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Structural change in urban growth

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Structural Change in Urban Growth

by

Henning Klodt

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I. Introduction*

The so-called industrial countries are by no means industrial any more. On average, employment of the industrial sector accounts for less than 40 percent of total employment in the OECD countries; in the United States it accounts for even less than 20 percent. The reasons behind the ongoing shifts from manufacturing to services are quite well understood. It seems less clear, however, how structural adjustment in the economy as a whole affects regional development within countries. It is the basic purpose of this paper to shed some light on the relationship between structural change at the aggregate level and the economic performance of urban and rural areas. It concentrates on the West German experience, but the general conclusions to be drawn from the analysis can probably be applied to other countries as well.

As a rule, the share of services is substantially higher in cities than in the countryside. In addition, income per head tends to be higher in cities. It could be expected, therefore, that the growth advantage of service activities over industrial activities would boost urban agglomeration and enlarge the income gap between urban and rural areas. It could further be expected that the expansion of service activities would increasingly drive industrial activities out of urban areas. In the following sections, it will be shown that none of these hypotheses holds - at least for the case of the West German economy. In rural areas, aggregate output growth was higher than in urban areas, and the shift from manufacturing to services was

* The paper was presented at the Symposium "Urban Agglomerations and Economic Growth", held by the Egon-Sohmen-Foundation, Zürich, August 20-22, 1993. The author gratefully acknowledges the helpful comments and suggestions from the participants of the Symposium, above all from Jeffrey Williamson.

more pronounced. The paper intends to explore these trends empirically and to provide some theoretical considerations that are concerned with the impact of new technologies on regional development.

There is a broad literature both on structural change at the sectoral level and on regional development. Nevertheless, the links between these two fields of research are few and far between. The paper starts from the analysis of structural change at the aggregate level (section II) and then evaluates the consequences of structural change for regional development (section III). The central message is that a better understanding of structural change between different industries may help to explain the differing growth performance of urban and rural areas.

II. The shift towards services

1. The share of services in the West German economy

Structural change between different sectors of an economy are in general measured in nominal output terms, in real output terms or in employment terms. The share of services in nominal output and employment tends to increase in the course of economic development. This pattern, that shows up in cross-country and time-series analyses as well, was already predicted by Colin Clark (1940) and Jean Fourastié (1949) and was empirically validated by Hollis B. Chenery (1960) and Simon Kuznets (1957, 1966) for a number of different countries. It also applies to the case of the West German economy (Donges, Klodt, Schmidt, 1989). The empirical evidence on the share of services in real output is less unequivocal. In some countries it rises or declines; in other countries it shows no systematic trend at all. If one looks for the stylized facts of structural change in real terms,

the assumption of constant service shares seems to be more appropriate than other assumptions (Kravis, Heston, Summers, 1983; Lawrence, 1984).

These stylized facts can be reproduced by a simple two-sector model, where it is assumed that productivity in services grows at a lower rate than in manufacturing (productivity bias) and that the income elasticity of the demand for services exceeds unity, whereas the corresponding elasticity for manufactured goods is below unity. When labour (l) is the only production factor and the productivity levels at $t = 0$ are equal across sectors, the development of output per worker (x/l) in services (s) and manufacturing (m) can be written as follows:¹

$$(1) \quad \frac{x_s}{l_s} = A e^{rkt}; \quad 0 < r < 1$$

$$(2) \quad \frac{x_m}{l_m} = A e^{kt}$$

If wages in services and in manufacturing are identical within countries and if markets are competitive, the price ratio (p_s/p_m) will be determined by the productivity ratio.

$$(3) \quad \frac{p_s}{p_m} = e^{kt(1-r)}$$

If there were no demand bias, the relative price increase of services over time would result in a decreasing share of services in real output. In this model, however, it is assumed that the demand bias just offsets the impact of the productivity bias on real output shares. Hence, the share of services in total output does not vary over time and can be written as

¹ For convenience, the t subscript is omitted in the following equations.

$$(4) \quad x_s = c(x_s + x_m) \quad 0 < c < 1,$$

where c is a constant.²

When the price of manufactured goods is taken as numéraire, the share of services in nominal output can be calculated as follows:

$$(5) \quad \frac{p_s x_s}{p_s x_s + x_m} = \frac{1}{1 + (\frac{1}{c} - 1)e^{(r-1)kt}}$$

This share increases over time. With uniform nominal wages across industries, the share of service employment in total employment is equal to the service share in nominal output and will also increase over time.³

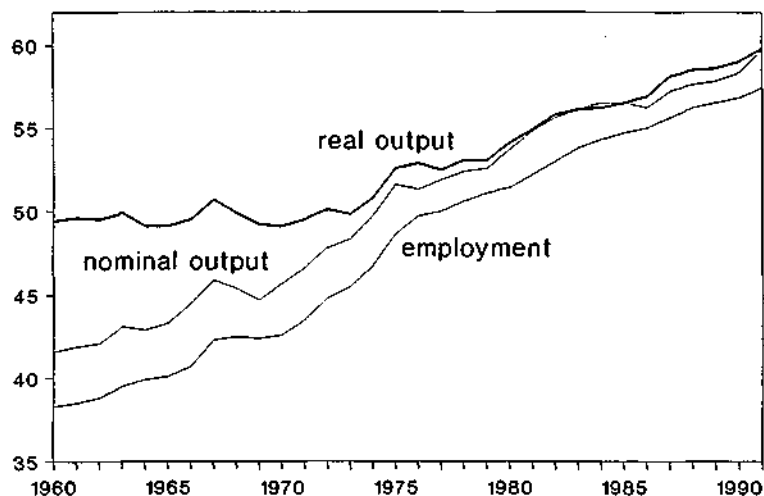
In order to keep it simple, the model ignores intermediate inputs. They can not be ignored, however, in empirical examinations of the predictions of the model. On the supply side, structural change is mainly determined by relative price changes of value added, whereas on the demand side it are the relative prices of gross output that count. As the following analysis concentrates on changes in sectoral supply conditions, all data on nominal and real output refer to value added. This choice is supported by pragmatic considerations, because the German statistics on national accounts provide highly disaggregated data at constant prices only for gross value added and not for gross output. Moreover, the sectorally and region-

² Equation (4) implicitly assumes that the income elasticity of services demand exceeds unity.

³ If the assumption of identical wages across industries is replaced by the less restrictive assumption of constant interindustry wage differentials, the employment share of the high-wage sector will be lower than its share in nominal output, but the change rates of the sectoral shares in nominal output and employment will still be identical. As a matter of fact, interindustry wage differentials are surprisingly stable over time (Thaler, 1989).

ally disaggregated data on national accounts that are examined in section III are available for gross value added only.

Figure 1 - Share of services in the West German economy (percent)



Source: Statistisches Bundesamt (a).

With respect to these considerations the empirical evidence for West Germany shows a rather good fit to the above described model for the period from 1960 to the mid seventies (Figure 1). In 1973, however, the share of services in real output began to rise, and in the following years it kept pace with the development of the shares in nominal output and employment. In the framework of the above described model this turnaround in the pattern of structural change can only be explained by a vanishing productivity bias (i.e. by an increase of r in equation (1)

towards unity).⁴ Such an assertion strictly contradicts to the widespread belief that most jobs in services are bad jobs and that economic prosperity centrally results from technical progress in the industrial sector. In order to identify the determinants behind the changing pattern of structural adjustment and its implications for regional development it seems appropriate to have a closer look at the service sector itself.

2. The service sector is changing its face

a) Two types of services

The service sector as a whole covers a broad range of industries that significantly differ in their economic performance and their distribution in space. Some service industries grow fast, others even shrink; some are highly centralised in specific areas, other are scattered over the whole country. Various authors have suggested to divide the service sector into sub-categories that take account of these differences. For the purpose of regional analysis, the most promising (but rarely noticed) approach was proposed by Bhagwati (1984), who distinguishes between embodied and disembodied services:⁵

- The provision of *embodied services* requires a close physical proximity of producers and consumers. Some of these services are directly related to private households and could also be described as "traditional services" (house servants, barber shops, laundries); others are concerned with shipping industrial

⁴ In this model, a steady increase of τ would imply a smoothly increasing real output share of services rather than a sudden change. The kink in the trend shown in Figure 1 probably reflects the impact of the significant real exchange rate changes on the relative price of tradables and non-tradables.

⁵ See also Bhagwati (1987).

goods to the consumers and could be described as "complementary services" (wholesale and retail trade, transportation).⁶

- *Disembodied services* do not necessarily require personal contacts between producers and consumers, but can also be provided over long distances. They basically consist of information that is provided by the producers and that can be transmitted from one place to the other without direct contacts between providers and users. Typical examples are financial and insurance services or the advices of lawyers, weather forecasters and economists.

Of course, the border line between these two categories is somewhat arbitrary and may change over time. The provision of insurance services, for instance, does in general not require direct personal contacts between the employees of the insurance company and their clients, but new contracts are usually negotiated in face to face meetings. Thus, at least part of insurance services can be regarded as embodied, whereas the main part is produced in a disembodied manner. Moreover, the available statistics do not always allow a strict separation of embodied and disembodied services. In German national accounts statistics, this mainly applies to the residual group "business and personal services" that can not be disaggregated further.⁷

⁶ The distinction of traditional, complementary and new services was proposed by Katouzian (1970). It should be noted, however, that the categories suggested by Bhagwati and Katouzian do not perfectly match.

⁷ According to additional information from the Federal Statistical Office this sub-sector is dominated by business services that belong to the category of disembodied services.

Table 1 - Share of service industries in real GDP (at 1985 prices)

Industry	1960	1970	1980	1990
Total services	49.4	49.0	54.1	59.0
Embodied services	19.3	18.1	17.9	17.7
Wholesale and retail trade	9.1	9.4	9.2	9.0
Transport	3.8	3.7	3.6	3.7
Hotels, restaurants	2.3	1.6	1.4	1.2
Education, science	2.3	1.6	1.5	1.6
Health care	1.8	1.8	2.2	2.2
Disembodied services	9.6	11.9	15.5	21.0
Communication	1.2	1.4	2.1	2.6
Banking, insurance	2.7	4.2	5.4	6.4
Business and personal services	5.7	6.3	8.0	12.0
Real estate	6.4	5.8	6.8	7.2
Government, private households, private non-profit	14.1	13.2	14.0	13.0

Source: Statistisches Bundesamt (a).

Table 1 describes the development of real output shares of embodied and disembodied services over time. Real estate was excluded, because the inclusion of this sector in the national accounts is very incomplete and rather arbitrary. Government and private household services are excluded, because the meaning of "real" output of this sector is rather ambiguous. For the remaining service industries it shows up that the weight of embodied services in the total economy is continuously declining, whereas disembodied services are rapidly expanding. In relative terms, the expansion of real output was most distinct in communication services and in business and personal services.

An evaluation of the impact of these intra-sectoral shifts on the productivity performance of the whole service sector requires a closer look at the prospects for productivity advances in the specific service industries.

b) *The productivity bias is disappearing*

The individual service industries differ not only with respect to output growth, but also with respect to productivity improvements. In those embodied services that can be regarded as traditional ones, the potentials for productivity growth are rather limited. The benefits of these services for the consumer often directly depend on the labour input of the service producer, and a reduction of labour input per unit of output in general reduces the quality of the respective service. In the words of Baumol (1967), "a half-hour horn quintet calls for the expenditure of 2½ man hours in its performance, and any attempt to increase productivity here is likely to be viewed with concern by critics and audience alike".⁸

As productivity grows in other sectors, the wage level in the economy rises, and traditional embodied services become more and more expensive. They turn into luxury goods that can only be afforded by the rich, whereas every day people tend to replace them by industrial goods - such as washing machines and vacuum cleaners as substitutes for house servants, or television sets and compact discs as substitutes for life performances.⁹ As a consequence, fewer and fewer people are

⁸ In a more recent publication, however, Baumol explicitly takes note of the potential for significant productivity increases in service activities other than the performance of concerts (Baumol et al., 1989).

⁹ Gershuny (1978) has described this substitution process as the emergence of the self-service economy.

employed in the sub-sector of traditional embodied services, and its share in nominal and real output declines.

The prospects for productivity growth in those embodied services that are complementary to industrial production do not differ substantially from long term productivity growth in the industrial sector itself. Their output expansion is restricted, however, by the same demand trends that restrict the expansion of industrial output. When the production of industrial goods increases by a certain amount, transport and trade activities will increase by roughly the same amount. When the share of the industrial sector in total employment declines (as predicted by the model of the previous section), the employment share of complementary services will probably decline as well.

The demand for disembodied services increases for its own reasons. When people get wealthier, for instance, they are more concerned with security issues, and their demand for insurance services rises. When legal frameworks and contracts become more complex, the advice of lawyers is required more often. And when products are increasingly differentiated, market success more and more depends on adequate advertising. An efficient industrial base is a prerequisite for an expansion of this type of services, because the demand for disembodied services tends to rise with per-capita income, but the total amount of disembodied services that people want to consume is not restricted by the size of the industrial sector. Hence, it can be expected that the income elasticity of the demand for disembodied services in general exceeds unity.

Disembodied services face very promising opportunities also with respect to productivity improvements, because they strongly benefit from new developments in information and communication technologies. As already stated, disembodied

services basically consist of information. Financial institutions provide information about capital markets, lawyers inform their clients about legal rules, and advertisers sometimes even create new information about the products they are praising. In the past two decades the outstanding feature of technological progress was the dramatic decline in the relative price of information due to the microelectronics revolution and related technology improvements. This development has strongly increased the productivity potential of disembodied services and has enabled these industries to provide a variety of new services that could not have been produced at reasonable costs without the micro-chip.

As Table 2 indicates, disembodied services are facing an advantage over embodied services both in the level and in the growth rate of labour productivity. In the 1980s, the productivity advance in services even exceeded the advance in industry. Apparently, structural change within the service sector has significantly contributed to the reduction of the productivity disadvantage of the whole service sector as compared to the industrial sector.

Hence, the changing internal structure of the service sector can be regarded as the main reason why the share of services in real output of the whole economy is rising since the early seventies. The demand bias in favour of services is no longer neutralized by the productivity bias in favour of industry. In the following section it will be discussed how the transformation of the service sector has affected the regional distribution of service producers and the relative growth performance of urban and rural areas.

Table 2 - Level and growth rate of labour productivity in the service sector by industry

Industry	1000 DM per employee (at 1985 prices)				average annual growth rate (percent)			
	1960	1970	1980	1990	60-90	60-70	70-80	80-90
Total services (a)	33.3	49.8	62.4	76.8	2.83	4.12	2.28	2.10
Embodied services	29.1	41.5	48.5	53.9	2.07	3.60	1.57	1.06
Wholesale and retail trade	22.5	35.4	43.6	50.2	2.71	4.62	2.11	1.43
Transport	29.2	48.2	58.9	72.6	3.08	5.14	2.03	2.10
Hotels, restaurants	31.8	30.2	31.8	28.2	-0.40	-0.51	0.52	-1.20
Education, science	81.4	96.1	69.8	75.1	-0.27	1.67	-3.15	0.74
Health care	66.6	76.0	70.2	64.5	-0.11	1.34	-0.80	-0.84
Disembodied services	46.6	71.1	93.1	120.4	3.21	4.31	2.74	2.60
Communication	24.5	40.0	67.5	103.8	4.93	5.04	5.36	4.40
Banking, insurance	57.7	89.5	119.5	148.7	3.21	4.48	2.94	2.21
Business and personal services	51.7	73.9	88.6	112.8	2.63	3.65	1.83	2.44
Government, private households, private non-profit	39.9	45.7	47.8	48.5	0.65	1.37	0.45	0.14
For comparison:								
Goods producing sector (b)	31.1	47.5	62.7	72.0	2.84	4.33	2.82	1.39

(a) Excluding real estate. - (b) Mining, manufacturing, construction, utilities.

Source: Statistisches Bundesamt (a).

III. The industrial structure of regions

1. Locational decisions of service producers

If land were not a scarce factor, all the economic activity of countries or even the world would probably concentrate in one location. With scarcity of land, the most attractive business locations will be occupied by those industries that are willing to pay the highest price for real estate.¹⁰ The willingness to pay in turn depends on the industry-specific cost advantages of producing in specific areas. These cost advantages depend on several factors:¹¹

- transport costs from shipping the products to the customers and from acquiring intermediate inputs;
- economies of scale that can be achieved by geographical concentration of production;
- localization economies that arise from geographical proximity to other producers within the same industry or technologically related industries;
- urbanization economies that are related to the density of population and overall economic activity of regions.¹²

¹⁰ Of course, the competition among firms for business locations is complemented by the competition for other purposes, in particular for residential or public purposes.

¹¹ For a survey see Stahl (1987).

¹² The distinction of "localization economies" and "urbanization economies" was originally proposed by Hoover (1937). Both can be summarized as agglomeration economies. For a detailed discussion see the contribution of Richardson (1993) to this conference. The results of Glaeser et al. (1991) on the growth performance of specific industries in different U.S. cities are indicating that urbanization economies are more important than localization economies.

It can be expected that these types of cost advantages significantly differ across industries. In embodied services, for instance, economies of scale and agglomeration economies are only of minor importance, and transport costs over long distances are often prohibitively high. The suppliers of these services will try to establish their business as close to the customers as possible. In consequence, the regional distribution of embodied services will more or less follow the distribution of global economic activities and people. Transport activities may be of greater relative importance in rural than in urban areas, and highly specialised shops may tend to concentrate in big cities, where markets are sufficiently large, but there is no reason to expect that embodied services as a whole would tend to cluster in specific agglomeration centres.

The pressure to follow the locational decisions of customers is much less pronounced for providers of disembodied services. If there were no cost advantages of clustering, however, they would also tend to disperse in space, because the quality of this type of services largely depends on close contacts between producers and consumers (the lawyer has to know the details of your case, the portfolio analyst must take your risk preferences into account, and the consultant has to inspect the company that he wants to advise). On the other hand, disembodied services can also be provided to far distant customers, for instance by electronic communication facilities. It will mainly depend on the relative importance of scale economies and agglomeration economies, whether it pays for the providers of disembodied services to concentrate in specific regions. The available evidence suggests that the advantages of regional concentration significantly differ between the separate industries of this sub-sector:

- In communication, banking and insurance, economies of scale seem to be substantial. Moreover, localization economies play a dominant role. They probably result from knowledge spillovers between firms within the same industry and from the emergence of communication networks at the local level, that are often based upon informal personal contacts. Moreover, these industries heavily depend on specialised workers; and regional concentration can promote the emergence of labour market pools. The existence of localization economies is the most plausible explanation for the fact that most German banking headquarters are located in Frankfurt and most insurance headquarters in Cologne.¹³ These industries within the sub-sector of disembodied services can be labelled as *urban services*, because they seem almost unable to survive in rural areas. On the other hand, it should be recognized that these arguments centrally apply to the headquarters of the cited industries; their branch offices are in general widely dispersed over different regions.
- In business services, on the other hand, scale and agglomeration economies seem to play no decisive role. It may be important for the producers of those services to be in close contact with their customers, but they are rather independent from the locational decisions of other producers within the same industry or in related industries. As a consequence, there are no strong reasons for regional clustering. For many companies in this industry, it may be more difficult to persuade qualified workers to move to densely populated areas than to areas where the landscape and climate are attractive and where traffic jams

¹³ The city where this conference takes place provides another example for the tendency of banking headquarters to cluster in specific locations.

are rare. When compared to urban services, most business services can be called *footloose services*.

As a result of these considerations, it can be expected that urban disembodied services are highly concentrated in urban centres, that the regional distribution of embodied services more or less follows the regional distribution of aggregate economic activity, and that footloose disembodied services prefer urban areas near big cities, where the conditions of living are more attractive than in crowded agglomeration centres. All these types of services have to compete, however, with manufacturing companies when they look for appropriate locations. A full picture of the regional distribution of economic activity has to take into account, therefore, the locational decisions of manufacturing industries. With respect to these decisions, the manufacturing sector is far from homogenous. It can be argued, however, that physical proximity to customers is less important and that scale economies at the plant level are much more important than in service industries. They will tend, therefore, to cluster in or near agglomeration centres, although they will in general not be willing to accept the high rental prices that are paid by urban services in city centres.¹⁴

A simple model may help to explain what spatial pattern of sectoral specialisation will emerge from these diverging interests in competition for locations. For this purpose, it is assumed that the spatial structure of the economy is one-dimensional with one centre and a continuum of locations that are described by their distance to the centre. This distance (d) should be interpreted as economic distance that is

¹⁴ For the United States, the extent of regional clustering of manufacturing industries is described by Krugman (1991). In his view, these clusters can mainly be explained by path dependency in regional development.

not necessarily identical to geographical distance, but also depends on the quality of roads, communication networks etc. If markets are competitive, firms are price-takers and earn zero profits. If the output price of industry i is given by p_i for all regions, and average costs per unit of output (excluding rents) are given by c_i , industry i will be willing to pay a real estate price per unit of output that equals the difference between p_i and c_i .

$$(6) \quad r_i(d) = p_i - c_i(d)$$

Due to the market size of the centre and due to the existence of scale and agglomeration economies, the costs per unit of output increase with d .

$$(7) \quad \frac{\partial c_i(d)}{\partial d} > 0$$

Hence, the reservation price for real estate decreases with d .

For the service sector as a whole, the reservation price for real estate at different locations and at time $t = 0$ is described by the bid function s_0 in Figure 2, where C denotes the centre and P denotes the periphery.¹⁵ The upper left part of this function mainly represents the real estate prices that are offered by urban disembodied services for locations in the cores of urban areas, whereas the right-hand part represents the bids for real estate from footloose disembodied services and embodied services. The corresponding bid function of the manufacturing sector is given by m . In accordance with the above described reasoning, it can be argued that m is

¹⁵ For a more detailed description of bid functions for real estate see Stahl (1987).

less convex than s_0 , because the distance costs are less pronounced than in urban services and more pronounced than in footloose services.

If the region under consideration is not completely specialised on services or on manufacturing, s_0 and m will intersect once or twice. Under the constellation of Figure 2, services will outcompete manufacturing in the bid for real estate in locations between C and d^* and in locations between d^{**} and P , whereas manufacturing offers higher real estate prices than services in locations between d^* and d^{**} . The envelope of s_0 and m gives the real estate prices that are actually paid in the different locations. With b denoting the city border, the share of services is given by $\overline{Cd_0} / \overline{Cb}$ in urban areas and by $\overline{d_0^* P} / \overline{bP}$ in rural areas.

Of course, the model is unrealistic to some extent, as it predicts the existence of a pure service core that is surrounded by separate Thünen rings of manufacturing and services. In reality, both service and manufacturing companies can be found at similar distances from agglomeration centres. Nevertheless, the prediction that the service intensity of agglomeration cores and the outer periphery is higher than that of outer urban and central rural areas seems to be in line with the empirical evidence. The Thünen rings of Figure 2 should be interpreted, therefore, as a stylized representation of the basic pattern of the regional distribution of industries.

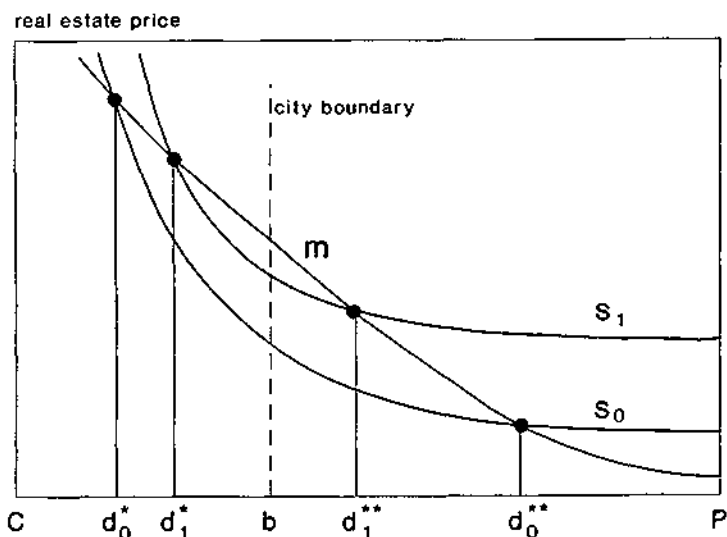
2. Technical progress and regional development

a) *Shifting bid functions*

The impact of structural adjustment on the regional distribution of industries can be analyzed by shifts of the respective bid functions for real estate in Figure 2.

When productivity grows in both sectors (i.e. when c_i in equation (6) declines), both s_0 and m will shift upwards and real estate prices will rise in all locations. However, when the relative importance of distance costs in manufacturing does not vary over time and, for the sake of facilitating graphical illustration, real estate prices are deflated by the productivity increase in manufacturing, the bid function m will not change over time. The general trend of structural change towards services will then show up in a shift of s_0 only.

Figure 2 - Bid functions for real estate by sector



When technical progress would not alter the relative distance costs in service industries, this shift would be a parallel one. As already mentioned, however, new technologies are very significantly influencing the relative costs of providing services across long distances. Especially for disembodied footloose services the

cost disadvantage of peripheral locations is decreasing with the advent of new information and communication technologies.¹⁶ As a result, s_0 is not only shifted upwards, but also twisted. Moreover, the decline of the relative price of information is shifting the border line between embodied and disembodied services, because it is increasingly attractive to provide also those services in a disembodied manner that were provided as embodied services in the past. This process of "disembodiment" (Bhagwati, 1984) adds to the non-parallel shift of s_0 . Hence, the vertical distance between s_0 and s_1 increases with distance from the centre.

The new service shares are given by \overline{Cd}_1^*/Cb and \overline{bd}_1^*/bP in urban and rural areas respectively. The general result of the upward shift of s_0 relative to m is a decreasing share of services both in urban and rural areas. Due to the non-parallel shift of s_0 , however, the process of deindustrialization is most distinct in rural areas.¹⁷ This result strongly contradicts to the widespread belief that urban areas are the principal beneficiaries of the ongoing structural shift from manufacturing to services (see, e.g., Daniels, 1987; Senn, 1993). In our model, the growth of services does not primarily take place in cities, but in urban areas. In the following, it will be demonstrated that this prediction is supported by the empirical evidence for the West German economy.

¹⁶ The impact of new information and communication technologies on the provision of services is discussed in detail in several contributions to Daniels (1991).

¹⁷ More precisely: $\overline{d}_1^* \overline{d}_0^{**} > \overline{d}_0^* \overline{d}_1^*$. It depends on the initial conditions and the concrete location of the city boundary, whether the higher absolute increase of service activities in rural areas is equivalent to a higher relative increase. If the ratio of the absolute increases of service activities exceeds the ratio of the absolute sizes of the service sector in rural and urban areas at $t = 0$ ($\overline{d}_1^* \overline{d}_0^{**} / \overline{d}_0^* \overline{d}_1^* > \overline{d}_0^{**} P / \overline{Cd}_0^*$), then the increase of service activities in rural areas exceeds the increase in urban areas also in relative terms.

b) *Structural change in urban and rural areas in West Germany*

An optimal data-base for analyzing the links between structural change and regional development would be highly disaggregated both by industry and by region. As a matter of fact, the available data for the West German economy are highly disaggregated either by industry or by region. Regional data are available at the level of 11 states (Bundesländer) or about 350 districts (Kreise). For our purpose, the data by district, that are available for the years 1970, 1980 and 1988, seem to be most appropriate. Unfortunately, they only contain information on nominal gross value added for five main sectors, whereas disaggregated data on real value added and employment are completely missing. Moreover, the sectoral disaggregation varies among districts and over time. If we want to compare the sectoral structure for all districts over the whole period since 1970, we can only distinguish between service activities (including government services) and non-service activities (agriculture, mining, manufacturing, utilities and construction).¹⁸

In Germany, there exist two types of districts: urban districts (kreisfreie Städte) and rural districts (Landkreise). Urban districts in general consist of individual cities, whereas rural districts are constituted by rural areas, villages and towns with the biggest town as the capital. These two types of districts allow to distinguish between densely and less densely populated areas.¹⁹ A strong impediment to

¹⁸ An extension of the analysis back to the sixties would raise severe data problems, because the geographical borders of many districts have changed.

¹⁹ In many empirical studies agglomeration centres are simply identified by the absolute number of inhabitants or the size of aggregate output. For the case of Germany, this would be severely misleading, because several large rural districts have more inhabitants than some urban districts, although the number of people per unit of land is generally higher in urban districts.

statistical comparisons over time are the administrative reforms that were conducted in North-Rhine-Westfalia and to some extent also in other states and that changed the demarcation lines between a number of districts. For 1980, the statistical offices of the states have provided a revised data set that takes account of the district reforms during the 1980s and that is comparable to the 1988 data set. For the 1970 data this adjustment had to be carried out by the author himself. In most cases, the administrative reforms of the 1970s and 1980s were conducted by merging small districts into bigger ones without changing the borders to third districts. In the few cases where the new border lines are not identical to the old ones, those old districts that were split up by the administrative reforms were included in that new district that absorbed the larger part of the respective split-up district.²⁰

All in all, the growth rate of aggregate nominal output in rural areas exceeded the growth rate in urban areas in the period from 1970 to 1988 (Table 3). The growth advantage of the poorer rural districts can be interpreted as a result of catching-up processes that can also be observed at the international level between rich and poor countries.²¹ It can further be interpreted as a first hint that the general structural trend towards services in the West German economy did not foster agglomeration and did not deteriorate the growth prospects of less service-intensive regions.

²⁰ A list of concordance between the districts of 1970 and 1988 is available from the author upon request.

²¹ Convergence of regions has also been reported for the United States by Blanchard and Katz (1992). It is not intended here to comment upon the vast literature on catching-up, convergence and conditional convergence stimulated by the new growth theories that appeared in the past years. For a survey of this literature and some empirical evidence for the OECD countries see Klodt (1993).

Table 3 - Average annual growth rate of aggregate nominal output in urban and rural districts 1970 to 1988 (percent)

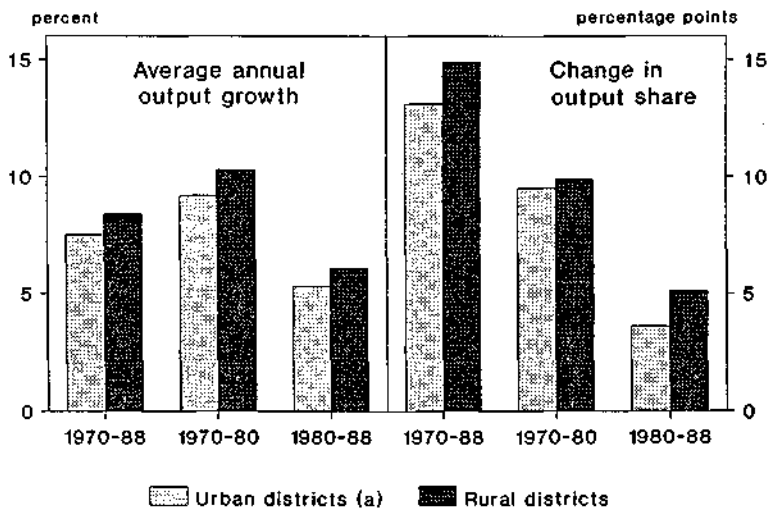
	Urban districts	Rural districts
1970-88	6.1	6.5
1970-80	7.3	7.8
1980-88	4.5	4.8

Source: Gemeinschaftsveröffentlichung der Statistischen Landesämter (1978, 1991); own calculations.

At the beginning of the 1970s, service industries accounted for 49.5 percent of aggregate output in urban districts and for 38.0 percent in rural districts. Both in the 1970s and 1980s, however, output growth of services and changes in output shares were higher in rural than in urban areas (Figure 3). The expansion of the service sector did not primarily take place in regions with high service sector shares, but was accompanied by substantial locational shifts of service production from urban to rural districts. These locational shifts were stimulated by the emergence of new information and communication technologies that increasingly enabled service producers to provide disembodied services over long distances to their customers and to shift production to areas where congestion is low and real estate is cheap. The winners are probably those rural districts that are not too far away from metropolitan centres.

The different speed of structural change towards services between urban and rural districts can also be observed at the level of individual states (Table 4). The only exceptions are Lower Saxony for the whole period from 1970 to 1988 and Lower Saxony, Rhine-Palatine and Bavaria for the 1970s. In the 1980s, the increase in the output share of services in rural districts exceeded the increase in urban districts for all states.

Figure 3 - Output growth and output share of services in urban and rural districts



(a) Including city states.

Source: Gemeinschaftsveröffentlichung der Statistischen Landesämter (1978, 1991); own calculations.

Of course, the argument of an increased regional mobility of disembodied services could be strengthened, if it were possible to break down the data presented in Figure 3 and Table 4 between embodied and disembodied services. However, such data are not available from official statistics. Future research in this area should therefore look for additional evidence from other sources, for instance from case studies for specific service industries or specific regions. Furthermore, it seems interesting whether similar results can be obtained for other countries.

Table 4 - Change in output share of services in urban and rural districts by state (percentage points)

State	Urban	Rural	Urban	Rural	Urban	Rural
	1970-88		1970-80		1980-88	
Schleswig-Holstein	8.25	14.01	5.84	8.99	2.40	5.02
Lower Saxony	14.22	12.47	9.95	6.25	4.27	6.22
North-Rhine-Westfalia	13.39	16.60	9.33	12.09	4.06	4.50
Hesse	12.71	18.84	9.08	13.61	3.62	5.24
Rhine-Palatine	9.81	13.74	9.68	8.22	0.22	5.52
Baden-Württemberg	11.95	14.36	7.99	8.82	3.96	5.53
Bavaria	14.12	14.95	10.87	10.45	3.25	4.50
Hamburg (a)	17.08	-	9.27	-	7.81	-
Bremen (a)	12.89	-	7.66	-	5.23	-
Berlin (a)	8.78	-	10.69	-	- 1.91	-
Saarland (b)	-	1.94	-	- 4.51	-	6.46

(a) City state. - (b) No urban districts.

Source: Gemeinschaftsveröffentlichung der Statistischen Landesämter (1978, 1991); own calculations.

Cross-country comparisons on the regional dispersion of service activities were established within the FAST programme of the EC commission (Illeris, 1989). The results are indicating that the move of service industries out of metropolitan areas is no unique German phenomenon. In Belgium, for instance, total service employment rose by 12 percent from 1975 to 1985, whereas the corresponding growth rate for the agglomeration region around Brussels (Brabant) was only 5 percent. Similar differences were observed for Denmark and the Copenhagen region, for France and the Paris region, for Norway and the Oslo region, and for Austria and the Vienna region, but not for Spain and the Barcelona region, for

Ireland and the Dublin region, or for Italy and the Milan region.²² Ilteris concludes that overall "a certain decentralization of service employment takes place" (p. 66). A similar trend of "counterurbanization" is reported by Jaeger and Dürrenberger (1991) for the United States and Central European countries.

IV. Implications for regional policies

According to the results of the previous sections, the regional dimension of structural adjustment was governed by a mix of two determinants: The basic determinant was the general shift from industrial activities to service activities in the whole economy that was mainly driven by sectorally different income elasticities of demand and the disappearance of the productivity bias between manufacturing and services. Without locational shifts of producers, this general trend would have resulted in higher growth rates of service-intensive urban areas. It was overcompensated, however, by an increased regional mobility of service producers. Presumably, this second determinant mainly reflects the enriched technological opportunities for providing disembodied services across long distances and for the disembodiment of embodied services. As structural change towards services goes on and technical progress in information and communication technologies is still very rapid, it can be predicted that the growth potential of rural areas will be more promising than that of urban areas also in the years to come.

Although the emphasis of this paper does not lie on policy aspects, it is tempting to draw some conclusions that appear to be important for the design of regional policies.

²² For the case of the Barcelona region, see also Baró and Soy (1993); for Scandinavia see Sjöhoft (1993).

First of all, regional policy makers should take into account that the most dynamic industries of highly developed economies are to be found in the service sector. Despite this well-known fact, regional policies of most countries or the EC still are primarily concerned with attracting manufacturing activities to backward regions. This priority seems to be increasingly misplaced. It probably reflects the vague intuition of many observers that economic prosperity basically rests upon a flourishing industrial sector and that service activities are not much more than an addendum that would be unable to survive without a solid industrial base.

This view was already expressed by Nicholas Kaldor (1966) who argued that the high share of services was the main reason for the slow growth of the British economy, or by William Baumol (1967) who blamed the poor productivity performance of services for causing urban crisis. In recent years, it materialized in the debate about the alleged dangers of deindustrialization in the United States and in Europe as well (see, e.g., Bluestone, Harrison, 1982; Rowthorn, Wells, 1987; Tyson, 1992).

Of course, it is hard to imagine how a vivid service economy could evolve without any industrial base at all. And what is more, the size of some service industries directly depends upon the size of the industrial sector (this type of services was labelled as complementary services in section II). On the other hand, the highest growth rates of output and employment were achieved in those service industries where market potentials are rather independent of the amount of industrial activities. Last not least, the highest share of services in aggregate economic activity can be observed in countries with the highest per-capita income. There is no reason for regional policy, therefore, to favour industrial activities and thus implicitly discriminate against service activities.

Secondly, the distinction between embodied and disembodied services appears to be relevant for the design of regional policies. For instance, it would be rather hopeless to try to attract embodied services to those regions where the corresponding demand is missing. The prospects for changing the locational decision of producers of disembodied services by regional policy instruments, on the other hand, are much better, because these producers face rich opportunities for bridging long distances to their customers and are able to react to incentives provided by regional policies.

Within the category of disembodied services, however, it should be distinguished between urban and footloose services. Urban services heavily depend on network externalities that require a certain amount of agglomeration and of regional clustering. Presumably, the promotion of beneficial urbanization and localization economies for urban services lies beyond the scope of regional policies. Networks of informal personal contacts and the stimulative atmosphere of big cities can not be planned and constructed by government institutions. Regional policy makers should recognize, therefore, that their influence on the localization of urban services is rather limited.

The prospects for altering the locational decisions of producers of footloose services by policy instruments seem to be more promising. It can be doubted, however, that the classical instruments of regional policy are adequate for this purpose. In general, regional policies heavily rely on subsidies for fixed capital formation. Such subsidies will not attract footloose services to backward regions, when these regions do not provide suitable communication network facilities that enable producers to stay into close contact with their customers even across long

distances. Hence, improving the infrastructure for communication may prove to be more effective than subsidising capital input.

Finally, it should be recognized that the basic trends of structural adjustment in space seem to be more favourable for rural than for urban areas. If it is the central objective of regional policies to reduce the gap between poorer rural and richer urban areas, this result may show up even without any government intervention. In the years to come, regional policies will possibly be praised for having achieved an economic convergence of rich and poor regions that would have occurred in any case.

References

- BARÓ, Ezequiel, Antoni SOY, "Business Service Location Strategies in the Barcelona Metropolitan Region". *The Service Industries Journal*, Vol. 13, 1993, pp. 23-35.
- BAUMOL, William G., "Macroeconomics of Unbalanced Growth: The Anatomy of Urban Crisis". *American Economic Review*, Vol. 57, 1967, pp. 415-426.
- , Suc A. BLACKMAN, Edward N. WOLFF, *Productivity and American Leadership*. Cambridge, MA, 1989.
- BHAGWATI, Jagdish N., "Splintering and Disembodiment of Services and Developing Nations". *The World Economy*, Vol. 7, 1984, pp. 133-143.
- BHAGWATI, Jagdish N., "Trade in Services and Multilateral Trade Negotiations". *The World Bank Economic Review*, Vol. 1, 1987, pp. 549-569.
- BLANCHARD, Olivier Jean, Lawrence F. KATZ, "Regional Evolutions". *Brookings Papers on Economic Activity*, 1992, No. 1, pp. 1-75.
- BLUESTONE, Barry, Bennett HARRISON, *The Deindustrialization of America*. New York, 1982.
- CHENERY, Hollis B., "Patterns of Industrial Growth". *American Economic Review*, Vol. 50, 1960, pp. 626-654.
- CLARK, Colin, "The Conditions of Economic Progress". London 1940.
- DANIELS, P. W., "The Geography of Services". *Progress in Human Geography*, Vol. 11, 1987, pp. 433-447.
- DANIELS, P. W. (ed.), "Services and Metropolitan Development. International Perspectives". London, New York, 1991.
- DONGES, Juergen B., Henning KLODT, Klaus-Dieter SCHMIDT, "Perspective Structural Changes in the West German Economy". In: Wilhelm KRELLE (ed.), *The Future of the World Economy. Economic Growth and Structural Adjustment*. Laxenburg, 1989, pp. 385-398.
- FOURASTIE, Jean, "Le grand espoir du XXe siècle". Paris 1949.
- GEMEINSCHAFTSVERÖFFENTLICHUNG DER STATISTISCHEN LANDESÄMTER, *Volkswirtschaftliche Gesamtrechnungen der Länder*, Heft 8, Stuttgart 1978.

- GEMEINSCHAFTSVERÖFFENTLICHUNG DER STATISTISCHEN LANDESÄMTER, Volkswirtschaftliche Gesamtrechnungen der Länder, Heft 19, Stuttgart 1991.
- GERSHUNY, J., *After Industrial Society. The Emerging Self-Service Economy.* London, Basingstoke 1978.
- GLAESER, Edward L., Hedi D. KALLAL, Jose A. SCHEINKMAN, Andrei SCHLEIFER, *Growth in Cities.* NBER Working Papers, 3787, July 1991.
- HOOVER, Edgar M. jr., *Location Theory and the Shoe and Leather Industries.* Cambridge, MA, 1937.
- ILLERIS, Sven, *Services and Regions in Europe. A Report from the FAST Programme of the Commission of the European Communities.* Brussels, Luxembourg, 1989.
- JAEGER, Carlo, Gregor DÜRRENBURGER, "Services and counterurbanization: the case of central Europe". In: P. W. DANIELS (ed.), *Services and Metropolitan Development. International Perspectives.* London, New York, 1991, pp. 107-128.
- KALDOR, Nicholas, *Causes of the Slow Rate of Economic Growth in the United Kingdom.* Cambridge, 1966.
- KATOUZIAN, M. A., "The Development of the Service Sector: A New Approach". *Oxford Economic Papers*, Vol. 22, 1970, pp. 362-377.
- KLODT, Henning, "Productivity Growth in Service and Non-Service Industries: Implications for Convergence". Paper presented at the Seminar "The Service Sector: Productivity and Growth", Rome, May 27-28, 1993.
- KRAVIS, Irving B., Alan HESTON, Robert SUMMERS, "The Share of Services in Economic Growth". In: F.G. ADAMS, B.G. HICKMAN (eds.), *Global Econometrics. Essays in Honor of Lawrence R. Klein.* Cambridge 1983.
- KRUGMAN, Paul, *Geography and Trade.* Cambridge, MA, 1991.
- KUZNETS, Simon, "Quantitative Aspects of the Economic Growth of Nations: II. Industrial Distribution of National Product and Labour Force". *Economic Development and Cultural Change.* Supplement to Vol. 5, 1957.
- KUZNETS, Simon, "Modern Economic Growth: Rate, Structure and Spread". New Haven, 1966.
- LAWRENCE, Robert Z., "Can America Compete?". Washington, D.C. 1984.

- RICHARDSON, Harry W., "Economies and Diseconomies of Agglomeration". Paper presented at the Egon-Sohmen-Foundation Symposium in Zürich, August 20-22, 1993.
- ROWTHORN, Robert E., John R. WELLS, *De-Industrialization and Foreign Trade*. Cambridge, 1987.
- SENN, Lanfranco, "Service Activities, Urban Hierarchy and Cumulative Growth". *The Service Industries Journal*, Vol. 13, 1993, pp. 11-22.
- SJÖHOLT, Peter, "The Dynamics of Services as an Agent of Regional Change and Development: The Case of Scandinavia". *The Service Industries Journal*, Vol. 13, 1993, pp. 36-50.
- STAHL, Konrad, "Theories of Urban Business Location". In: E. S. MILLS (ed.), *Handbook of Regional and Urban Economics*, Vol. II, 1987, pp. 759-820.
- STATISTISCHES BUNDESAMT (a), Fachserie 18: Volkswirtschaftliche Gesamtrechnungen. Reihe 1.3: Konten und Standardtabellen, Hauptbericht. Stuttgart, lfd. Jgg.
- THALER, Richard H., "Anomalies: Interindustry Wage Differentials". *Journal of Economic Perspectives*, Vol. 3, 1989, pp. 181-193.
- TYSON, Laura D'Andrea, *Who's Bashing Whom? Trade Conflict in High-Technology Industries*. Washington, D.C., 1992.