Germany
Telephone: 0431/8814-338
Fax: 0431/8814-500
E-mail: krieger-boden @ifw.uni-kiel.de

* This paper is a spin-off of a larger research project on “Globalization, Transfer of Technology, and Urbanization” carried out by A. Kopp under the direction of H. Siebert at the Kiel Institute of World Economics. I would like to thank E. Bode, D. Dohse, and R. Soltwedel for helpful comments and suggestions. Financial support by the Volkswagenstiftung is gratefully acknowledged.

# Contents

# 1. Introduction

Globalization and European integration (which is both part of and response to globalization) substantially change economic relations: They increase trade and factor mobility between European regions thereby fostering interregional competition and affecting the interregional division of labor. However, it is by no means clear whether such change is to the benefit of all European regions, i.e., whether – in the words of the EU Commission – the cohesion of regions will increase or decrease.

On the one hand, in the neoclassical tradition stresses an optimistic view of the integration process: Integration fosters the division of labor according to comparative advantages, raises overall welfare as well as the welfare of each country or region involved in the process, and equalizes factor prices. In this optimistic view, it is taken for granted that increased integration entails cohesion of countries and regions. On the other hand, a more pessimistic view of the integration process expects rising polarization of regions. Due to economies of scale, the argument goes, some industries increasingly concentrate in few large agglomeration centers. This process of regional specialization entails a rising susceptibility to asymmetric shocks. Also, a core-periphery-divide of regional income reflects the rather divergent income potentials related to different industries. Hence, according to this pessimistic view, there are winners and losers of the integration process, and the way regions are specialized is decisive for appertaining to either group.

The need for more reliable information on the intensity and quality of regional specialization in the course of integration is all the more important as adjustment pressure lasting on European regions did and will further increase due to the

completion of the single market and the formation of the European Monetary Union, due to the east enlargement looming around the corner, and due to unabated progress of overall globalization. In the first section of this paper, we resume what economic theory, in particular new economic geography, can tell us on the relationship between integration, specialization and the economic performance of regions. In the second section, we summarize the empirical evidence on the impact of European integration on the specialization of European regions. In the third section, we sketch an agenda for future empirical research.

## 2. Integration and regional specialization in economic theory

The most important factors shaping the economic landscape are natural advantages, scale economies and diseconomies (as centripetal and centrifugal forces), and transaction costs. These factors taken together determine where industries locate, decide on concentration and de-concentration of economic activities, on the emergence of urban agglomerations, and on the forming of core-periphery relations. Integration intervenes into the balance of these factors by decreasing transaction costs (formally introduced to most of the theories reviewed by decreasing transportation costs).

*Traditional regional science*

Von Thünen (1826) already recognized the significance of agglomerative forces and of transportation costs for shaping the economic space. In his model, von Thünen describes centripetal forces, i.e., a high yield per acre, and a high transport intensity of certain goods, as well as centrifugal forces, i.e., scarcity of land: Adjacent to a given urban center, only productions with a particularly high acreage yield are able to pay for the high relative price of land. Farther from the

urban core, production of goods with a lower acreage yield gradually becomes profitable, if only these goods are not very transport intensive. Acreage yield and transportation costs thus determine a core-periphery divide of income (i.e., land rents) forming a system of concentric rings around the center. Moreover, the model predicts a high degree of specialization of the respective areas. The von Thünen model was successfully transformed to the explanation of urban land use structures by Alonso (1964), who substituted a central business district for the urban center, and analyzed the location decisions of firms and commuting workers within a monocentric city.

In the sequel of von Thünen, various theoretical strands evolved the neo-classical trade theory with its comparative advantage approach in the tradition of Ricardo, Heckscher, Ohlin, and Samuelson, the location theory in the tradition of Weber, Lösch, and Isard, and polarization theories in the tradition of Perroux, Myrdal, Hirschman, and Kaldor (for a survey see Krieger-Boden 1995). As these theories predict quite divergent outcomes of the market process — on the specialization of regions as well as on the existence and persistence of a core-periphery divide with respect to regional income and growth —, they entailed controversial discussions within regional science.

*New economic geography: Basics*

It is a major improvement of the recently emerging new economic geography (NEG) to unite several of these strands of traditional theories with elements of the new trade theory. As a result, NEG also reconciles the rather divergent perspectives on regional performance and development in a common frame.

NEG applies general equilibrium models for explaining the economic landscape from a decentralized market process, taking into consideration scale economies,

inhomogeneity of products, and non-competitive markets, transportation or transaction costs, factor mobility, and endogeneity of factor endowments. At the heart of NEG models are locational decisions that shape the regional division of labor and the industrial specialization of regions. Mobile factors choose their location according to existing centripetal and centrifugal forces (table 1).

Table 1 — Centripetal and centrifugal forces in the new economic geography

| Centripetal forces | Centrifugal forces |
|---|---|
| Technical scale economies (internal to a firm) | Scarcity of immobile factors |
| Localization economies (internal to an industry) | Congestion costs |
| Urbanization economies (purely external within a region) | |
| *Translating in NEG models into:* | *Translating in NEG models into:* |
| Home market effect | Price competition effect |
| Price index effect | |

*Source*: Krugman (1998), own compilation.

The centripetal forces arise from scale economies and the inhomogeneity of products, in particular from

- technical increasing returns to scale internal to a firm (e.g., due to a degression of fixed costs),
- economies of localization external to a firm but internal to a certain industry (forward and backward linkages such as a large industry-specific market, proximity to important industry-specific suppliers, supply of specific labor qualifications, or specific knowledge spillovers),
- economies of urbanization that are not restricted to a specific industry (e.g., more general information and knowledge spillovers).

More explicitly, in NEG models centripetal forces translate into

- home market effects: the higher a region's share of the manufacturing sector is, the higher are sales obtained without any loss to transport costs, and the higher are (nominal) factor incomes in the respective region,

- price index effects: the higher a region's share of the manufacturing sector is, the more of its consumption goods originate from the region itself without having to bear any transport costs, the lower is thus its price index, and the higher are real factor incomes.

By contrast, the centrifugal forces strengthen as agglomeration increases and give incentive to a deglomeration of factors. Such forces are

- scarcity of immobile factors increasing the respective factor prices (e.g., land, immobile labor),

- congestion costs (e.g., air pollution, traffic congestion, high crime rates).

In NEG models, centrifugal forces particularly translate into

- price competition effects: the higher a region's share of the manufacturing sector is, the smaller is the scope for regional producers to reach product prices well above costs, and the more intense is the pressure exerted on the level of factor incomes in the respective region.

The balance between centripetal and centrifugal forces is not fixed. Rather, it changes, as the degree of integration increases, i.e., as transaction costs decrease. By considering exogenous changes of transaction costs, the NEG models which are static by nature get a dynamic dimension. In order to see how the balance of these forces changes in the process of integration it is useful to have a closer look on the mechanism of NEG models (for a comprehensive presentation see Fujita, Krugman and Venables 1999).

The basic model of NEG assumes an economy with two production sectors (Krugman 1991). One sector, say agriculture, produces a homogeneous product with a constant-returns technology on a perfectly competitive market, and the other sector, say manufacturing, produces a large variety of non-homogeneous products with an increasing returns technology (IRS). Due to this IRS technology, each variety is produced at one location exclusively. Concerning goods markets, NEG models usually build on the work of Dixit and Stiglitz (1977) considering a two stages utility function[1] and assuming a love of variety for consumers. Transport costs take the form of iceberg costs as introduced by Samuelson (1952).[2] Usually, only two production factors are taken into consideration, one immobile factor called "farmers" producing the homogeneous good, and one perfectly mobile factor called "workers" producing the manufacturing goods (hence, there is no capital included). These factors get all income associated to production as profits are excluded. The mobile factor is assumed to be the engine of any agglomeration process: due to migration, the factor endowment of the destination region is improved which increases its attraction as a location for other manufacturing activities which leads to ongoing in-migration of workers driving a circular cumulative process.[3]

Yet, agglomeration only takes place, if the centripetal forces are not outweighed by the centrifugal forces. Decisive to the agglomeration process are real wage differentials between regions that determine the migration decision of workers.

---

1 That is, one utility function for the choice between the agricultural and the manufacturing product and another utility function for the choice between the different varieties of the manufacturing good.

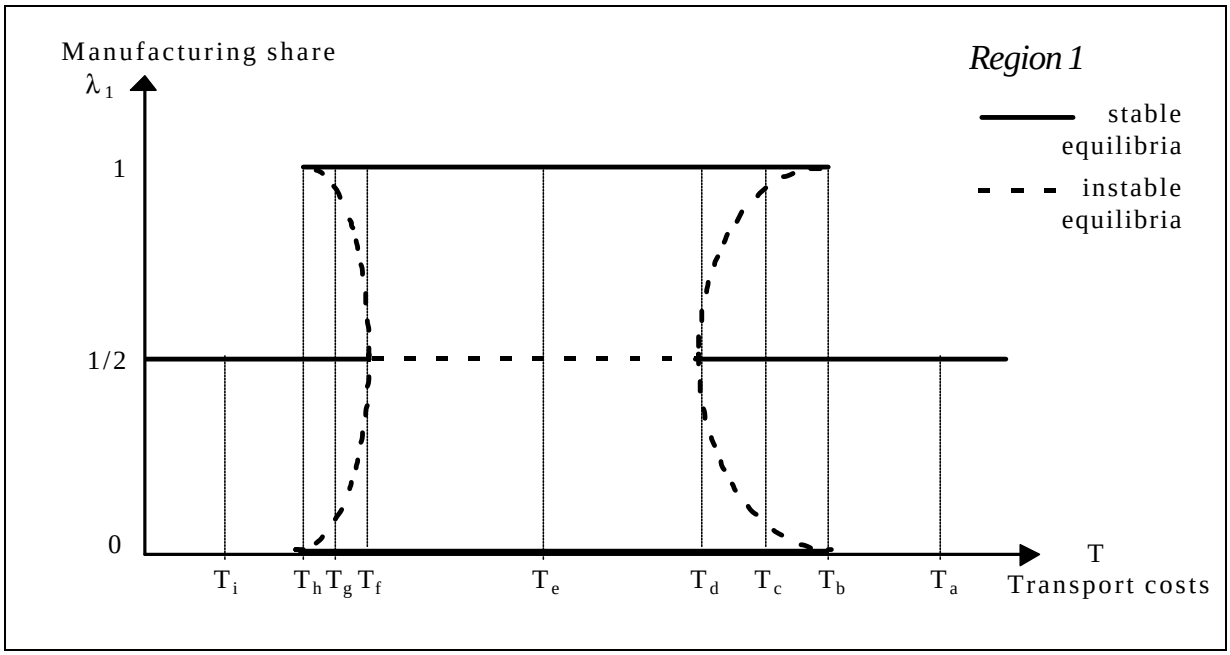
2 That is, it is assumed that during shipment a certain part of the goods concerned simply "melts" away. By this assumption one avoids modeling a separate transportation industry. Again, this way of modeling transport costs can be traced back to von Thünen, who assumed shipment of grain to be costly, because the horses transporting it had to be fed from it.

3 Some NEG models assume other engines of agglomeration, e.g., migration of firms instead of workers (Venables 1996, Markusen and Venables 1999; see below), or factor accumulation (Martin and Ottaviano 1999, Baldwin and Forslid 2000).

Workers migrate to the region with the highest real wage. Real wages in a region, however, depend on the centripetal home market and price index effects and on the centrifugal price competition effects, and thus on the scale of the region's manufacturing sector and on the general level of transport costs. All three effects are negatively related to the level of transport costs. The degree to which these three effects depend on transport costs differs and depends on the significance of the manufacturing sector as compared to the agricultural sector as well as on the elasticity of substitution between the manufacturing varieties. It can be derived from the model, therefore, that the relevant wage function is a bifurcation function: An exogenous change of transportation costs shifts the balance between centripetal and centrifugal forces, and there exist critical points at which this shift completely changes the migration behavior.

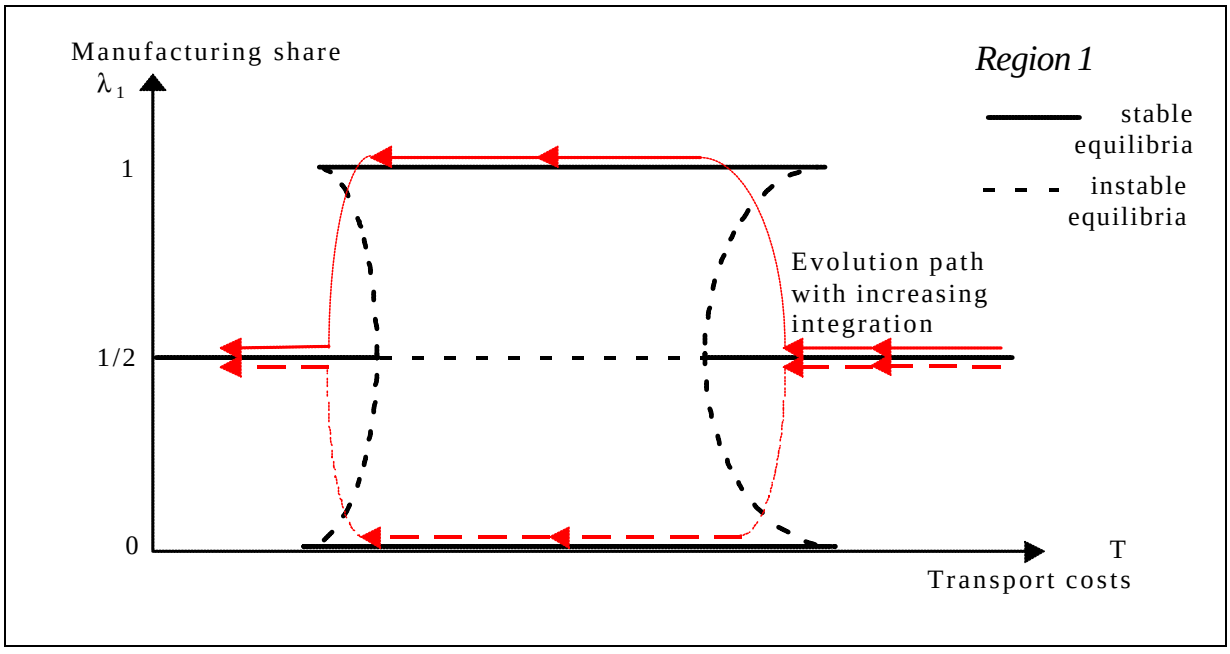
Figure 1a presents solutions for situations with different transportation costs: Initially, the two regions of the model are homogenous and endowed equally with both factors. Production thus takes place in a symmetric way where each region shares one half of it. With transportation costs being considerably high (say at $T_a$) this symmetric solution is stable, since the centrifugal price competition effect prevails home market and price index effects: High transportation costs act as a trade barrier for each region against competition from abroad. By the same token, due to this trade barrier, any additional production caused by an exogenous in-migration of mobile workers into the region would foster intra-regional price competition, reduce wages in the region, and thus drive workers out again. Hence, agglomeration of production factors is discouraged, the spatial equilibrium is stable.

Figure 1a — Model solutions at different levels of transport costs




Source: Fujita, Krugman, Venables (1999). - Own illustration.

Figure 1b — Evolution path with increasing integration — the U-curve




*Source*: Fujita, Krugman, Venables (1999). - Ottaviano and Puga (1997). - Own illustration.

With transportation costs achieving a medium level (say $T_e$), the trade barrier becomes less effective, and a region that succeeds in attracting some mobile workers will be able to take advantage of the home market and price index effect lowering the price of the manufactured good and raising real wages. The internal price competition is dampened because the manufactured good may be exported to the other region whereas workers move in the opposite direction. In this situation, the symmetric equilibrium is not stable. The centripetal forces drive an agglomeration process toward one of the extreme solutions where all manufacturing takes place in just one region: All workers and manufacturing firms either concentrate in region 1 or region 2 — which of them becomes the central region is due to random chance or infinitesimal differences.

Finally, with transport costs approaching zero (say at $T_i$),[4] home market and price index effects get almost negligible, whereas the price competition effect within the central region is still effective driving workers out of the center towards the peripheral region, i.e., entailing a process of deglomeration. Hence, the outcome may once more be the symmetric solution.

There are two transition zones in-between the symmetric and extreme solutions ($T_b > T > T_d$ and $T_f > T > T_h$), each with five equilibria, three stable and two instable (cf. $T = T_c$ or $T = T_g$). For $T = T_b$ (resp., $T = T_f$), we get at the sustain point for the extreme solution (resp., for the symmetric solution) which is to say that from this point on the extreme solution (resp., the symmetric solution) is stable if by any chance the evolution should arrive at it. For $T = T_d$ (resp., $T = T_h$), we arrive at the break point for the symmetric solution (resp., for the extreme solution) which is to say that from this point on even a small incidental

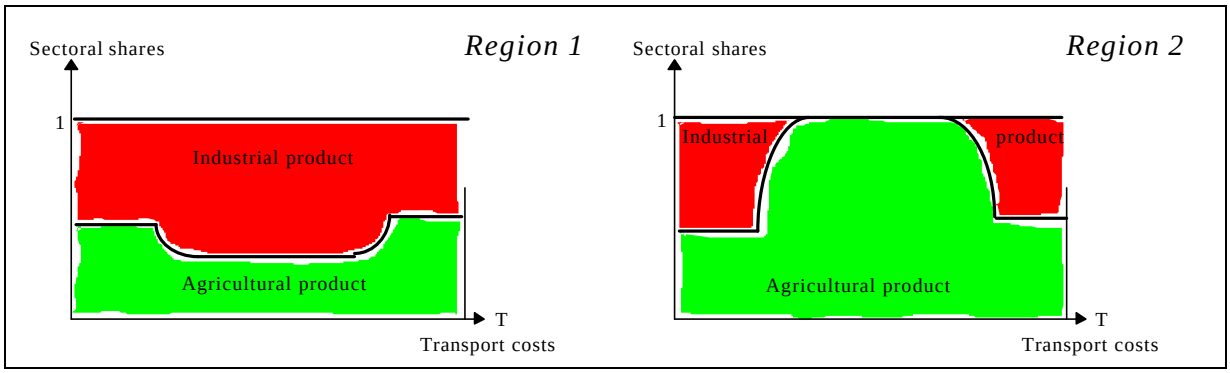
[4] This part of the bifurcation function is most clearly revealed by NEG models that include further centrifugal forces besides the price competition effect into the basic model, e.g., transport costs for the homogeneous (agricultural) product (Fujita, Krugman, and Venables 1999).

deviation from the symmetric solution (resp., the extreme solution) will lead to a new equilibrium at the extreme solution (resp., symmetric solution). NEG models, however, do not describe in what way exactly the transition from the symmetric solution to the extreme solution and from the extreme solution to the symmetric solution takes place.[5] Still, conceiving of an evolution that is characterized by increasing integration / decreasing transport costs one may derive an evolution path which is more or less shaped like an U-curve or an inverted U-curve, respectively, leading from dispersion of the manufacturing sector to concentration and back to dispersion (figure 1b).

Seen from the perspective of regions, integration evolves a core-periphery system where the economic center (core region) gets specialized in the manufacturing sector with increasing returns, monopolistic competition, and a high income potential. As the concentration process refers to the manufacturing sector only, the other, peripheral region will get specialized in what is left, the agricultural sector with constant returns, perfect competition, and a low income potential (figure 2). Accordingly, the evolution leads from regional diversificaton to regional specialization with the emergence of a core-periphery-divide, and then again to regional diversification accompanied by a catching-up of the peripheral region.

[5] The instable equilibria mark the divide between the symmetric and extreme solutions: from any point above the upper instable equilibrium we will arrive at the upper extreme solution; from any point between upper and lower instable equilibrium we will arrive at the symmetric solution; and from any point below the lower instable equilibrium we will arrive at the lower extreme solution. Thus, in the first transition zone, the prevalence of the extreme upon the symmetric solution becomes the more likely, the lower the transportation costs get.

Figure 2 —Regional specialization at different levels of transport costs — 2 sectors/2 regions




Source: Own illustration.

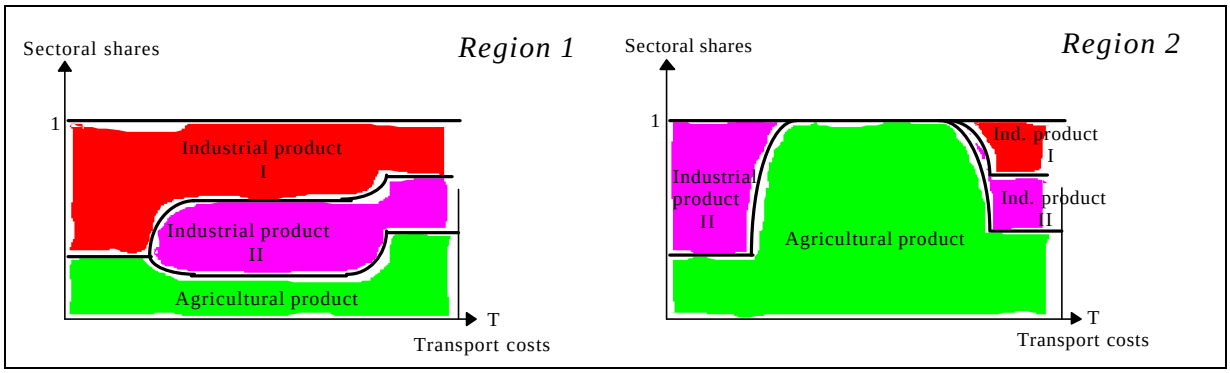
*The clustering of industries*

Considering two non-competitive manufacturing goods,[6] the analysis becomes more differentiated (figure 3). As in the former case, in a state of autarky with very high transport costs each region produces all goods in a symmetric way. In the agglomeration phase at a medium level of transport costs, all manufacturing takes place in just one region raising regional specialization dramatically. However, if we move on to a state with very low transport costs, there is no return to the symmetric solution, instead we find each region getting specialized in one of the manufacturing goods. By this location of industries, it is possible to take advantage of scale economies, particularly of those that are inherent to a firm or a branch, whereas the centrifugal forces, particularly the price competition effect and the effect resulting from the competition for immobile factors, are eased to a certain degree.[7]

[6] One may think of two industries with IRS technology, or of two varieties within one industry. Note that in reality the distinction between varieties and separate industries is gradual rather than substantial.

[7] Dluhosch (2000) stresses the significance of such centrifugal forces, particularly the influence of competition. According to her view, if competition grows due to integration, it may increasingly split production into separate components which may then be manufactured at various scattered locations. Hence, integration may not “per se promote a center-periphery

Figure 3 —Regional specialization at different levels of transport costs — 3 sectors/2 regions




Source: Own illustration.

To put it more broadly, the theoretical story of regional specialization becomes the more complex the more regions and the more industries are included, particularly, if their production technologies differ with respect to returns to scale. Accordingly, the described process of agglomeration and deglomeration does not affect all industries to the same degree and not at the same level of transport costs. Thus, not only the degree of regional specialization will change in the course of integration, but also its nature, i.e., the specific industry mix of each region. First, industries with particularly high increasing returns will start moving from the periphery to the core. Others with weaker increasing returns will follow later when transportation costs have declined a bit further. By assumption, constant returns-industries will simply stay where they are. As transportation costs decline from a medium to a low level, the increasing returns industries will relocate to regions with low production costs, i.e., the peripheral regions. By this process, the increasing returns industries will tend to develop clusters, each at only few locations, instead of becoming dispersed evenly. Clusters of increasing returns industries will become the more likely the lower transport costs are. Hence, many regions will host some of these industries and

pattern" but rather "provide the opportunity to reap the benefits of a finer (vertical) division of labor which can be shared among trading partners." (p. 158)

will be able to take advantage of their income potential. Still, the regional specialization may increase (Ottaviano and Puga 1997, Puga 1999), at least if observed at a disaggregated sectoral level.[8]

The often observed, striking difference of industrial concentration in the US and in Europe, which are economies of a comparable size and of a similar technological level, offers an elucidating illustration for these considerations (Fujita, Krugman, and Venables 1999): Whereas US industries tend to be highly concentrated on one or very few locations, the same industries in Europe exhibit a much larger number of major centers. This divergence may be explained by the higher transaction costs of trade in Europe posed by the internal borders that have blocked industrial clustering at a continental scale. As a consequence, one might expect the European integration process to be accompanied by a cumulative process of concentration and clustering.

*Agglomeration without labor mobility*

Instead of labor mobility, some NEG models assume other engines of agglomeration, e.g., migration of firms (Krugman and Venables 1995, Venables 1996, Markusen and Venables 1999).[9] In this case, however, the centripetal forces are somewhat constrained as there is no cumulation of consumers. The demand for intermediate goods takes the place of demand for consumption goods by mobile workers as a trigger for agglomeration. It is assumed that all manufactures may serve as final goods as well as as intermediates. Economies of scale are related to the use of these intermediates as inputs. Hence, the more

[8] It has to be considered that an increasing regional specialization at the level of varieties may look like decreasing specialization /increasing diversification at the level of industries. So, the observation of an increase or decrease of regional specialization may depend decisively on the sectoral breakdown chosen for the observation.

[9] Or factor accumulation due to endogenous growth.

industries are concentrated, the higher are the scale economies they can exploit. However, firms that are attracted to a central location must draw their workers from other industries located in this very region. Therefore, competition for workers will be strong, wages will rise in the central region, and this will force industries with a lower potential for scale economies to withdraw from the central region in order to reduce their production costs. A "lack of interregional labor mobility both postpones agglomeration in a process of regional integration and weakens it when it happens", and it can thus "sustain non-extreme equilibria in which all regions have industry, even if in different proportions." (Puga 1998:16).

*Urban economics and specialization*

More directly than the NEG models described above, urban economics deal with agglomerations, their determinants, and their specialization (for surveys see Duranton and Puga 1999, Fujita, Krugman and Venables 1999). Models of urban economics show how the existence of scale economies leads — in a situation of population growth — to the emergence of cities. In close analogy to NEG, such models describe optimal systems of cities in a tension between centripetal and centrifugal forces. The outcome of such models, however, depends on the assumptions chosen with respect to these forces.

On the one hand, a basic model by Henderson (1974) claims an extreme specialization of cities. Henderson assumes scale economies in cities to take the form of being internal to a certain industry (localization economies) whereas diseconomies are thought to be purely external (like congestion costs). As a result, cities become specialized on certain industries that share internal scale economies while repelling other industries because of high external diseconomies. On the other hand, other models (e.g., Abdel-Rahman and Fujita

1993) exhibit more differentiated results. If one does not restrict the analysis on localization economies as the only centripetal force, but takes into consideration some cross-sector economies as well, one may derive urban systems in which specialized and diversified cities coexist, and where diversified cities tend to be larger than specialized cities.

The type of specialization of a city determines its optimal size: The higher the internal scale economies of the city-specific industry are the larger is the optimal size of the city. When a city is getting larger than its optimal size, one would expect a new city to emerge leading to a whole system of hierarchical urban agglomerations. Yet, within a certain range of size, the high market potential of an existing city compared to its hinterland prevents any individual firm from settling at another location. Some sort of prisoner's dilemma hinders the emergence of further cities and an optimal urban system. Again, different models take different views of this problem. Henderson (1974), for instance, postulates "urban developers" (e.g., city corporations) which intervene if existing cities get too large, buy land for a new city, subsidize people and firms to move them to the new city, and profit from it by controlling size and specialization of the new city. Without such developers, it is argued, cities generally will tend to be too large. Other authors (e.g., Fujita, Krugman, and Venables 1999) argue with the existence of multiple equilibria similar to those in NEG: beyond a certain city size the existence of a further new city is sustainable if it emerges by chance (sustain point); beyond an even larger size, the existence of such a new city is inevitable (break point) and out-migration from the old city is advantageous for each firm. Finally, with increasing population, a hierarchy of cities will emerge.

Also, some models (e.g., Fujita, Krugman, and Mori 1999) demonstrate that this hierarchy of cities will be a complex one: As different industries require different optimal sizes of cities and different distances from one city to the next, a system

of different, overlapping networks will evolve producing cities of all sizes and all sorts of specialization. In particular, higher-order (and in most cases larger) cities will contain a wider range of industries than lower-order (and in most cases smaller) cities. Thus, in a framework founded on micro-economic modeling of decentralized market processes, urban economics succeeds in simulating a system of central places that resembles sufficiently well the more intuitive solutions of Christaller and Lösch.

These models of urban economics do not directly address the problem of increasing integration. Generally, they assume a sufficiently high degree of integration, i.e., a sufficiently low level of transportation costs. One may, however, conclude that increasing integration, by decreasing transportation costs and diminishing economic distances between cities, should change the optimal hierarchical urban system. While at first, when starting from very high transportation costs, integration should foster centripetal forces and thus enable the emergence of the urban system, it should, at a lower level of transportation costs, lead to a growing significance of centrifugal forces. Hence, in this phase, optimal sizes of cities should diminish and optimal geographical distances between cities should extend. However, as we have seen above, it is one major feature of urban economics that any given system of cities may turn out to be quite sustainable. Urban systems are characterized by a high degree of hysteresis that may also produce severe lock-ins.

The risks stemming from such a sub-optimal urban system are stressed by another strand of the urban economics literature. This literature particularly refers to the links between urban systems and economic growth considering the theory of endogenous growth (e.g., Glaeser 1999, Kopp 2000a, b, Siebert and Kopp 2000). It is maintained that innovation, and hence endogenous growth, is fostered by the agglomerative forces of urban centers, particularly by human

capital accumulation and by knowledge spillovers between firms belonging to the same industry (the above mentioned localization economies), yet only, if congestion costs do not get too large.

Within this literature, for instance, two models with quite specific properties derive a remarkable result on urban systems and their evolution (Black and Henderson 1997, Eaton and Eckstein 1997). Assuming localization economies and human capital accumulation as centripetal forces, and commuting costs, congestion, and investment in human capital as centrifugal forces, they formulate a close link between population growth of cities and the formation of human capital within them. In these models, each city represents a certain level of human capital per worker. Cities with a higher level of human capital offer higher wages to mobile workers and thus tend to get larger than cities with a lower level of human capital. However, in order to work in such high-wage cities, workers from cities with a lower human capital level have to invest in human capital formation beforehand, and this investment is costly. In maximizing lifetime consumption, the worker is, hence, confronted with a trade-off between a higher wage level in the larger city and a higher investment amount to attain the respective higher human capital. City population will then adjust to remove any incentive to migrate, and the growth of cities will be in a steady state: If population grows, each city grows, too, at the same rate as total population (Eaton and Eckstein 1997).[10] Hence, the rank size distribution of all cities remains stable. It may be concluded from these models, that urban structures need to be differentiated in size and degree of specialization to meet all requirements for an

[10] The model of Black and Henderson (1997) is even more complex, since it assumes that family dynasties decide on where each family member works and how much investment in human capital should be spent on him. While all members get the same income — the family average income —, the family chooses an optimum portfolio of some members working in small cities with low wages and low investment and others working in large cities with high wages and high investment.

optimal human capital formation, and, hence, for evoking innovation and economic growth.

If the urban system is prevented from achieving its optimal structure due to hysteresis or political distortions this could severely damage the economy's prospects for income and growth. In the case of European regions with an already enhanced level of integration, we should expect a spread of the city size distribution due to the dispersion of activities from large urban agglomerations with high diseconomies to smaller cities with less price competition. Particularly, as far as localization economies are concerned, e.g., in the form of spillovers internal to a certain industry, the existence and undisturbed evolution of medium-sized and small cities seems important, and may be taken as an indicator for an urban system with a high growth propensity. Hence, the number of cities in a region, and their respective role in the hierarchical urban system (i.e., their size and their type of specialization), as well as the degree of persistence of this urban system in the process of integration is likely to influence regional specialization and regional income. Urban systems should thus be taken into account when analyzing the effects of integration on regions.

*Specialization and comparative advantages*

In most NEG and urban economics models, space is assumed to be homogeneous. Yet, of course, traditional natural and comparative advantages still play a significant role in shaping regional specialization. Location decisions are taken in a tension between such agglomeration-inducing forces described in NEG and urban economics, on the one hand, and natural and comparative advantages described in Ricardian, and Heckscher-Ohlin-Samuelson models, on the other hand. It cannot be stated *ex ante* which of these influences may dominate the other.

Some models analyze the relation between agglomerative forces and immobile factor endowments. For instance, Venables and Limao (1999) combine a core-periphery model with a Heckscher-Ohlin-Samuelson model and analyze the effect of distance from this core for peripheral countries/ regions. According to this analysis, "factor endowments and factor intensities are not sufficient to predict the structure of production or pattern of trade" (Venables and Limao, 1999:23), i.e., agglomeration economies matter: Sectors with inherent agglomeration economies[11] tend to be concentrated in the core, remoteness of regions tends to reduce real income. Yet, the effect of distance on prices and income is complex, depending on the interactions between agglomeration economies and factor intensity; due to the abundance of particular factors there may be production peaks at locations away from the center. Moreover, a reduction of transport costs on all activities will cause terms of trade changes which evoke relocations of industries to the periphery and a catching-up of the periphery, i.e., factor endowments and factor intensities will gain significance for regional specialization. More generally, natural comparative advantages may determine regional specialization the more evidently, the more heterogeneous regions are with respect to immobile factor endowments, the less pronounced IRS technologies are, and the higher the degree of integration is.

Another model combining urban economics and comparative advantages is provided by Fujita, Krugman, and Venables (1999) who show that regions with natural advantages in the form of natural hubs for transportation networks (ports, fords), tend to become a point of crystallization for an emerging urban

[11] In the model of Venables and Limao (1999), such agglomeration economies are modeled in the form of higher transport intensities attributed to these sectors. Such modeling does not seem to fit with NEG models, which usually do not assume different transport intensities for different products. Yet, since in the model of Venables and Limao high transport intensities are assumed to originate inter alia from an extensive use of intermediates for production, there is some kind of urbanization economies inherent. Note that the model is based entirely on constant returns to scale technology and perfect competition.

system. Of course, for urban systems emerged on the base of natural advantage, all general statements referring to the persistence of such systems apply, and we may conclude that natural advantages are likely to leave a quite visible trace in the pattern of regional specialization.

*Hypotheses on regional specialization from the economic theory reviewed*

The new theoretical literature on the regional effects of integration offers a great variety of highly sophisticated models which quite often exhibit multiple equilibria, path-dependencies, and hysteresis. Depending on the assumptions chosen as well as on the initial situation, these models predict different regional effects of the integration process. Thus, when trying to assess the regional impact of European integration the point of departure has to be specified: Does integration start from a high level of transaction costs leading to a medium level (i.e., at the right-side wing of the "U-curve"), or from a medium level leading to a low level (i.e., at the left-side wing of the "U-curve")? And if we think in particular of the envisaged eastern enlargement, do regions from different countries perhaps even start from quite different points of departure, and thus face quite different challenges in the process of integration? Still, we may at least draw some tentative conclusions from the economic theories reviewed which may be taken as guiding hypotheses for the review of the empirical evidence:

- The overall net benefit of integration will be positive, due particularly to an enhanced exploitation of scale economies and spurred competition that increases efficiency.

- The division of labor between regions is likely to change; yet, it is open to question whether integration will lead to an overall concentration or dispersion of the industries with increasing returns to scale as a whole. Also, there are

some doubts as to where concentration or dispersion, respectively, would occur, and which kind of regions would benefit or lose from it.

– In any case, integration should increase regional specialization, at least if observed at a deep sectoral breakdown. For, according to NEG theories, regional specialization increases in the concentration phase as well as in the dispersion phase. In the latter phase, industries with high returns to scale should tend to form highly specialized clusters which ought to be found not only at traditional central regions but at peripheral regions, too.

– A region's industry mix should determine its income, and, particularly, industries with high returns to scale should offer high income potentials to their locations. However, predictions from theory on the cohesion of regions with respect to income are ambiguous: Depending on whether regions are in the concentration or dispersion phase, the core-periphery-divide of regional incomes should increase or diminish.

– According to theory, regional specialization and regional income should also depend on the existence of cities in a region, on their rank-size positions within the urban system, and on their specific types with respect to diversification or specialization.

– Finally, regional specialization is likely to respond to existing natural competitive advantages, particularly at a very low or a very high level of integration, and less so at an intermediate level.

# 3. Empirical evidence on regional specialization in the process of European integration

Compared to the increasingly sophisticated theory on integration, agglomeration, regional specialization, and regional income, the empirical evidence lags behind. As yet, there are hardly any econometric tests on the relevance of NEG models. [12] Although a number of studies analyze the implications of the European integration process on industrial location and regional specialization, most of them refer to the level of European countries, and empirical evidence at the level of European regions is particularly sparse. Also, little is known about optimal urban systems in Europe, since most empirical analyses focus on the US or on other non-European areas.

*Specialization of European countries*

Evidence on the specialization of European countries can be drawn from two strands of empirical literature: literature on asymmetric shocks which has given particular rise by the formation of the European Monetary Union, and, more generally, literature on industrial location and the international division of labor in Europe. The literature on asymmetric shocks derives some indirect evidence on specialization from the countries' susceptibility to such shocks. Some studies find a growing synchronization of business cycles between countries, i.e., a declining susceptibility to country-specific shocks, as a result of growing trade relations and closer integrated exchange rate regimes. They seem to suggest that

[12] See, however, the work by Davis and Weinstein (1996, 1999) who tested the relevance of home market effects and found them to be significant in the case of (Japanese) regions, but not in the case of (OECD-) countries. See also Ellison and Glaeser (1997) who tested the relevance of agglomerative forces against random chance ("dartboard approach") in the process of concentration and found U.S. industries to be considerably more concentrated than random chance alone would explain.

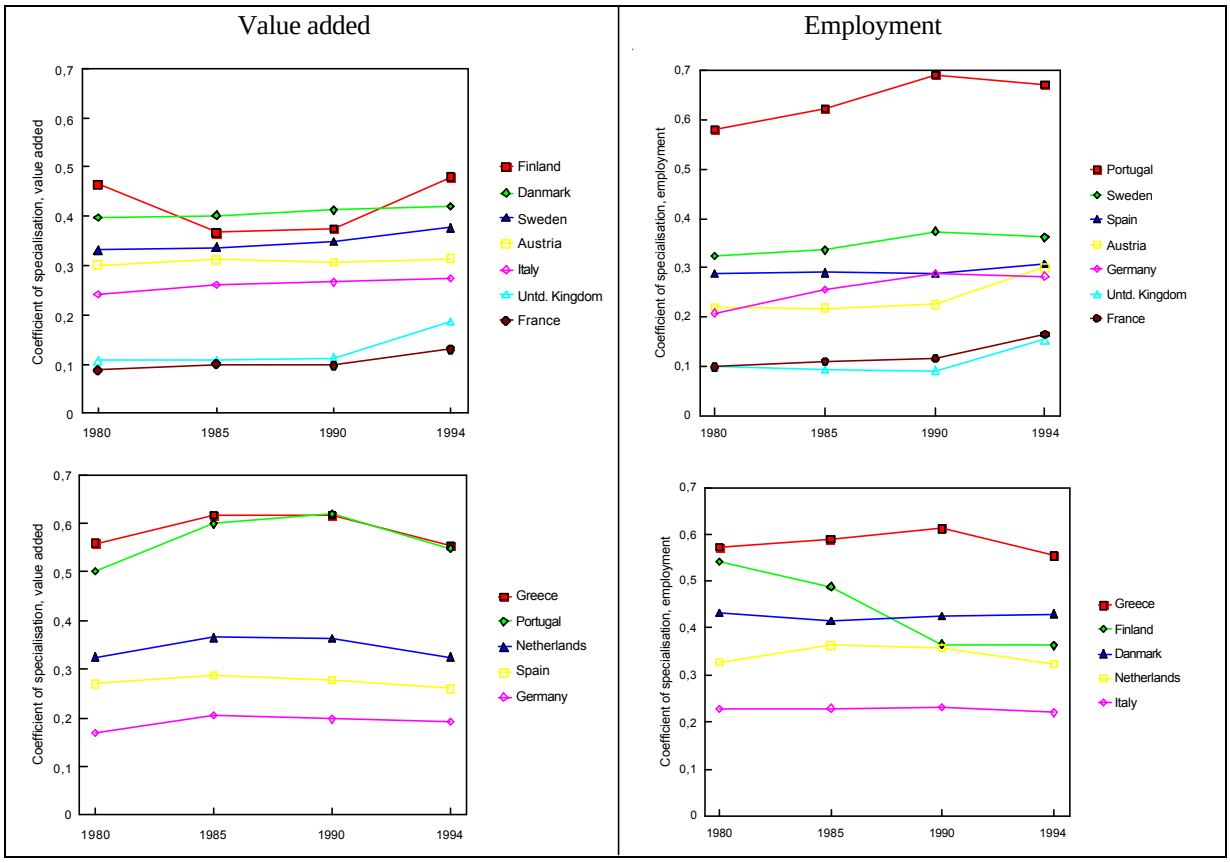
specialization decreased in the course of integration.[13] Frankel and Rose (1998) estimated for OECD countries (including EU member states, USA, Canada and Japan) that with closer trade links business cycles tend to be more synchronized. Artis and Zhang (1997 and 1999) analyzed the correlation of OECD countries' business cycles with the US and the German business cycle, respectively. They found that for European countries the correlation was higher to the German than to the US cycle, particularly, after the European Monetary System had been installed. These results, too, may suggest the conclusion that specialization of countries has decreased.

Most investigations dealing more directly with industrial location and specialization in Europe refer to the manufacturing sector. According to these investigations, overall specialization of EU member states seems to have increased in the 1970s and 1980s, starting from a remarkably low level at the end of the 1960s as compared to US states (Hufbauer and Chilas 1974, Molle and Boeckhout 1995, Amiti 1999, Brülhart 1998, Walz 1999). A comprehensive new study on country specialization and industrial location, also, finds an overall increase of specialization and concentration of industries since the 1980s, though at a very slow pace, and as the result of quite divergent processes with concentration of industries in some countries and dispersion in others (Middelfart-Knarvig, Overman, Redding, and Venables 2000). The EU Commission, so far, maintains that the European integration process has led to only few changes in the degree of specialization of member states, and to a

[13] Note that one could also think of tracing back an increased synchronization of cycles to an accelerated transmission of shocks from one country to another via growing forward and backward trade linkages, i.e., increasing synchronization would not necessarily indicate a decreasing specialization. However, some recent studies reveal a close relation between the susceptibility of countries to asymmetric shocks and their extent of specialization (Imbs 1999, 2000, Belke and Heine 2000).

steady, yet very slow catching-up of the low-income states.[14] Our own estimates also underline the slow pace of change and reveal that there seems to be much ambiguity, particularly with respect to the 1990s (figure 4, Tables A1 and A2 in

Figure 4 — Coefficients of specialization[15] for value added and employment in Europe




Source: OECD. — Own calculations.

the appendix).[16] Whereas some countries exhibit a slight increase of specialization (cases in the upper graphs of figure 4),[17] others show hardly any clear tendency

---

14 See the Commission's reports on Europe 2000+, on cohesion in the EU, on the socio-economic situation of EU regions, and on the competitiveness of European industry (EU-Commission 1995, 1996, 1999a, 1999b).

15 $s = \sum_{i}^{n} |a_i - b_i|$, where $a_i$ are industrial shares of the economy under investigation, and $b_i$ are industrial shares of a reference economy (here: EU average), and where $0 \le s \le 2$.

16 For an overview on different measures of specialization and their specific properties, see Amiti (1999) and Krieger-Boden (1999).

(cases in the lower graphs). Also, the countries' evolution withrespect to specialization differs according to whether one looks at value added or employment. Thus, an unequivocal tendency toward increasing specialization can be found only for Austria, the United Kingdom, France, and Sweden.

Brülhart (1998) finds that increasing returns industries tend to be highly localized, i.e., form clusters as predicted by NEG theory.[18] By contrast, some labor-intensive industries are still much more evenly dispersed across European countries. According to Brülhart, this may simply reflect a delayed process of agglomeration in these sectors. Brülhart concludes that industries with strongly increasing returns tend to agglomerate even at a still low degree of integration, whereas industries with weakly increasing returns enter into a process of agglomeration at a much higher degree of integration only.

*Specialization of European regions*

As to the evolution of specialization on a regional level, the severe lack of empirical results is primarily due to a lack of data on European regions. In particular, there is lack of data on the spatial division of labor and the location of industries in a sufficiently disaggregated regional and industrial break-down and covering a sufficient number of years.

---

17 Finland only fits into this group, as far as the period 1985-1994 is concerned.

18 In order to classify industries with respect to the scale of their returns Brülhart followed the classification scheme by Pratten (1988). A number of studies analyze the characteristics of industries with respect to the relevance of scale economies applying methods either on the measurement of economies of scale within industries (e.g., Pratten 1988, Oliveira Martins, Scarpetta and Pilat 1996) or on the degree of localization (e.g., Ellison and Glaeser 1997, particularly for France see Maurel and Sédillot 1999). See also OECD (1987) distinguishing five categories of industries: scale-intensive industries, science-based industries, industries producing differentiated goods, labor-intensive industries, and resource- intensive industries. For an overview see Junius 1999.

Helg et al (1995) and de Nardis, Goglio and Malgarini (1996) find that European regions are much more specialized on few industries than EU member states (and therefore are more explicitly affected by asymmetric shocks) but they do not analyze the change of this pattern in the course of the integration process. Molle (1980), Brülhart (1998), and Walz (1999) find for the 1970s and 1980s, respectively, that the manufacturing sector as a whole became more localized which may indicate an increase of regional specialization. Krieger, Thoroe and Weskamp (1985), Waniek (1995), and Brülhart (1998) reveal for the 1970s and 1980s, respectively, that, simultaneously, the concentration of the manufacturing sector at existing agglomeration centers diminished. Also, Bode (1999), in an analysis of West Germany, discovers a trend toward de-concentration. One may conclude, that — as predicted by the theoretical considerations for the case of integration progressing from an intermediate to a high level — the manufacturing sector as a whole seems to have withdrawn from the centers toward the periphery.

However, these investigations refer to the manufacturing sector as a whole. They need to be supplemented by more detailed analyses of regional specialization in the manufacturing sector, and, also, in the services sector, [19] because individual industries may form highly specialized clusters while broad sectors as a whole disperse (cf. p. 15). A first step into this direction has been taken by Hallet (2000). He finds regional specialization to have been decreasing since the 1980s — which admittedly may be due to a statistical bias arising from an insufficient sectoral break-down of the data base.[20] Like Middelfart-Knarvik et al. (2000), he

[19] An analysis of the service's sector will be particularly interesting, not only because it has become the largest sector in Western economies, but also, because it is closely interlinked with manufacturing due to organizational changes, which, e.g., lead to an out-contracting of several services that have been included in the industry so far, and remain highly embodied to the specific industry.

[20] Hallet (2000) used existing data by Eurostat which are broken down into 17 sectors, including agriculture, 9 manufacturing industries, and 5 service industries. As we have seen

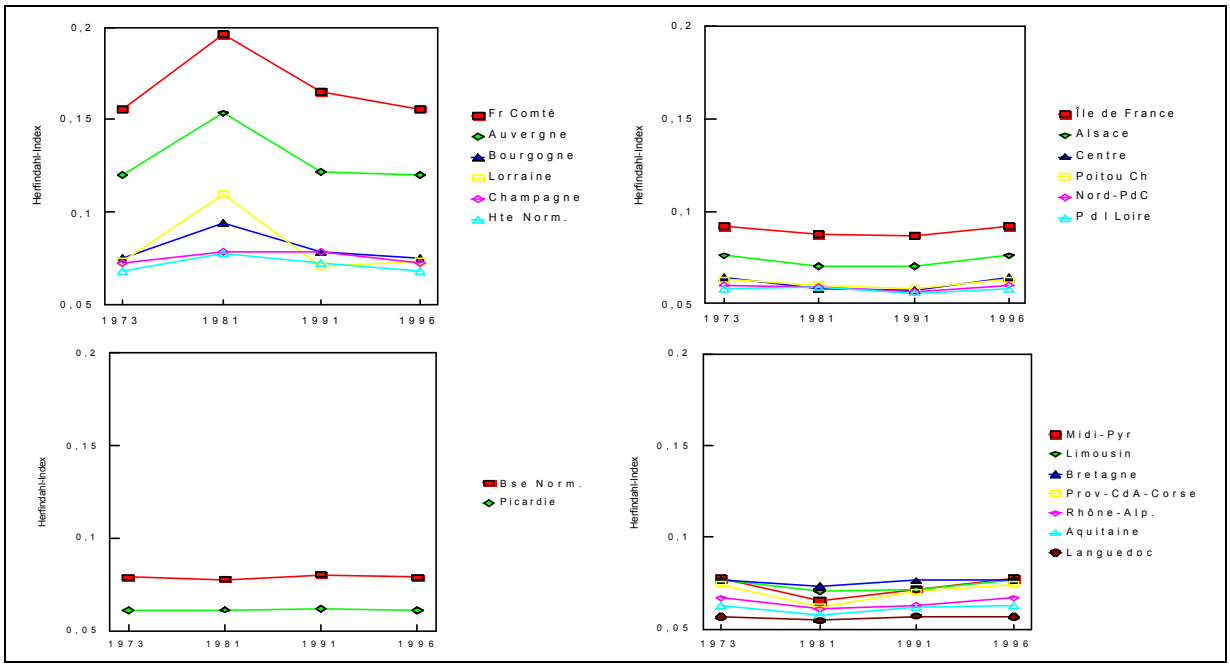
finds any process of concentration of industries to be very slow. Hence, these results stress the need to analyze regional specialization for even longer time periods, covering two or more decades, and with an even more detailed industrial break-down.

An appropriate analysis of the spatial division of labor and the location of industries, however, requires to take recourse to nationally available data for EU member states, since (for the time being) no such data set exists at the European regional level that is internationally comparable. Therefore, we started a project of collecting and exploiting such data at least for a number of selected countries (see the remarks on a future research agenda). So far, we have employment figures for France for some selected years from 1973 to 1996 broken down into 21 regions and 30 manufacturing branches. For this data set, Herfindahl indices have been calculated which compare a given regional structure to a situation where all industries have equal shares (figure 5; for a discussion of the advantages and disadvantages of the respective indicators see Krieger-Boden 1999). We find that most regions over a period of more than 20 years show almost no variation at all with respect to specialization (whereas some regions exhibit an evolution which may be taken as an inverted U-curve). However, calculating Gini indices which refer to the similarity of a regions' structure to the average structure of France as a whole, reveals another picture (figure 6):

---

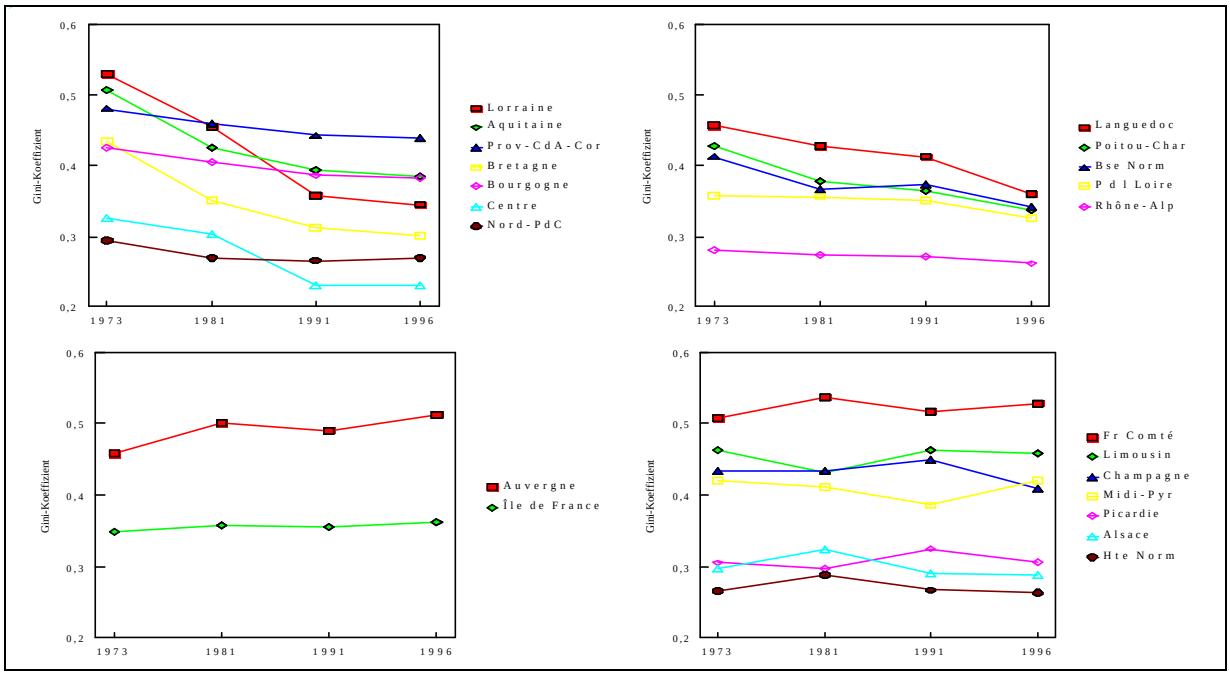
from the theoretical considerations (p. 15), the depth of the sectoral break-down decides on whether, in the case of overall dispersion, one ought to observe decreasing or increasing specialization.

Figure 5—Regional specialization in France, Herfindahl indices[21]




Source: SESSI. — Own calculations.

Figure 6—Regional specialization in France, Gini indices[22]




Source: SESSI. — Own calculations.

21 $h = \sum_{i}^{n} (a_i)^2$, where $a_i$ are industrial shares of an economy under investigation, $1/n \leq h \leq 1$

22 Based on locational coefficients.

According to these figures, specialization in most regions seems to have decreased, particularly in regions which were most specialized in the early 1970s. However, these Gini indices may in the first line reflect not a decrease of regional specialization but rather an increase of the specialization of France as a whole,as stated above in the results on the specialization of EU member states (p. 27). These inconclusive results suggest that more research is needed in order to get more clear-cut results, and to find out whether a general pattern of specialization in the course of increasing integration can be detected.

To this end, it is important to analyze in-depth the nature of the regional specialization, i.e. the industry mix within regions. To know that regions are highly specialized is not enough. Regions may be specialized on industries with increasing returns technology (e.g., information technology), or, due to natural advantages, on industries with localized inputs (e.g., mining, iron and steel industry), or on foot-loose industries with constant returns technology (e.g., food production, textiles). The specific industry mix realized in a region most likely will influence its income and growth. More detailed information on the nature of regional specialization may render possible an analysis of the relation between specialization and regional income.

*Specialization and urban systems*

Quite opposite to NEG, there exists an extensive empirical literature on urban systems. In fact, the process of theory building seems to have been just the other way round: Whereas in NEG scientific progress mainly consisted in modeling the theoretical impact of market imperfections, urban economics in a more inductive and descriptive orientation brought about a broad variety of empirical results that

gave incentive to the formulation of theoretical models explaining these features.[23]

It has been manifested that diversified and specialized cities co-exist, and there seems to be a weak correspondence between the size of a city and its degree of specialization: Larger cities tend to be more diversified. This is in line with the theoretical approach by Abdel-Rahman and Fujita (1993; see p. 17); apparently, urbanization economies are relevant. Glaeser et al. (1992) even find urbanization economies to be more important than localization economies. However, Henderson et al. (1995) find evidence for the significance of both kinds of external economies: Both seem to matter for new high-tech industries, whereas mature capital goods industries seem to take advantage of localization effects only.

With respect to hierarchy in urban systems, it is well-established that the rank-size distribution of such systems does not change with population growth, i.e., all cities of an economy, large or small, grow in parallel with more or less similar growth rates (Black and Henderson 1997, Eaton and Eckstein 1997). Moreover, several countries reveal a quite stable hierarchical system that can be described by Zipf's law or the rank-size-rule: The second-largest city holds about one half of the population of the largest city, the third largest city holds about one third of that of the largest, the fourth largest about one fourth, and so forth. Although in most countries cities are a bit more evenly dispersed than the rank-size-rule would predict (Rosen and Resnick 1980), still the regularity in city size distributions is striking. So far, no convincing theory exists that explains this empirical observation (Fujita, Krugman and Venables 1999).

---

[23] For a survey on the "stylized facts" about the composition, size and locations of cities see Duranton and Puga (1999) and the literature quoted there.

Also, there is a strong persistence of the same kinds of activities in the same cities. Several studies, one covering the period of 1860 to 1987 in the US, reveal a high degree of stability in the concentration and dispersion of industries on cities (e.g., Dumais, Ellison, and Glaeser 1997, Kim 1995). However, this stability is to be seen against the backdrop of a frequent movement of firms. Innovations and the birth of new plants seem to take place particularly in larger and more diversified cities (Duranton and Puga 1999). By contrast, more mature industries seem to relocate to smaller cities with an already high degree of specialization on the particular industry. This once more underlines the above mentioned findings by Henderson et al. (1995) that mature industries benefit from localization economies, and new industries are particularly favored by the existence of urbanization economies. Feldman and Audretsch (1999) argue on the base of their empirical results that the innovative output of a city is driven by diversity across industries with a common science base, and by city size.

The empirical results thus underline the stability of urban systems, and reveal a high degree of hysteresis within these systems. The question hence arises whether existing urban systems are at their optimum. Due to their resistance to any changes called forth, inter alia, by the integration process, they may persevere in a sub-optimal state harming the income perspectives of regions concerned. At least for developing countries, it is maintained that urban structures have been distorted in favor of the large metropolitan areas resulting in a deficit of relatively small cities. As Kopp (2000a, b) and Siebert and Kopp (2000) show for the cases of Mexico and China, any reduction of this distortion, i.e., by an increased spread of the highly skewed city size distribution, leads to a higher aggregate growth of the respective country. For Europe, it would be interesting to analyze in how far the specific mixture of large, medium-sized, and

small cities and of diversified and specialized cities affects economic growth of countries or regions. To our knowledge, no such analysis exists so far.

Most of the urban economics investigations reviewed do not refer to Europe, but rather to the US or, as in the last case, to developing countries. Only the case of France has been analyzed in this context, and it has been found that the French urban system is described particularly well by the rank-size rule (Eaton and Eckstein 1997). There is much scope for further empirical analysis in the field of urban systems in Europe and their effects on regional specialization and regional income.

# 4. Agenda for further empirical research on regional specialization

We summarize our review of the theoretical and empirical literature on economic integration and regional specialization in the following conclusions:

- The division of labor between regions is likely to change, though perhaps at a slow pace. Since empirical evidence is sparse, however, the direction of change is by no means clear. The existing empirical evidence for European countries seems to suggest that specialization may increase rather than decrease.

- The process of regional specialization seems to be the result of rather divergent developments: It has been shown, at least for European countries, that some increasing returns industries that used to be highly concentrated in the center of Europe seem to de-concentrate by withdrawing from these centers and forming new clusters in more peripheral countries. Some labor-

intensive industries, being more dispersed anyhow, seemingly tend to form clusters, too.

– The effects of integration on regional income perspectives are ambiguous: While on the one hand, some IRS industries spread more evenly across space thus improving the income potential of peripheral regions, others get more concentrated.

– The role of the urban system regarding regional specialization and regional income in the process of European integration is still rather opaque.

In order to overcome the shortcomings, comprehensive empirical research on a regional level with a sufficiently deep sectoral breakdown is definitely warranted. Our research work shall identify patterns of regional specialization in West Europe in order to give insights into the degree, the nature, and the effects of regional specialization as a result of the integration process. More specifically, it aims at describing the evolution of regional specialization in the EU since the 1970s, analyzing the impact of integration on regional specialization, identifying the nature of regional specialization according to different types of industries, and analyzing the influence of the degree and the nature of regional specialization on regional income.

A suitable research agenda might consist of four consecutive steps:

*(i) Establishing a data base:* We start by gathering sectorally disaggregated data on employment for selected EU countries since the mid-1970s. The initial sample will consist of Germany, France, Spain, and Portugal; further EU countries will be included according to data availability. The countries of the sample should vary with regard to size, industrial structure, development level,

and duration of EU-membership assuring that their analysis will help identify the impact of integration under a variety of conditions.

To appropriately analyze the spatial division of labor and the location of industries data are required in a sufficiently disaggregated regional (NUTS-II regions) and industrial break-down (3-digit-industrial classification at least in the manufacturing sector) with respect to employment. In order to analyze effects of the integration process, these indicators are needed in a cross-section, covering two or more decades. To our knowledge, no such data set exists at the European regional level that is internationally comparable (existing data by Eurostat are broken down into 17 sectors, including agriculture, 9 industrial branches, and 5 service branches). Therefore, we will take recourse to nationally available data for each country included. In doing so, we will have to take due attention to systematic differences between the various sources of data. In an attentive procedure, we will provide a set of data as far comparable as possible.

*(ii) Descriptive statistics:* We will calculate various statistic indicators to appropriately measure the degree of regional specialization, such as Gini coefficients, Balassa or Herfindahl indices. Also, the nature of regional specialization, i.e., specialization on the different types of industries, will be described, in order to analyze whether different types of industries are influenced in different ways by the integration process, and with differing effects on the evolution of the regions. This part of the analysis will rely on an a priori identification and classification of such types of industries derived from applying methods on the measurement of scale economies within industries (e.g., Pratten 1988, Oliveira Martins, Scarpetta and Pilat 1996), or on the degree of localization (e.g., Ellison, Glaeser 1997).

*(iii) Econometric analysis:* Using methods of time series analysis, and applying appropriate econometric measures for pooled data sets, respectively, we will investigate

- in how far regional specialization — its degree and its nature — can be traced back to indicators for progress of integration, such as a time trend or the intensity of intra-EU trade.

- the impact of the degree and nature of regional specialization on regional income.

On that basis we hope to overcome a well-known puzzle of regional science: Although it is theoretically well established that regional specialization should significantly influence the growth perspectives of regions, this could not be proven in empirical analysis. Instead, in traditional shift-share-analysis, which tries to separate the structural component of regional growth from the region-specific component, the major influence on regional growth was generally attributed to the region-specific component. Now, in considering the effects of economies of scale on specialization and regional income, it may appear that these components were simply misspecified: the income and growth potentials of IRS industries will not precipitate in the overall average performance of the respective industry, but rather in its performance within the very region in which this industry is concentrated. New promising methods have been developed improving and sophisticating the traditional shift-share-analysis (e.g., Garcia-Mila and McGuire 1993, Esteban 2000, Möller and Tassinopoulos 2000).

Due allowance should be given to the influence of the urban structure within this process of integration and specialization. In particular, it should be analyzed how differentiated urban structures are with respect to size and degree of specialization, and to what degree they affect innovation and economic growth in

the countries and regions under investigation. Due allowance should also be given to existing natural advantages of regions.

*(iv) Classification of regions:* Finally, the results of this investigation will also enable us to characterize regions that are likely to win in the process of EU integration (i.e., regions specializing on industries with a high income potential) and regions that are more likely to lose (i.e., regions specializing on industries with a low income potential).

With a sufficiently detailed data set on European regions, we hope to provide some more explicit answers on regional specialization and on the potential winners and losers of integration in Europe.

# Appendix

Table A1 — Specialization coefficients on industrial value added in Europe

| | | | | | Change | | |
|---|---|---|---|---|---|---|---|
| | 1980 | 1985 | 1990 | 1994 | 1980–85 | 1985–90 | 1990–94 |
| Sweden | 0,3316 | 0,3376 | 0,3501 | 0,3784 | 0,0060 | 0,0125 | 0,0283 |
| Finland | 0,4654 | 0,3680 | 0,3743 | 0,4815 | –0,0974 | 0,0063 | 0,1072 |
| Denmark | 0,3981 | 0,4020 | 0,4133 | 0,4204 | 0,0039 | 0,0113 | 0,0071 |
| Germany | 0,1685 | 0,2033 | 0,1977 | 0,1926 | 0,0348 | –0,0056 | –0,0051 |
| Austria | 0,3026 | 0,3127 | 0,3084 | 0,3154 | 0,0101 | –0,0043 | 0,0070 |
| Netherlands | 0,3243 | 0,3656 | 0,3622 | 0,3246 | 0,0413 | –0,0034 | –0,0376 |
| United Kingdom | 0,1101 | 0,1101 | 0,1142 | 0,1874 | 0,0000 | 0,0041 | 0,0732 |
| France | 0,0888 | 0,1022 | 0,0990 | 0,1305 | 0,0134 | –0,0032 | 0,0315 |
| Italy | 0,2429 | 0,2624 | 0,2665 | 0,2754 | 0,0195 | 0,0041 | 0,0089 |
| Spain | 0,2691 | 0,2870 | 0,2775 | 0,2591 | 0,0179 | –0,0095 | –0,0184 |
| Portugal | 0,5013 | 0,6001 | 0,6189 | 0,5483 | 0,0988 | 0,0188 | –0,0706 |
| Greece | 0,5579 | 0,6175 | 0,6174 | 0,5545 | 0,0596 | –0,0001 | –0,0629 |

Source: OECD. - Own calculations

Table A2 — Specialization coefficients on industrial employment in Europe

| | | | | | Change | | |
|---|---|---|---|---|---|---|---|
| | 1980 | 1985 | 1990 | 1994 | 1980–85 | 1985–90 | 1990–94 |
| Sweden | 0,3223 | 0,3348 | 0,3733 | 0,3603 | 0,0125 | 0,0385 | –0,0130 |
| Finland | 0,5412 | 0,4872 | 0,3656 | 0,3624 | –0,0540 | –0,1216 | –0,0032 |
| Denmark | 0,4325 | 0,4152 | 0,4254 | 0,4303 | –0,0173 | 0,0102 | 0,0049 |
| Germany | 0,2091 | 0,2545 | 0,2863 | 0,2822 | 0,0454 | 0,0318 | –0,0041 |
| Austria | 0,2194 | 0,2177 | 0,2246 | 0,2995 | –0,0017 | 0,0069 | 0,0749 |
| Netherlands | 0,3282 | 0,3634 | 0,3586 | 0,3235 | 0,0352 | –0,0048 | –0,0351 |
| United Kingdom | 0,0970 | 0,0935 | 0,0901 | 0,1520 | –0,0035 | –0,0034 | 0,0619 |
| France | 0,0969 | 0,1098 | 0,1152 | 0,1638 | 0,0129 | 0,0054 | 0,0486 |
| Italy | 0,2281 | 0,2301 | 0,2311 | 0,2185 | 0,0020 | 0,0010 | –0,0126 |
| Spain | 0,2876 | 0,2883 | 0,2876 | 0,3058 | 0,0007 | –0,0007 | 0,0182 |
| Portugal | 0,5787 | 0,6211 | 0,6893 | 0,6702 | 0,0424 | 0,0682 | –0,0191 |
| Greece | 0,5720 | 0,5900 | 0,6120 | 0,5540 | 0,0180 | 0,0220 | –0,0580 |

Source: OECD. - Own calculations

# References


Abdel-Rahman, H.M., and M. Fujita (1993). Specialisation and diversification in a system of cities. *Journal of Urban Economics* 33(2): 165–183.

Alonso, W. (1964). *Location and Land Use*. Cambridge, Mass..

Amiti, M. (1999). Specialization Patterns in Europe. *Weltwirtschaftliches Archiv* 135: 1–21.

Artis, M.J., and W. Zhang (1997). International Business Cycles and the ERM: Is There a European Business Cycle? *International Journal of Finance and Economics* 2:1–16.

Artis, M.J., and W. Zhang (1999). Further Evidence on the International Business Cycle and the ERM: Is There a European Business Cycle? *Oxford Economic Papers* 51:120–132.

Baldwin, R.E., and R. Forslid (2000). The core-periphery model and endogenous growth: stabilizing and destabilizing integration. *Economica* 67: 307-324

Belke, A., and J.P. Heine (2000). On the Endogeneity of an Exogenous OCA-Criterion: The Impact of Specialisation on the Synchronisation of Regional Business Cycles in Europe. Forthcoming.

Black, D., and V. Henderson (1997). Urban Growth. NBER Working Paper 6008. National Bureau of Economic Research, Cambridge, Mass.

Bode, E. (1999). Localized Knowledge Spillovers and Regional Employment: Evidence from Germany. Paper prepared for the final colloquium of the DFG-Schwerpunktprogramm "Technologischer Wandel und Regionalentwicklung in Europa" am 17.–19.6.1999 in Berlin. Mimeo.

Brülhart, M. (1998). Trading Places: Industrial Specialization in the European Union. *Journal of Common Market Studies* 36 (3): 319–346.

Davis, D.R., and D.E. Weinstein (1996). Does Economic Geography Matter for International Specialization? NBER Working Paper 5706. National Bureau of Economic Research, Cambridge, Mass.

Davis, D.R., and D.E. Weinstein (1999). Economic Geography and Regional Production Structure: An Empirical Investigation. *European Economic Review* 43: 379–407.

Dixit, A.K., and J.E. Stiglitz (1977). Monopolistic Competition and Optimum Product Diversity. *American Economic Review* 67 (3): 297–308.

Dluhosch, B. (2000). Industrial Location and Economic Integration. Centrifugal and Centripetal Forces in the New Europe. Cheltenham.

Dumais, G., G. Ellison, and E.L. Glaeser (1997). Geographic Concentration as a Dynamic Process. NBER Working Paper 6270. Cambridge, Mass.

Duranton, G., and D. Puga (1999). Diversity and Specialisation in Cities: Why, Where and When Does it Matter? Discussion Paper UAB-IAE 443.99.

Eaton, J., and Z. Eckstein (1997). Cities and Growth: Theory and Evidence from France and Japan. *Regional Science and Urban Economics* 27 (4–5): 443–474.

Ellison, G., and E.L. Glaeser (1997). Geographic Concentration in U.S. Manufacturing Industries: A Dartboard Approach. *Journal of Political Economy* 105 (5): 889–927.

Esteban, J. (2000). Regional Convergence in Europe and the Industry Mix: a Shift-Share Analysis. *Regional Science and Urban Economics* 353–364.

EU-Commission (1995). Europe 2000+ — European Cooperation in Spatial Development. Brussels.

EU-Commission (1996). First Cohesion Report. Brussels.

EU-Commission (1999a). 6th Periodical Report on the Socio-economic Situation and Development of the Regions in the EU. Brussels.

EU-Commission (1999b). The Competitiveness of European Industry. 1999 Report. Brussels.

Feldman, M.P., and D.B. Audretsch (1999). Innovation in cities: Science-based diversity, specialization and localized competition. *European Economic Review* 43 (2): 409–429.

Frankel, J., and A.K. Rose (1998). The Endogeneity of the Optimum Currency Area Criteria. *Economic Journal* 108:1009–1025.

Fujita, M., P. Krugman and T. Mori (1999). On the evolution of hierarchical urban systems. *European Economic Journal* 43 (2):209–251.

Fujita, M., P. Krugman and A.J. Venables (1999). *The Spatial Economy: Cities, Regions and International Trade*. Cambridge (Mass.).

Garcia-Mila, T., and T. McGuire (1993). Industrial Mix as a Factor in the Growth and Variability of State's Economies. *Regional Science and Urban Economics* 23: 731–748.

Glaeser, E.L. (1999). Learning in Cities. *Journal of Urban Economics* 46: 254–277.

Glaeser, E.L., H.D. Kallal, J.A. Scheinkman, and A. Shleifer (1992). Growth in cities. *Journal of Political Economy* 100: 1126–1152.

Hallet, M. (2000). Regional Specialisation and Concentration in the EU.

Helg, R., P. Manasse, T. Monacelli and R. Rovelli (1995). How Much (A)symmetry in Europe? Evidence from Industrial Sectors. *Centro Studi sui Processi di Internazionalizzazion. Working Paper* 82. Milan.

Henderson, J.V. (1974). The Sizes and Types of Cities. *American Economic Review* 64: 640–656.

Henderson, J.V., A. Kuncoro, and M. Turner (1995). Industrial Development in Cities. *Journal of Political Economy* 103(5): 387–410.

Hufbauer, G.C., and J.G. Chilas (1974). Specialization by Industrial Countries: Extent and Consequences. In H. Giersch (ed.), *The International Division of Labour*. Tübingen.

Imbs, J. (1999). Co-Fluctuations. CEPR Discussion Paper 2267. London.

Imbs, J. (2000). Sectors and the OECD Business Cycle. CEPR Discussion Paper 2473. London.

Junius, K. (1999). *The Economic Geography of Production, Trade and Development*. Kieler Studien 300. Tübingen.

Kopp, A. (2000a). Openness, Intermediate Imports, and Growth. Kiel Working Paper 996. Institute of World Economics, Kiel.

Kopp, A. (2000b). The Structure of Urbanization and Growth. Kiel Working Paper. Institute of World Economics, Kiel, forthcoming.

Krieger, C., C. Thoroe, and W. Weskamp (1985). *Regionales Wirtschaftswachstum und sektoraler Strukturwandel in der Europäischen Gemeinschaft.* Kieler Studien 194. Tübingen.

Krieger-Boden, C. (1995). *Die räumliche Dimension in der Wirtschaftstheorie. Ältere und neuere Erklärungsansätze.* Kiel.

Krieger-Boden, C. (1999). Nationale und regionale Spezialisierungsmuster im europäischen Vergleich. *Die Weltwirtschaft* 1999 (2): 234–254.

Krugman, P. (1991). *Geography and Trade.* Leuven.

Krugman, P. (1998). What's New about the New Economic Geography? *Oxford Review of Economic Policy* 14 (2): 7–17.

Krugman, P., and A.J. Venables (1995). Globalization and the Inequality of Nations. *Quarterly Journal of Economics* 110 (4): 857–880.

Markusen, J., and A. Venables (1999). Foreign direct investment as a catalyst for industrial development. *European Economic Review* 43 (2): 335–356.

Martin, P., and G.I.P. Ottaviano (1999). Growing locations: Industry location in a model of endogenous growth. *European Economic Review* 43 (2):281–302.

Maurel, F., and B. Sédillot (1999). A Measure of the Geographic Concentration in French Manufacturing Industries. *Regional Science and Urban Economics* 29: 575–604.

Middelfart-Knarvig, K.H., H.G. Overman, S.J. Redding, and A.J. Venables (2000). The Location of European Industry. Report prepared to the Directorate General for Economic and Financial Affairs, European Commission. Economic Papers 142, ECFIN/318/00-EN.

Möller, J., and A. Tassinopoulos (2000). Zunehmende Spezialisierung oder Strukturkonvergenz? Eine Analyse der sektoralen Beschäftigungsentwicklung auf regionaler Ebene. *Jahrbuch für Regionalwissenschaft* 20 (1): 1–38.

Molle, W. (1980). *Regional Disparity and Regional Development in the European Community*. Farnborough.

Molle, W., and S. Boeckhout (1995). Economic Disparity under Conditions of Integration — A Long Term View of the European Case. *Papers in Regional Science* 74 (2): 105–123.

de Nardis, S., A. Goglio, and M. Malgarini (1996). Regional Specialization and Shocks in Europe: Some Evidence from Regional Data. *Weltwirtschaftliches Archiv* 132 (2): 197–214.

OECD (Organisation for Economic Co-operation and Development). OSC-Data.

OECD (Organisation for Economic Co-operation and Development) (1987). *Structural Adjustment and Economic Performance.* Paris.

Oliveira Martins, J., S. Scarpetta, and D. Pilat (1996). Mark-up Ratios in Manufacturing Industries. Estimates for 14 OECD Countries. OECD Working Papers — Economic Department Working Papers (IV) 24. Paris.

Ottaviano, G. I. P., and D. Puga (1997). Agglomeration in the Global Economy: A Survey of the „New Economic Geography". CEPR Discussion Paper 1699. Centre for Economic Policy Research, London.

Pratten, C. (1988). A Survey of the Economies of Scale. In Commission of the European Communities, *Research on the „Cost of Non-Europe.* Volume 2: *Studies on the Economics of Integration.* Luxembourg.

Puga, D. (1998). European Regional Policy in Light of Recent Location Theories. Draft <http://dpuga.eco.utoronto.ca>

Puga, D. (1999). The Rise and Fall of Regional Inequalities. *European Economic Review* 43: 303–334.

Rosen, K.T., and M. Resnick (1980). The Size Distribution of Cities: An Examination of the Pareto Law and Primacy. *Journal of Urban Economics* 8: 165–186.

Samuelson, P.a. (1952). The Transfer Problem and Transport Costs: The Terms of Trade when Impediments are Absent. *Economic Journal* 62: 278–304.

Services des Statistiques Industrielle (SESSI). Enquête Annuelle d' Entreprises. Paris.

Siebert, H., and A. Kopp (2000). *Globalization, Technology Transfer and Urbanization*. Kieler Studie. Tübingen, forthcoming.

von Thünen, J.H. (1826). *Der isolierte Staat in Beziehung auf Landwirtschaft und Nationalökonomie*. I. Teil. Berlin.

Venables, A.J. (1996). Equilibrium Locations of Vertically Linked Industries. *International Economic Review* 37: 341–359.

Venables, A.J., and N. Limao (1999). Geographical disadvantage: A Heckscher-Ohlin-von Thunen model of international specialization. CEPR Discussion Paper 2305. London.

Walz, U. (1999). Dynamics of Regional Integration. Heidelberg.

Waniek, R.W. (1995). Sektoraler und raumstruktureller Wandel in Europa. In H. Karl und W. Henrichsmeyer (Hrsg.), *Regionalentwicklung im Prozeß der Europäischen Integration*. Bonner Schriften zur Integration Europas 4. Bonn.