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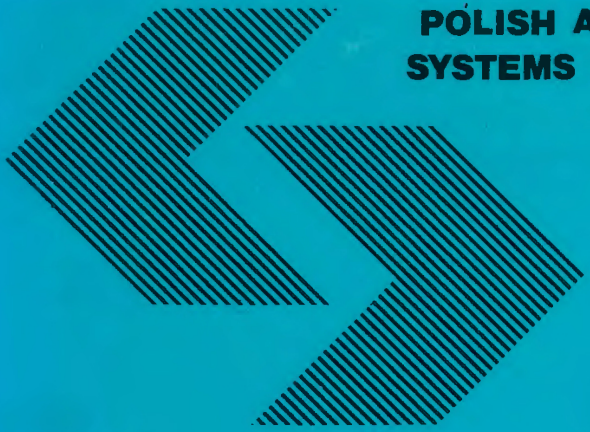

STRATEGIC REGIONAL POLICY

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EDITORS

PART II

WARSAW 1985

SYSTEMS RESEARCH INSTITUTE
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STRATEGIC REGIONAL POLICY

Paradigms, Methods, Issues and Case Studies

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VI. METHODS:
MONITORING, MODELLING, CONTROL

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PROBLEMS OF STRUCTURAL ADAPTATION IN OLD INDUSTRIAL AREAS A FACTOR-ANALYTICAL APPROACH

1. Introduction

Structural change in an economically interdependent world is a phenomenon the consequences of which are unevenly spread, even within developed countries. Although the necessity of structural adaptation is acknowledged to be in the general economic interest, the costs of this change are undisputably not borne equally; the burden is concentrated on selected social groups and regions. One type of region in which the consequences of structural change (and the inability to adjust to these consequences) become most obvious is the so-called "old industrial area".

Old Industrial Areas (hereafter referred to as OIAs) are generally understood as having the following characteristics: an economic base going back to the last century - as such it comprises areas in which the impulses for economic prosperity have been created, a prosperity which has lasted for more than a century and which is now declining; a concentration in a narrow range of industries, typically mining, steel production, heavy engineering, paper, textiles. Such areas exist in many developed countries: in FRG the Ruhrgebiet, in France parts of Alsace-Lorraine, in Great Britain the areas around Newcastle, Liverpool, Glasgow, in the US Western Pennsylvania and West Virginia, and in Austria the steel district concentrated in the northern part of Styria. This list of examples demonstrates that the phenomenon of concentrated costs of structural change (the problems of stagnation with high unemployment and, because of the strong monostructure, limited possibilities of avoiding it by commuting to other firms or sectors) occur in many countries of the developed world.

Some of these symptoms may occur in regions that might not be "old" in the specific sense of this context. It will be argued here that (1) there are distinctive differences in regions within developed countries; (2) the OIAs represent a special case of regions wiht characteristics indicating an inability to adjust to structural change; (3) this inability is the result of a combination of elements, a combination that is remarkably different from that of other regions; and (4) these elements point to the supply side as a cause of the difficulty of change, an emphasis that can be supported by theoretical considerations.

2. A Theoretical Approach

An important problem in regional growth theory is how to explain changing fortunes in regional development, i.e. why favoured regions reach a peak of prosperity and then start to decline. The well-known regional growth theories (export base model, models of cumulative causation, shift-share analysis, models of normal growth patterns, to the extent that the latter two can be regarded as theories) emphasise change in one direction only, although each is capable of highlighting certain aspects of the lost dynamics of OIAs.

For a long time it was popular in regional economics to focus attention on structure. Indeed it is very tempting to explain a region's decline in terms of structure, particularly if the region's economy is characterised as a monostructure (i.e. is concentrated in very few industries). The structural explanation employed by Toothill (1961) and Scott (1965) was seriously questioned by Chinitz (1961) and later by Cameron (1970). The basic assumption (that the growth differential can be attributed to the structural component) has to be dismissed. The explanatory content of shift share analysis was very doubtful anyway, since the empirical findings were not able to show the dominant influence of the structural component. This is not to suggest that the "structural" explanation must be dismissed completely. After all, in most studies, approximately half of the growth differential is explained by the structure.[1] There are, however,

three qualifications. First, most studies do not go beyond 1970, a point of time after which the problem became more serious. Second, the results are sensitive to the level of disaggregation. Third, there are considerations beyond the purely compositional aspects of structure. Chinitz (1961) made the important point that a particular structure can have negative influence on important characteristics of the supply side, such as entrepreneurial behaviour, accessibility to capital, high wages, qualification of work force, environmental conditions etc. All this meant, however, was that the decline of OIAs cannot be explained exclusively in terms of structure in the traditional sense of sectoral compositions.

A second approach of the regional economist is export base theory. As with shift share analysis, it was very popular, especially in the '50s and '60s, but was dismissed in the early '70s as not theoretically valid by Richardson (1978) among others. However, export base theory makes the essential point that important impulses for regional growth are set by exogenous demand of which export demand constitutes the most part. The approach has been revived by export-led growth models, starting with Kaldor (1970, 1977) who argued that once the Verdoorn law is taken into account, once-prosperous industrial countries or regions may experience decline due to the competition from "successful latecomers". Given the rise and the growth of world demand, successful challengers who can enlarge their share are predestined to have higher growth rates as the market as a whole and, more importantly, as the region the share of which is declining. By this process of catching up and overtaking other regions, the possibility of continous expansion for old industrial centres is limited. The fact that the world market and its growth rate are assumed to be given and that the growth of productivity of the newly industrialised regions is greater than that of OIAs makes a turning point possible.

Kaldor not only stressed the importance of export demand, but reintroduced the notion of cumulative processes originally put forward by Myrdal (1957). Myrdal postulated his idea of circular causation first for social processes in general, before discussing it in economic terms expressed more explicitly by Kaldor.

A formal interpretation was put forward by Thirlwall and Dixon (1975), showing that the stability of a growth path depends on certain parameter values, in addition to the Verdoorn coefficient, the mark up, the autonomous rate of productivity growth especially price and income elasticities of export demand. It would be very difficult to make empirical tests of regional parameters. But it might be assumed that the differences are greater between regions than between nations (simply because they are more specialised) and that especially for OIAs (with their standardised products), exports are very sensitive to price differences and that their products have a low elasticity of income.

This export-led growth model of course begs the question why export demand gets weaker for a region, or the other way around, why regional supply can no longer meet the exogenous demand. Consequently, there is a relevance to theories which can explain why income and price elasticities assume values which permit low growth rates or rates which diverge away from the national average. One such theory is the product cycle hypothesis, an approach which explains why prices and income elasticities are or become important and which attributes a significant role to technical innovation.

The product cycle hypothesis basically postulates that every product (or even market) goes through various stages, and that the criteria for the competitiveness of a product varies according to the specific stage. The relevance of this theory for OIAs results from the question as to how the market opportunities for their products can be evaluated and also because the product cycle has a spatial component, every stage proposing certain localities (Vernon, 1960, Geldner 1978). According to the product cycle hypothesis the interpretation of the backwardness of OIAs is given by the fact that they were not able to leave the cycle and remain in the innovative initial part. They are therefore at a stage in which they are exposed to price competition to which, because of adverse factor proportion, they cannot resist. Products of OIAs have a high price elasticity

combined with a low income elasticity, a combination which results from having gone through the product cycle. This is in accordance with their spatial situation: OIAs tend to be located in peripheral zones, significant distances from the relevant economic, political and cultural centres and rely on a narrow range of occupational skills. This connection between location and the product cycle forms the core of the supply-side interpretation of OIAs which have blocked transmission mechanism for developing new products and shedding the old ones (Tichy, 1981).[2)]

The line of argument suggest the following hypothesis: (1) regions generally, and OIAs in particular, are extremely open economies; (2) their growth is determined by exogenous demand; (3) the basic message of export base models is that regions are not autonomous: they have an export base that is too small or perhaps even an inappropriate export base; (4) a number of parameters explain to what extent a destabilising process is possible, under which condition a diverging growth rate takes place. It becomes clear, therefore, that against exogenous demand there has to be set endogenous supply. (5) The "regionalized" version of the product cycle hypothesis represents the essential argument to link (autonomous export) demand to this supply side and proposes an endogenous explanation for the changing fortunes of OIAs.[3)]

It would seem, therefore, that there are elements of the various regional growth theories which support the conclusion that the poor performance of OIAs stems from the fact that they are in the final stage of their "life cycle", a stage that is marked by a lack of competitiveness and an inadequate flexibility in adjustment to change. It is the supply side factors that make regions old, not the weak demand. It is a combination of supply side elements that acts as a barrier to change, a combination which corresponds to the characteristics of the spatial version of the product cycle hypothesis.[4)]

3. Factor Analytical Description of Old Industrial Areas in Austria

This interpretation of OIAs is principally testable. One step to such an empirical test is to describe Austria's regions by certain variables pointing to the supply side and giving hints to certain stages of the product cycle, to the ability to innovate or to the inability to adjust, to inflexibilities and to see if there are certain clusters among theses subregions which are similar to each other and different from other groups. If our interpretation of OIAs is correct then among the regions of a developed country those which are commonly regarded as "old" must differ from all others in terms of certain characteristics and constellations of variables which relate to supply-side elements. One approach to this problem is to extract from a multitude of objects which have a multitude of characteristics the ones which share certain characteristics and which differ from others. This is central to the approach of factor analysis.

a) Data

The analysis starts, therefore, with the question: can the district of Austria deemed to be "old" be described by elements and factors which are significant for these districts and not for all others? Of the 82 Austrian districts analysed, 8 were regarded as "old industrial districts".[5] The designation of certain districts as OIAs has to be done according to an a priori basis. We therefore assume that certain districts can be regarded as "old" and then determine whether they can be described by a combination of variables. The classification as "old" is of course not completely deliberate and follows a common understanding of industrial problem areas. In another study a similar designation (also on an a priori basis) was selected (Tichy, 1981).

The 82 districts were described by 10 variables (which all refer to manufacturing industry):

(1) size of plants measured by the total number of employees divided by the mumber of plants;
(2) level of industry concentration, as given by the percentage of the three largest industries out of the total employment of the district;
(3) female participation rate;
(4) qualification of the workforce, as the percentage of blue-collar workers (as opposed to white-collar workers) out of the total employment (note that the variable "qualification" is negatively defined, because it is measured in terms of percentage of the less qualified part);
(5) wage level, as wage payments divided by the number of employees;
(6) mean annual growth of productivity over the period 1972-79;
(7) level of productivity in 1979 as the net output value per employee;
(8) growth of industrial output 1972-1979, as the mean value of annual growth rates;
(9) birth rate of firms, measured by the number of jobs created in new firms 1976-1980 as a proportion of the number of total jobs;
(10) death rate, measured by the same method.

It is of course disputable what variables describe satisfyingly supply side inadaquacies and production capacity; in the selection of variables the small data base on the district level was a severe limitation; for a more consistent consideration it would of course be advantageous to include more variables - ones which are not restricted to manufacturing industries alone, especially those which depend on sociological and political dimension. Yet the limited availability of data at the regional level (and, in our case, at the district level) restricts the analysis to the above variables.

Within these (strong) limits the leading idea was to find characteristics and combinations of characteristics which go beyond the compositional aspect of structure and which give hints to the productive capacity and the flexibility of regions and districts; and which at the same time respresent in their combination indicators for stages of the product cycle hypo-

thesis and its agglomeration aspects: indicators for (in)flexibilities like size of plants (where size is in indirect proportion to the adaptive ability), qualification of the workforce, diversification of industrial structure. Size of plants and concentration/diversification of industry may - according to Chinitz (1961, p. 285) - also be interpreted aus indicators for a region's "entrepreneurial potential": the larger the plant, the stronger internal hierarchy what leaves little room for risk-taking and entrepreneurial behaviour; the less diversified the industrial structure the stronger the oligopolistic environment which has a lower entrepreneurial birth rate; the ease of entry is considerably greater in an environment dominated by small firm industries - districts dominated by big business cause an aura of second-class citizenship for the small businessman. Differences in the kind and quality of labour are expressed by the wage level, qualification of workforce and female participation rate. The latter is certainly partly dependent on the industrial composition, but points to the fact that this composition has further effects for the supply of labour which raises the question if a low participation rate represents in any case a potential supply. Besides being a result of the nature of the work done by the men it is a mirror of very specific and coherent structures of social relations: a "bread winner" ideology which puts women into the home, an active policy of keeping out alternative employment, little competition for female labour by indigenous firms - all resulting in a lack of paid work for women (Massey, 1983, p. 77, Chinitz, 1961, p. 287). Variables 6,7,8 are the result of factor inputs but represent, beside this purely computational relation, rough indicators for the only indirectly measurable efficiency of factors of production and for the economic dynamism. The combination of (above average) wage level and (below average) productivity level hints to the high efficiency wages and their importance in the context of the Verdoorn-Law as pointed out by Kaldor (1970) and Dixon/Thirlwall (1975). The two last variables are partly result of a region's potential for change, they also give information about the mobility of firms and plants, about the age of the capital stock.

The explanatory power does not so much reside in the single variable, but in the combination of variables. E.g. low female participation rates do not only indicate that women do not represent a potential supply or have a disinclination to work (because of the shift work of men or the possibly greater spatial radius of the labour market) but that this fact is in interaction with variables as e.g. industrial structure causing a low birth rate, above average wage level. In this sense every variable is as much a cause and a result (for a detailed analysis of these connections see e.g. Erickson/Leinbach, 1979, Segal, 1979, Massey, 1983). The selection of available variables, therefore, was directed by the intention to get hold of direct factors of input, but beyond these factors of elements and their possible combinations which are able to indicate interindustry influences which may or may not foster the adaptive capacity.

b) An Outline of the Applied Factor Analysis

Based on a n x m data matrix, where n represents the number of the random sample (in our case 82 Austrian districts) and m the number of attributes (or variables), the factor analysis yields the number and characteristics of independent basic functions of "factors" (e.g. Schlosser, 1976). The variables analysed are representable as a function of these factors. Thus each factor describes a common aspect of those variables which define the factor. The factor analysis reduces the variables in principle to orthogonal, i.e. linear independent, not with each other correlating factors.

The factor analysis yields a m x r matrix of factor loadings (where r is the number of extracted factors) and a n x r matrix of factor scores. The factor loading indicates the extent to which the factor is "loaded" (positively or negatively) by the variable; it represents the correlation of the variable with the factor and therefore lies between -1 and +1. Generally, a factor loading above .25 to .30 is regarded as significant (Dixon and Brown, 1979, Schlosser, 1976). Because of the orthogonality of the factors one variable can have approximately the same loadings

on several factors, thus its association is not unique.

The factor score explains the extent to which a district is subject to the characteristic of a factor, so that it can be positive or negative. A negative value indicates the lack of this characteristic or the existence of an inverse characteristic.

The factor analysis of the Austrian regional industrial structure was implemented by principal component factor analysis. This method analyses the total variance of the variables. The number of factors extracted is initially equal to the number of variables, so that a criterion for the limitation of the number of factors is necessary. A frequently used (although not undisputed) criterion considers all those factors with the explained variance (or eigenvalue) greater than one (Hofstatter, 1974). However, this criterion is capable of being applied to our analysis, since the first four factors explain about 75 % of the total variance and the contribution of the other factors is considerably less compared with the contribution of the first four factors.

Since in most cases it is relatively difficult to interpret these extracted factors, a supplementary transformation or rotation of the factors is made in order to produce loadings as low or as high as possible. This procedure does not affect the factor configuration; only the coordinate axes are rotated (relative to the variable vectors) in the factor space. Because of the altered loadings, the factors can now be more easily interpreted.

A generally accepted technique for rotation according to this principle of the simple structure is the "varimax-method" (Hofstätter, 1974) which is also used here.[6)]

4. Results

(a) Outline of the Factors

The factor analytical technique employed divides the data material into four factors:

Table 1: Factors and Factor Loadings

Rotated Factor Loadings (Pattern)

	Factor 1	Factor 2	Factor 3	Factor 4
1. Size	.833	-.023	.047	-.194
2. Level of concentration of industry	.439	.369	-.191	.467
3. Female participation	-.810	.079	-.158	.148
4. Qualification	.062	.164	-.744	.252
5. Wage Level	.677	-.055	.632	-.133
6. Productivity '72-'79	.001	.877	.071	.017
7. Productivity level '79	.253	.103	.760	.202
8. Output '72-'79	-.096	.910	-.118	.023
9. Birth rate	-.409	.304	-.102	.639
10. Death rate	-.255	-.182	.024	.890
VP	2.310	1.903	1.624	1.602

The variance proportion for each factor is the sum of the squares of the elements of the column of the factor pattern matrix corresponding to that factor. When the rotation is orthogonal, the variance proportion is the variance explained by the factor.

Factor 1, which has the highest variance proportion and thus contains the most information, indicates the following correlations: a concentration of large firms, a high wage level, and a low female-participation rate. Also significant are the level of industry concentration, the birthrate, and at the margin of significance is the death rate. Such a specific constellation of variables can be expected to have a high value in OIAs. The most obvious and striking charakteristic is the heavy monostructure, i.e. OIAs are dominated by a few industries, in most cases steel, paper, textiles. The level of industry concentration therefore should be a significant characteristic. One aspect of this mono-

structure is also the low female-participation rate: only accounting for the structural bias this should be low in OIAs. These regions are also dominated by a small number of large firms so that the average size of firms can be expected to be high. This above-average size would also be an indication of the strong export orientation of firms which constitute the (declining) export base of the region.[7] High wages represent barries to entry for other enterprises, while low birth rates and low death rates are consequences of such barriers. They are also signs of a low degree of flexibility in the context of the product cycle hypothesis: old firms are not allowed to die with the result that there are entry barriers for new ones. Firms which are old, large and confined to a few industries are (because of their organisational structure) usually disinclined to innovate and follow the product cycle to the end. The low female-participation rate may also be an indicator of low flexibility being a result of social and political processes and hinting to rigid class structures. The various arguments suggest that the combination of variables contained in factor 1 describe OIAs.

Factor 2 shows loadings for the growth of industrial production and productivity, a positively significant birthrate and an even stronger concentration of industries, a variable which obviously does not obstruct high growth. This is also true for all other non-significant variables; qualification and size of firms seem to have no influence on output and productivity growth. (Accordingly, variables with no significant factor loading provide indirect information). The combination of variables contained in factor 2 express economic dynamism reflecting high output growth and high productivity, and according to our a priori knowledge of OIAs it should have negative values in these districts. Factor 3 represents an "input quality" factor, involving a high level of productivity, linked wiht a low porportion of blue-collar workers and high wages. Each of the other variables has an insignificant influence on this "input-quality".

We customarily think of OIAs as having a pronounced absence of "input quality". They have an narrow range of occupational skills in the work-force, because the products tend to be

standardised. Their level of productivity is low, caused partly by an old capital stock. The "input quality" represented in factor 3 is expressed by three variables: two of them, which have the highest loadings are presumably represented (with negative signs) in OIAs. Even if this factor does not discribe OIAs exactly, it should be able to illustrate the lack of "input quality" and therefore carry negative values.

Factor 4 is strongly dominated by birth rates and death rates. The level of industry is also positive, and the range of occupational skills is of marginal significance. This factor shows essentially the capacity of an OIA to renew itself and reflects the positive age structure of firms. It may be best interpreted as the one which describes newly industrialised, agricultural regions, where many newly-established (and sometimes assisted) firms concentrate on a few industries and do not demand special skills of the workforce, other input quality features (productivity level, wage level) also being insignificant.

(b) Distribution of factor values for OIAs

The factors which are marked by the loadings of the variables take different values in the various districts. These values can have unlimited positive or negative dimensions. The explanatory power resides in the sign and in the relative position to other values. Of the 82 districts, 8 were assumed to be "old".[8)]

Table 2: Values of the Four Factors for Old Industrial Districts

	1	2	3	4
Bruck/Mur	2.784	-.453	-.899	-.014
Judenburg	1.782	.216	-.744	-.451
Leoben	3.063	-.784	-.995	.242
Lilienfeld	1.790	-.308	-1.119	.516
Mürzzuschlag	2.657	.448	-.950	.150
Neunkirchen	.840	-.459	-.452	-.747
Scheibbs	1.004	-.173	-.692	-.180
Voitsberg	1.714	-.113	-.754	-.252

It can be seen from Table 2 that factor 1 and factor 3 have for the relevant districts the same signs, factor 1 taking higher values. This confirms the assumption that this constellation of variables is an essential characteristic of OIAs. This assumption is reinforced by the relative strength of the factor values: in the ranking of values of factor 1, all the 8 "old" districts are among the first 15 (and 6 among the first 7).

Table 3: Ranking of factor 1 according to values

1	Leoben	3.063
2	Bruck	2.784
3	Mürzzuschlag	2.657
4	Gänserndorf	1.926
5	Lilienfeld	1.790
6	Judenburg	1.782
7	Voitsberg	1.714
8	Steyr	1.616
9	Reutte	1.286
10	Spittal	1.270
11	Linz	1.175
12	Zwettl	1.011
13	Scheibbs	1.004
14	St. Johann	.847
15	Neunkirchen	.840

A similar picture yet not as accentuated results from the ranking of the value of factor 3 (which all have negative signs in old districts): four of the old districts are among the first 15, 3 further follow tightly on position 17, 18 and 19.

Table 4: Ranking of factor 3 according to values

1	Tamsweg	-1.802
2	Zwettl	-1.618
3	Oberwart	-1,549
4	Hartberg	-1.286
5	Völkermarkt	-1.273
6	Rohrbach	-1.249
7	Hermagor	-1.165
8	Güssing	-1.132
9	Lilienfeld	-1.119
10	Leoben	- .995
11	Gmünd	- .983
12	Mürzzuschlag	- .950
13	Lienz	- .928
14	Bruck/Mur	- .899
15	Horn	- .868
16	Waidhofen	- .762
17	Voitsberg	- .754
18	Judenburg	- .744
19	Scheibbs	- .692

The values of factor 2 and factor 4 show no special significance: first the signs are changing and none of the relevant districts is among the first or last values. Old industrial districts assume with both factors average ranking, i.e. if factor 2 is considered as the one which indicates "growth" or "dynamism", OIAs manifest neither especially strong nor weak growth. Somewhat more surprising is the lack of dominance of factor 4. It might be assumed that the empirical findings of low birth rates and death rates in OIAs should have made factor 4 more significant. The insignificance may partly be due to the inclusion of the variable "level of industry concentration" and partly to the fact that the low birth rate has significant value in factor 1.

So far the emerging overall picture is as follows: factor 1 and factor 3 describe essential features of OIAs. This combination occurs only in OIAs both factors being significantly different in all other districts. Factor 2 and factor 4 include

characteristics which do not clearly seperate OIAs from other areas. Factor 3 has been regarded above as the one which reflects the "quality" of the input factors, especially of labour. Because of the dominance of factor 1 in OIAs, it is tempting to regard this as the one which reflects the "age" in industrial districts.

(c) Differentiation of "old" and other industrial districts

The fact that the negative values of factor 1 are often strongly represented in rural districts (10 rural districts are among the 15 districts with the lowest negative values) can lead to the impression that factor 1 reflects characteristics of industrial areas in general and is not suitable to characterise industrial areas as specifically "old". That factor 1 expresses more than just general features of industrial regions becomes evident as soon as the factor constellation of all industrial districts (where the percentage employed in manufacturing industry is higher than 50%) is taken into consideration.

Table 5: factor values of industrial districts

	1	2	3	4
Mödling	-.550	-.527	2.204	-.567
Wr. Neustadt	-.885	-.593	.049	-.942
Wien Umg.	.522	-.430	1.565	-.143
Gmunden	-.309	-.167	.353	-.992
Wels	-1.065	1.360	1.279	-1.193
Hallein	.532	-.160	1.124	-.769
Bregenz	-.570	-.418	.210	-.258
Dornbirn	-.370	-.156	.272	-.475
Feldkirch	-.648	-.015	.041	-.670
Baden	.367	-1.096	.061	.860
Linz	1.175	.480	1.043	-.540
Steyr	1.616	-.099	-.272	.304

Compared to the factor constellation of "old" industrial districts, the difference in factor 1 and factor 3 of these remaining industrial districts is striking. Factor 1 had (except

in the case of Linz and Steyr) either weak positive, mostly negative values, and it would therefore be misleading to interpret factor 1 as a general indicator for industrial areas (within industrial districts there are strong differences regarding factor 1).

Marked differences also exist regarding factor 3: barring the case of Steyr, all remaining idustrial districts have positive values which in 5 cases are exceptional. Thus the aformentioned general features of "old" industrial districts are reinfoced by the comparison to other industrial districts: the dominance of positive values of factor 1 and negative values of factor 3 signifying large firms, low female participation rates, high wages, strong concentration of industries, low birthrates, low productivity levels and narrow ranges of occupational skills.

The comparison may be extended in the other direction to consider which districts have factor values similar to the ones assumed to be "old". Three further examples emerge (Spittal, Steyr, Zwettl) showing strong positive values for factor 1 and negative values for factor 3. In analysing these additional districts, the dilemma stated at the beginning of the factor analytical approach again becomes evident: because this method does not explain dependent variables by independent ones but allocates constellations of characteristics according to frequency criteria, a pre-analytical concept of allocation is necessary to evaluate the factors. The original designation of districts as OIAs may prove a posteriori not to have been extensive enough, and three further districts may have to be added.

6. Concluding Remarks

Data inadequacies and the limitations of factor analysis, which is essentially a reduction of a complex bundle of variables into certain factors, suggest some caution in interpreting the results.[9] Bearing this in mind, certain conclusions are nevertheless possible:

First, it was possible to show that there are distinctive differences in regions within developed countries, and that OIAs represent a special case of regions that can be described by common characteristics: two of the four factors had a strong significance. both with regard to the sign and to the ranking of factor values in those districts which were assumed to be old. That not all four factors have an explanatory value for OIAs is an indirect confirmation of the results. From this it would follow that there are no multidimensional degrees in the charactaristics of districts in Austria. If this were the case, there would be only old ones and those that are not old. The nature of factor analysis consists of showing the varying degrees of intensity of factor which not necessarily describe OIAs.

The combination of factor 1 and factor 3 enables us to give a more precise description and definition of OIAs and represents an attempt at showing them as areas with supply-side inadequacies and inflexibilities. The most obvious characteristic is monostructure. To the extent that problems have a "structural" cause, this is expressed by the variable "level of industry concentration". That this characteristics alone is not sufficient is shown by the fact that "level of industry concentration" is significant in three of the four factors (considering the small size of districts, there has to be a certain degree of specialisation, anyway). The disproportionate size of firms may be taken as an indicator (according to export base models) of export orientation and dependency on export demand. The problem of OIAs is exacerbated by low productivity, high wages, so the efficiency wages (in the sense of the theory of cumulative causation) are high. The combination of negative values of factor 3 (low productivity and "quality") with characteristics of factor 1 (high wages) supports the hypothesis of such a negative causation. Many characteristics indicate that OIAs stayed within the product cycle and point to inflexibilities in the socio-economic structure.

They also correspond to an interpretation of the product cycle where locational aspects have been added. In the advanced stages of a product, a high capital intensity is combined with a narrow range of occupational skills, having its location in peripheral industrial zones; a still persistent low female participation rate hints to very coherent and rigid social strata; as indicators of a low flexibility can also be regarded - besides and caused by the large plants of little diversified industry - low birth rates but also low death rates.

The combination of characteristics found in old industrial districts therefore not only enables a more precise description but corresponds (to the extent the limited data make it possible) to the purported hypothesis[10]: OIAs, as former prosperous regions, are at the end of a "development cycle"; consequently the supply-side elements by which they can be described indicate a low degree of flexibility and make them the least capable of adjusting to structural change.

Table 6: Factor Values for the 82 Districts (Principal Component Analysis)

		FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4
1	Eisenstadt	-.872	1.123	.421	-.587
2	Güssing	-.974	1.026	-1.132	.196
3	Mattersburg	-.637	.023	-.022	.100
4	Neusiedl	-.765	-.516	.276	1.467
5	Oberpullendorf	-1.622	.604	-.583	1.100
6	Oberwart	-1.145	-.265	-1.549	-.320
7	Hermagor	-.798	.327	-1.165	-.566
8	Klagenfurt	-.803	-.636	.688	-.981
9	St. Veit	.325	-.327	-.345	-.484
10	Spittal	1.270	.292	-.159	-.155
11	Villach	-.298	-.413	.124	-.739
12	Völkermarkt	-.239	-.321	-1.273	.276
13	Wolfsberg	.165	.326	-.512	-.652
14	Amstetten	.172	-.052	-.226	-.674
15	Baden	.367	-1.096	.061	.860
16	Bruck/Leitha	.709	-.330	4.573	2.328
17	Gänserndorf	1.920	1.412	2.545	1.085
18	Gmünd	-.412	-.396	-.983	-.405
19	Hollabrunn	-1.168	-.025	.357	5.429
20	Horn	-1.205	-.331	-.868	-.112
21	Korneuburg	.471	.113	.677	-.236
22	Krems	.609	-.559	-.316	-.713
23	Lilienfeld	1.790	-.308	-1.119	.516
24	Melk	-1.074	-.999	-.388	.323
25	Mistelbach	-1.092	-.642	.063	-.652
26	Mödling	-.550	-.527	2.204	-.567
27	Neunkirchen	.840	-.459	-.452	-.797
28	St. Pölten	-.207	-.709	.279	-.781
29	Scheibbs	1.004	-.173	-.692	-.180
30	Tulln	.515	1.465	.591	.400
31	Waidhofen	-.822	-1.717	-.762	3.048
32	Wr. Neustadt	-.885	-.593	.049	-.942
33	Wien/Umgebung	.522	-.430	1.565	-.143
34	Zwettl	1.011	-.746	-1.618	1.715
35	Braunau	.445	.732	.060	-.345
36	Eferding	-.037	-1.049	.822	-.244
37	Freistadt	-.819	-.227	-.502	.788
38	Gmunden	-.309	-.167	.353	-.992
39	Grieskirchen	-.080	-.263	-.509	-.647
40	Kirchdorf	-.356	-.478	-.310	-.384
41	Linz	1.175	.480	1.043	-.540
42	Perg	.008	.122	-.153	-.252
43	Ried	.357	.083	-.034	-.097
44	Rohrbach	-1.360	-.482	-1.249	.017
45	Schärding	-.714	-.310	-.505	-.478
46	Steyr	1.616	-.099	-.272	.304
47	Urfahr/Umgebung	-.666	.269	.107	-.043
48	Vöcklabruck	.111	-.824	.241	-.729
49	Wels	1.065	1.389	1.279	1.193
50	Hallein	.532	-.140	1.124	-.769
51	Salzburg	1.213	-.663	1.085	-.916
52	St. Johann	.847	-.660	.412	1.079
53	Tamsweg	-.355	1.833	-1.802	-.256
54	Zell a. See	-.170	.371	.200	.213
55	Bruck/Mur	2.784	-.453	-.899	-.014
56	Deutschlandsberg	-.584	1.005	-.636	.030
57	Feldbach	-1.155	-.500	-.382	1.508
58	Fürstenfeld	-1.261	-.433	1.553	-.538
59	Graz	.111	-.409	.300	-.788
60	Hartberg	-.632	.177	-1.286	1.087
61	Judenburg	1.782	.216	-.744	-.451
62	Knittelfeld	-.214	.561	-.829	-.983
63	Leibnitz	-.250	.127	-.239	-.755
64	Leoben	1.063	-.784	-.995	.242
65	Liezen	.369	-.591	.078	-.470
66	Mürzzuschlag	2.657	.448	-.950	.150
67	Murau	-.248	.370	.212	.545
68	Radkersburg	.602	.525	-.191	1.660
69	Voitsberg	1.714	-.113	-.754	-.252
70	Weiz	.573	-1.077	-.734	-.482
71	Imst	-.776	-.410	-.362	-.187
72	Innsbruck	-.799	-.361	1.084	-1.025
73	Kitzbühel	-.805	-.059	1.596	-.871
74	Kufstein	-.215	-.814	.479	-.367
75	Landeck	-.500	6.838	-.238	.447
76	Lienz	-.817	.374	-.928	.622
77	Reutte	1.286	1.193	.477	-.286
78	Schwaz	.520	.543	1.516	-.108
79	Bludenz	.222	-.037	.648	.013
80	Bregenz	-.570	-.418	.210	-.258
81	Dornbirn	-.370	-.156	.272	-.475
82	Feldkirch	-.648	-.015	.041	-.670

Notes

1) The weak explanatory content of "structural" explanations is not only due to the crude explanatory approach of shift-share analysis. Using a theoretically more sophisticated model of normal growth pattern, the same picture emerges (Steiner, 1981).
2) A similar interpretation of the shift of economic importance of regions in the United States from the northern industrial centres to the south and the west in terms of the product cycle hypothesis is given by Norton/Rees (1979).
3) For a more extended version of these theoretical considerations see Steiner (1983).
4) This interpretation of OIAs has much in common with the idea put forward by Chinitz (1961). He uses the concept of a region's capacity for attracting new industries with considerable freedom of location from a transport point of view. The fact that OIAs are lacking this capacity may be traced to a certain combination of factors of supply forming interindustry influences on factor costs.
5) From the total number of 120 districts in Austria the 23 districts of the metropolitan area of Vienna were excluded as being untypical because of urban agglomerations, since they probably would have distorted the results. Also some minor technical changes had to be made: the districts of the provincial capitals and their surroundings were compressed into one, a few districts had to be omitted because of the incompleteness of the data set.
6) The calculations cited in this paper were implemented on the UNIVAC 1100/81 computer of the Universities of Graz by means of the BMD - computerprogram for factor analysis (see Dixon/Brown, 1979).
7) Export base models are hard to test empirically; lacking in most cases the data for regional export revenues, some rough approximations like size of plants or location quotients have been used. That the size of plants might indicate export orientation is backed by arguments pointing to indivisibilities and minimum efficient size so that production exceeds

local demand.

8) As mentioned above, these districts were chosen according to an a priori basis, derived from a commonly agreed concensus which districts may be considered to be old. This selection is of course somewhat arbitrary and open to criticism; the number could have been larger or smaller. In this analysis a restrictive interpretation is used and the number of "old" industrial districts limited to eight. In order to avoid the danger of petitio principii (districts being termed "old" and then the characteristics being confirmed by the analysis) the sample of districts regarded as "old" is similar to the one employed in another study (Tichy, 1981).

9) In order to confirm the empirical evidence of the results of the principal component factor analysis described so far, the data was also tested by alternative methods of factor analysis, as well as by means of a cluster analysis.

The maximum-likelihood factor analysis, a rather different method of factor extraction, yield virtually the same factor structure as the principal component factor analysis.

Evidently, the solution of the data examined is in the main invariant to the method used for rotation, too; after a factor analysis with an oblique (as opposed to the hitherto orthogonal) rotation of the factors the factor structure was very similar to the results of the principal component analysis.

Since the analysis of the data by different methods of factor analysis produced essentially the same results, the original findings seem to be confirmed.

As a further test the same data set where factor analysis has been applied was then proved by means of a cluster analysis (see Dixon/Brown, 1979). It turn out that the classification problem is solved similarly in the main feature by factor analysis and cluster analysis. (An extended description of the factor-analytical methods used may be obtained from the authors upon request).

10) In the sense of falsificationism the undertaken attempt to find empirical confirmation of our hypothesis is of course no "proof" for the validity. Sargent once used for a test of his "rational expectations" the modest formulation that his hypothesis is "not obscenely at variance with the data" (see Maddock/Carter, 1982, p. 46). We hope for our paper that the degree of obscene variance is small enough not to raise protest even according to puritanic standards.

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DISCUSSIONS

Paper by I. Masser

Discussion participants: R. Espejo, A. Straszak, I. Masser.

Discussion focussed on functions which should be performed by local government and on proper balancing of these functions. This regards e.g. the strategic monitoring function and the eveluation and appreciation functions. A lack of such a balance may lead to impairment of planning and implementation capacities in local governments. It turns out crucial to set up a mechanism for getting a feedback, through reporting, hearings - seemingly - redundant information, related to own plans and actions. Modern computing equipment may greatly help in carrying out this task, but it must be used in a very delicate manner.

Paper by D. Boekemann and R. Kulikowski

Discussion participants: I. Masser, S. Dresch, S. Ikeda, R. Kulikowski, D. Boekemann.

The discussion concentrated first of all on the institutional side of the systems modell, with particular attention paid to the differences between Austria and Poland in that domain. The authors acknowledged existence of such differences, but pointted out that they can be reduced to the question of proportions, since e.g. there is in Poland an important, although not very large, share of market-oriented tourism operations. When the international tourism market is considered, differences get even smaller. In case of Poland the main problem is adequate cooperation between various operators in the tourism and recreation field*, be it specialized enterprises, trade unions, institutions owning facilities for their employees etc. This applies as well, to investment policies and regional promotion, made on the basis of investments and other approaches.

Utility functions of local authority decisions were said to be assessed primarily on the basis of monetary value of decisions made.

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* Most of these operators enlarge recently the market-oriented share of their activities (eds.).

Paper by M. Steiner and U. Posch

Discussion participants: A. Mouwen, S. Ikeda, M. Steiner.

First, in answering the question on possibilities of a foreasting use of the results obtained it was indicated that factor analysis by itself does not reveal the causal structure, which would be necessary for any sort of forecasting application. Thus, only a comparative study could be undertaken. On the other hand, the available time series of the data did not go beyond the period 1971--1981, and for some items only 1971-1979, and therefore the comparative study could not encompass the dynamics of processes in question, but only the static aspects.

Paper by J. Kacprzyk and A. Straszak

Discussion participants: R. Espejo, I. Masser, J. Kacprzyk.

Discussion centered around the need of implementing computer-based information systems using approaches which would not lose much of the information available and still present it in a simple and legible way. Besides the fuzzy-set-theoretic constructs other approaches were cited, such as Bayesian inference rules. Within this context the questions related to extensions of such applications were raised, pertaining namely to knowledge-based expert systems. These systems,nowadays in the development stage, may contain information in terms of "if... then..." statements, where both conditions and events are fuzzy defined. When developed and tested, such systems may have a great impact on observation and analysis of socio--economic processes.

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