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The importance of regional factors for the income distribution in Austria

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Zwischen großräumiger Arbeitsteilung und integrierter regionaler Entwicklung

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THE IMPORTANCE OF REGIONAL FACTORS IN THE DETERMINATION OF PERSONAL INCOME - THE CASE OF AUSTRIA -

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Table of Contents

Tables page

I. Introduction

The concept of disparities stands at the heart of regional science. Due to its interdisciplinary character, it takes a more general perspective of disparities and - closely related - development (Seers, 1979; Coates, Johnston & Knox, 1977) than economics. It considers not only income, but also other economic and social indicators (infrastructure and public goods, satisfaction of basic needs, etc.). Besides the discussion of regional development measures, the change of disparities during economic growth (Cuadrado Roura, 1982; Klages, 1975; Williamson, 1965) and urban development (Haworth, Long & Rasmussen, 1978; Hirsch, 1982; Moses, 1962; Ravallion, 1979; Walker, 1979) constitutes an important field of research.

However, the recognition of the multi-dimensionality of inequality leads to an important conceptual problem. If variables are interdependent, observable interregional differences in one can partly (or completely ?) be attributed to variations in others. Thus, the analysis of interregional income disparities without correction for heterogeneity in education, work experience, demographic characteristics, etc., is in some sense misleading. Although there is a whole branch of literature in economics dealing with the estimation of the influence of these population categories on personal income only preliminary efforts have been made in regional sciences. There exist very few empirical studies, which explicitly analyze regional income differences after correction for the heterogeneity in the population. Some multiregional economic models implicitly have taken a small step in this direction (Issaev, et. al., 1982), but usually they do not analyze regional income differences in detail.

In economics, studies of income formation by use of an earnings equation often contain a regional variable, but this is done in a way which conceals much of the information contained. First of all, regions are often large and delimited geographically. But this means aggregation of large agglomerations, small and medium sized towns, rural areas, etc. Since regional economic theory usually argues in terms of these spatial units, one could arrive at more satisfactory results by employing a homogenous regionalization. In this case, areas are aggregated up to regions depending on their socio-economic characteristics, irrespective of their geographic location.

Second, the effect of interregional income differences is usually measured by introducing a set of dummy variables, each representing a particular region. The coefficients of these dummies can roughly be interpreted as interregional differences in the income level, holding other things constant. But this procedure a priori assumes that other coefficients, measuring returns on education and work experience etc., are equal across regions. On the other hand, when these parameters are allowed to vary they are found to exhibit wide variability (Hanushek 1973, 1981; Hirsch 1978). Unfortunately, these differences were not explored in detail, although some recent labor market theories suggest that structural differences in income generation may exist between regions.

It is therefore one of the aims of this study to look more closely to interregional variations in earnings function parameters. Furthermore, we use a regionalization which corresponds better to the concepts used in regional labor market theories. The remaining discussion is organized in five sections. Section II briefly reviews the major theoretical research traditions and

formulates the main hypothesis to be tested. Section III, then, discusses the specific concept of regionalization. After the description of the data set in Section IV, Section V reports empirical results. Section V.1 gives the average incomes by region and tests the resulting differnces. After this first brief insight into the regional structure of income, Section V.2 applies the standard version of the human capital model, restricting interregional differences to a shift in mean incomes. Section V.3 proceeds in a more general way: All coefficients are free to vary across regions and tests concerning the interregional equality of different groups of parameters are performed. Section V.4 uses an information theoretic approach to assess the regional factor in income formation quantitatively in relation to other income determining factors.

The results favor the opinion that interregional differences in income cannot wholly be explained by differences in human capital endowments of individual workers. Some interesting insights are provided in the structural pattern of the differences. Conclusions and implications are drawn in Section VI.

II. Theoretical approaches to regional income differentials

There are basically 2 approaches to the question of inter-regional income differences. The first, firmly in the tradition of neoclassical economics, places emphasis on the supply side of the labor market, pointing to the fact that labor supply may vary in its quality across regions. The second, starting from a rather different perspective, concentrates on the demand side, considering heterogenous demand conditions as the prime source of income variations[1)]. In fact, there are several versions of the theory

on either side so that it is not possible to speak of the supply or demand model. But there seems to be one basic point which constitutes the watershed of the 2 approaches: the first relies on the equilibrating forces of the market process whereas the second distrusts these forces and points to the existence of cumulative, disequilibrating mechanisms which are stabilized by special labor market institutions.

The general view of the neoclassical model is that of a competitive labor market where maximizing behaviour and free flows of factors and goods lead to equilibrium wages throughout the economy. Inasfar as income differentials are observed they are accounted for by 3 sources: (i) They reflect simply temporary disequilibrium phenomena. (ii) They are caused by productivity differences of workers between regions. (iii) They compensate for different working and living conditions.

The first explanation poses no problem since differences should disappear in the long run (Addison 1975). As a matter of fact, it is not possible to determine when the short run ends and the long run begins.

The second explanation is in the research tradition of human capital theory (Becker 1975, Mincer 1958, 1974). The essence of this neoclassical theory of income distribution is that different income levels can be explained by different individual skills, whose main sources are formal and informal (on-the-job) training. This results in the well-known earnings function relating income to years of schooling and work experience. Implicitly, this approach provides an explanation of regional income variations: If the distribution of schooling and experience differs between regions, an uneven distribution of regional incomes, measured by

the average or the like, would be the result. In effect, the hypothesis is, that if by differentiating accurately between different types of labor interregional wage differences vanish. Since this is simply a problem of aggregation we call it the aggregation hypothesis (see Gerking, Weirick 1983).

A more general view than in the human capital theory is taken by the compensating differences model (Thaler, Rosen 1975; Brown 1980). It is argued that in addition to productivity levels of labor it is nessecary to correct for utility levels of income. This in turn is affected by characteristics of the region. Most important and evidently, if the price level varies across regions then, provided no money illusion exists, this should be reflected in nominal wages in order to equalize real wages. In general, given similar productivity characteristics, (real) wages should vary in accordance with workers' valuations of regional amenities.

The second approach to regional income differentials combines the theory of polarized development from regional sciences (Myrdal, 1957; Hirschman, 1958; Friedmann, 1972; Richardson, 1973; etc.) and labor economics' segmentation theory (Gordon, Edwards, Reich, 1982; Cain, 1977; Sengenberger, 1978; Brinkmann, et.al., 1978). Contrary to neoclassical theory, segmentation theory argues that uncertainty, friction and information costs are determining elements of the economic system. To reduce the costs brought about by these factors, the labor market endogenously creates institutions leading to a division of workers and workplaces into several, hardly related segments.[2)]

In a complex, highly specialized economy, requirements of a workplace and skills of a worker usually do not match. So, either

the requirements of the workplace have to be reduced by reorganization of the flow of work and standardization of the production process, or the skills of the worker has to be adapted to the requirements by training (Piore, 1973). This not only leads to two groups of jobs - high and low requirements - but also to two groups of workers: Workers in the first group (the primary segment) have gone through a process of on the job training, i.e. the employer has invested into their skills. Therefore they can be replaced only at high costs and so the employer is interested in a low turnover rate in this group. Workers are attracted to the firm by higher wages and the offer of a career. Members of the second group (the secondary segment) do not accumulate skills on their jobs, skills they once acquired even deteriorate, they are easily replaced and consequently run a high risk of loosing their job according to fluctuations in the business cycle.

This segmentation is stable due to some cumulative mechanisms: Since the employer cannot observe the productivity or trainability of a potential employee, he usually orients his decision, whether to hire someone or not, on observable characteristics, which he thinks are correlated to the employee's productivity or trainability (Aigner, Cain 1977). Among these are: race, sex, formal education, age and employment history. So, if someone works in the secondary segment, his chances to get a job in the primary segment are reduced.

The different risks involved for employers in hiring for jobs in the primary or secondary segment, leads to the emergence of different recruiting strategies. While for the secondary segment employees are hired on the external labor market, i.e. the 'standard' labor market of economic theory, jobs in the primary seg-

ment are usually filled with people already with the firm, since their productivity is well known. Entry to the internal labor market is confined to few, relatively low-skilled jobs (Piore, 1972).

Important in our context is the notion of positive feedback processes as discussed by Vietorisz and Harrison (1973). The standard negative feedback of neoclassical theory, they argue, is no longer inevitable in a segmented labor market. "Such processes can still be present, but, when concentration and segmentation occur, they are overpowered by strong positive feedback" (Vietorisz and Harrison, 1973, p.369).

The adoption of labor saving innovations in a high-wage-sector (or segment) leads to an increase in productivity and wages, while in a low-wage-sector (segment) labor intensive techniques persist.

The concept of positive feedback processes is a common feature of segmentation theory and the theory of polarized development. Economies of scale, agglomeration and urbanization economies, selective mobility of labor, capital and innovation lead to persistent interregional differences in the level of development and in the wage level. Other arguments pointing into the same direction are higher unemployment rates and lower levels of labor productivity in the periphery caused by interregional differences in capital equipment. This results in regional specialization of economic activities. Since management functions and the tertiary sector usually are more sensible to agglomeration and urbanization economies than production, those activities are overrepresented in urban centers. Also within large enterprises, functions are often scattered over regions, according to their optimal

location. Production plants are located in rural areas with low land prices and an underutilized labor force, while the headquarter resides in an urban agglomeration with access to headquarters of other firms, public authorities, and specialized institutions, such as advertizing agencies, specialized banks and insurance companies, etc.

This leads to organizational dependence of the economy in rural and peripheral areas from the centers (Marshall, 1979; Massey, 1979; for an empirical study for Austria see Tödtling, 1984), and to an unequal distribution of primary and secondary jobs over regions. There tend to be more primary jobs (and more employees in the primary segment) in agglomerations than in rural areas (Buttler, Gerlach, Liepmann, 1977).

The polarization hypothesis can be summarized in the following way: Due to the mechanisms discussed above, interregional differences in earnings functions can be expected. They should be closely connected with the spatial distribution of labor market segments. Moreover, the different promotion patterns in these segments should show up in particular in the variables measuring work experience. In other words, steeper (working-)age - earnings profiles in higher developed and more centrally located regions can be expected.

III. Regionalization

The paper uses a regionalization for Austria originally developed for another study (Peripol-study) by J. Kaniak (Kaniak, 1983). This permits direct comparisons of our results with results of this study.

The regionalization distinguishes the Austrian counties ("politische Bezirke") by the indicators "level of development" (D) and "accessibility" (A), each of which is classified into the categories "high", "medium" and "low". This yields a 3 x 3 matrix of types of region, from which eight elements are occupied (see table 1).

Table 1: The 8 different types of region

D/A	H	M	L
H	H/H	H/M	H/L
M	M/H	M/M	M/L
L	--	L/M	L/L

A: accessibility; D: level of development;

H: high, M: medium; L: low;

The indicator "level of development" is measured by the net regional product per capita, the unemployment rate, the net migration rate, and per capita return on local taxes [3]. The counties are ranked corresponding to each of the four variables separately. For each county these rank scores are added up and the counties were ranked again according to this sum. The upper quarter of this ranking is considered as the group with a high level of development, the lower third is termed the low level of development group. The medium category is derived as a residual.

The indicator "accessibility" is intended to measure a region's access to the regional, national and the international markets. So three types of gross-regional-product potentials (regional, national, international) were calculated in the usual way: as the

sum of gross regional products weighted by a decreasing function of distance. The three potentials differ by their distance decay functions. For the regional potential only counties within 45 minutes car travel time were taken into account, while the distance decay function for the national potential reaches up to 720 minutes. The international potential considered the GRPs of all Western European countries. Again the aggregation procedure described above was applied to delimit counties with high, medium and low accessibility.

We end up with the two-dimensional ordering displayed in table 1, where the category "high accessibility - low level of development" is empty. It should be noted that our basic spatial units, - the Austrian counties - are rather small. Their average population is below 100.000 inhabitants. It was the aim of the regionalization to build up homogenous regions, the counties of which are not necessarily contiguous. With this type of regionalization we expect a maximum amount of intercounty inequality to show up between regions. A test of this assertion is gained as a by-product of the estimations in Section V.4.

IV. Data

The empirical investigation is based on a data set drawn from the 1981 Microcensus file of the Austrian Central Bureau of Statistics (ÖStZ). The 1981 Microcensus is a supplementary survey to the 1981 Population Census and comprises about 70.000 individuals. For the present analysis only those were included (i) for whom information on all the relevant characteristics (income, occupational status, county, age, education and sex) was available, (ii) who were Austrian citizens, (iii) who

had one and just one full time employment (but excluding self-employed and apprentices), and (iv) whose age were above 18.

This reduced the data set from 70.000 to about 15.000 individuals. Income was reported in Austrian Schillings (AS) as the average monthly net income, i.e. net of tax and social security payments and including all transfer payments. Obviously, it was the intention of the ÖStZ to measure personal disposable income. Since our theoretical arguments are based on characteristics of the regional labor markets, the wage rate or gross income should be preferred over disposable net income. By using the latter in the analysis the question arises whether this might lead to a serious bias in statistical estimates of the regional influence, as, for example, in a regression framework. The problem has 2 dimensions, namely: (i) What is the effect of the tax and transfer system if gross incomes are really different by regions? and (ii) are there region-specific differences of personal taxes and transfers of either direct (e.g. different legislation) or indirect influence (e.g. different composition of the population with respect to tax or transfer-relevant characteristics) ?

In view of a progressive income tax the former situation tends to narrow income gaps with the consequence of an underestimation of the regional factor. Thus, if a regional disparity exists between net incomes the disparity of gross incomes would even be greater. The latter situation is more difficult to assess. Although the personal tax and social security as well as the transfer system are in their main parts designed at the national level so that there are no substantial regional differences in legislation, the indirect differences are more hidden[4]. One important correction we were able to make was the deduction of children's allowance

Table 2 : Percentage Distribution of Attributes of Variables Used in the Empirical Analysis

YEARS OF EXPERIENCE	PERCENT	CODE
1 - 5	12.5	EXPER0
6 - 12	18.4	EXPER1
13 - 25	30.9	EXPER2
26 - 40	32.9	EXPER3
OVER 40	5.4	EXPER4

EDUCATION	PERCENT	CODE
compulsory secondary general school	34.4	SCHOOL0
compulsory technical school	42.5	SCHOOL1
medium level secondary school	11.0	SCHOOL2
top level secondary general school	4.7	SCHOOL3
top level secondary technical school	4.5	SCHOOL4
university	2.9	SCHOOL5

OCCUPATIONAL STATUS	PERCENT	CODE
blue collar (unskilled)	27.4	STAT0
blue collar (skilled)	21.1	STAT1
white collar	38.8	STAT2
civil service	12.7	STAT3

SEX	PERCENT	CODE
male	64.9	
female	35.1	SEX

REGION	PERCENT	CODE
H/H	26.9	REGION0
H/M	9.2	REGION1
H/L	19.4	REGION2
M/H	15.9	REGION3
M/M	7.2	REGION4
M/L	2.7	REGION5
L/M	4.0	REGION6
L/L	15.3	REGION7

which might have introduced a systematic difference between rural and urban areas.

The other variables used in the analysis are standard variables

of human capital theory, namely: formal education, work-experience, occupational status and sex. Table 2 shows the percentage distribution of these variables and the regions along with the programming code. We had no detailed information on job-experience in the data set. Therefore the usual procedure (see Mincer 1974) was adopted in defining the variable as age minus schooltime minus 6. This, of course, invalidates the parameter of the experience variable, but there are no a priori reasons that the estimates of the regional variable should be affected. After this transformation the variable was grouped into 5 distinct classes to allow for the different growth pattern of income during the life-cycle.

The sex variable is introduced to capture the well-known income differences between men and women. There are by now several theories which can explain these differences. We do not adhere to any specific hypothesis but add the variable as a mere control. What is important for the purpose of the present paper is the fact that wage differentials by sex can be explained within neoclassical theory and are therefore compatible with it [5].

V. Empirical Analysis

1. The Differences in Average Incomes

The differences of average incomes between regions are reported in table 3. It gives the absolut as well as the percentage values in terms of the overall mean of 8442 AS. The regional differences are as great as 15 percentage points between the highest (HH) and the lowest (MM) value. We tested the hypothesis that the measured differences are random. The corresponding F-statistic of 32.6 [6]

indicates that this hypothesis can be rejected at a significance level of 99.9% .

Table 3 : Average income by regions

D/A	H	M	L
H	9077 (107.5)	8091 (95.8)	8744 (103.6)
M	8087 (95.8)	7804 (92.4)	8293 (98.2)
L	--	7882 (93.4)	8011 (94.9)

But the impression of Table 3 is that there are some regions which are obviously distinct whereas between others the difference is less striking. Thus we tested pairwise one region against the other (T-tests), the results being presented in Table 4. There are basically 3 regions with a strong difference from the others, namely HH and HL (both different from all the others) and MM (different from all but 2). On the other hand at the 95%-level LM and LL are only different from HH and HL. By aggregating all regions which are not different from each other we get a condensed form of our regionalization with HH highest, HL upper medium, HM, MH and ML lower medium and finally MM, LM and LL lowest. From this it can be seen that, contrary to our expectations, HL is higher than HM and ML is higher than MM.

Table 4: Pairwise Test of the Significance of the Differences of Average Incomes

	HH	HM	HL	MH	MM	ML	LM	LL
HH	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx
HM	xxx			x				
HL		xxx	xxx	xx	xxx	xxx	xxx	
MH			xx					
MM			xx					
ML					x			
LM								
LL								

xxx : 99%-level, xx : 95%-level, x : 90%-level

Thus the question is raised whether our 2 indicators correspond to the structure of incomes. So we tested the hypothesis that the incomes along each separate dimension are equal, holding constant the other dimension [7]. The corresponding F-statistics of 23.3 (D) and 10.8 (A) give clear evidence that both our indicators have a separate influence at a significance level of 99.9% . Despite such an encouraging result the above mentioned misplacings show that not both indicators do equally well. In particular, whereas the picture with regard to D is quite clear-cut, along the A - axis emerges some sort of U - shape. This is somewhat surprising but corresponds with earlier works based on the same classification scheme. Some remarks and comparisons will be made at the end of the paper.

2. The aggregation hypothesis

As we pointed out in the theoretical part, different regional average incomes are not by themselves contradictory to the neoclassical model. The human capital model points to different productivity levels of individual workers which might, on the average, differ by region. The compensating differences model generalizes these results and states that, additional to the productivity factor, an environmental factor, such as different price levels or regional amenities must be taken into account. In view of the more general perception of the latter model it seems natural to take this model as a basis for empirical testing. We oppose this view for 2 reasons:

i) The compensating differences model in fact assumes the equalization of the utility of money in different regions. It is therefore necessary to standardize the incomes for utility levels of a monetary unit. Thus, the concept is strongly related to the individual utility function, which cannot be observed by itself. For this reason, the theory is, although valuable at the theoretical level, of little help empirically. If one is not prepared to declare anything which correlates with the income distribution as an argument of the utility function, the whole theory is turned into a tautology (King 1980).

ii) The second argument concerns the theoretical basis of the model (Bradfield 1976). This can best be seen on the question, whether real or nominal income is the relevant variable. If one considers real wages c.p. to be equal and at

the same time price levels different so that nominal wages are different, then this amounts to assuming disequilibrium in other markets. Thus, this theory reveals its character as a partial equilibrium concept, which again may be valuable at the theoretical level, but is not, in our view, applicable at the empirical level [8].

In view of the above 2 arguments as well as the relatively small area which is covered by the analysis the use of nominal income and the neglect of regional amenities seems justified. We therefore took a typical "human capital approach" earnings function of the form [9]:

(1) INCOME = f (SCHOOL, EXPER, SEX, STAT, REGION)

and performed a linear regression on these variables after having transformed them in dummy-variables representing the categories defind earlier (see table 2) [10].

Table 5 : Predicted Income by Region Using Regression Results of Equation (1) in AS

D/A	H	M	L
H	8829 (104.6)	8143 (96.5)	8575 (101.6)
M	8158 (96.6)	8159 (96.6)	8480 (100.5)
L	--	8051 (95.4)	8308 (98.4)

Holding the other variables constant at their mean this yields a

regional income distribution comparable to the one above, but this time corrected for individual productivity levels (see table 3 and 5). The values in brackets again express the regional income in percent of the overall mean. Comparison of table 3 and 5 shows a clear reduction of the income differences since the difference between the highest and the lowest region is now about 9 percentage points. So there is clear evidence that part of the disparities is due to individual productivity-related factors.

But what is more interesting is the question, whether the remaining difference is pronounced enough to be confirmed statistically. To this end we performed an F-Test on the hypothesis, that the coefficients of the regional dummies are simultaneously zero. The corresponding F-statistic of 17.2 strongly supports the alternative hypothesis of inequality among the regions (significance level 99.9%). Thus, although one can see the equalizing effect of the characteristics tied to individual productivity there remains a significant part of income differentials due to a regional factor.

To see whether the correction had any influence on the structure of the incomes we performed the same calculations as in the case of simple average incomes. Table 6 shows the results of the pairwise tests of equality of coefficients. It can be seen that the number of pairwise different regions has all but diminished. There are now 4 regions with practically the same (lowest) income level: HM, MH, MM and LM, whereas HH remained exceptionally high and different from all others. In between and significantly different from these 2 groups are the low accessibility regions, which, however, cannot be grouped consistently. HL and LL are different from each other, but both are indifferent from ML, so that the relation is intransitive.

Table 6: Pairwise Test of the Significance of the Differences of Average Incomes

	HH	HM	HL	MH	MM	ML	LM	LL
HH		xxx	xxx	xxx	xxx	xx	xxx	xxx
HM			xxx			x		
HL				xxx	xxx		xxx	xxx
MH						x		x
MM						x		
ML							xx	
LM								x
LL								

xxx : 99%-level, xx : 95%-level, x : 90%-level

A test of the separate influence of D and A gives again clear evidence of the income determining influence of both factors (F - statistics 11.8 and 15.9 for D and A respectivly, significance level 99.9%). As before the rank order does not contradict our expectations with regard to D and again shows the U - shape for the A - factor.

3. The structure of differences

Until now, our findings show that, according to the expectations of the aggregation hypothesis, the correction of average incomes by regions for individual productivity-related factors tend to narrow income gaps. Yet, within the framework of a "classical human capital approach" earnings function, a statistically significant part of the income differentials remains due to regional variations, measured by region specific intercepts. Moreover, the

principal structure as well as the significance level of income differences is not essentially changed by taking productivity-corrected rather than raw average incomes as a basis of analysis. This result cannot, of course, be taken as a proof of the inadequacy of the neoclassical model of the labor market. In our view, it demonstrates either or both of the following two points:

i) In view of the simple version of our earnings function as well as the shortcomings of our data there may be some neglected factors which influence individual productivity and vary systematically by regions. As an example of such an argument one might suspect that school quality varies by regions (although this is rather unlikely for the Austrian school system).

ii) There are neglected factors on the demand side of the labor market. This argument might subsume all theories, which consider the structural relationship of the labor markets as a dominant income determining factor. Some of the arguments of these theories were reviewed at the beginning of the paper.

One can see that both aspects, the second more than the first, point to the fact that it is not a simple shift of the income level which we should expect to determine the regional differences but some structural differences of income generating forces. Formally speaking, if this process shows up in the variables considered in the earnings function, we should expect the coefficients of the variables to vary by region. An appropriate test of that is to regress the earnings function separately for all regions (Table 7) and then test if the parameters are equal[11].

Table 8 shows the results of various hypotheses on the parameters of the earnings functions regressed separately for the 8 regions.

Table 7: Regressioncoefficients

	MODEL 1	MODEL 2							
		H/H	H/M	H/N	M/H	M/M	M/N	N/M	N/N
INTERCEPT	6147	5478	5684	5770	5531	6109	6201	6305	5856
	(55.9)	(22.9)	(22.1)	(28.2)	(28.2)	(17.2)	(8.5)	(16.5)	(346)
EXPER1	1222	1269	1192	1345	1386	719	2181	695	1005
	(13.2)	(5.6)	(5.0)	(6.8)	(7.3)	(2.1)	(3.2)	(1.9)	(4.4)
EXPER2	2171	2689	1797	2259	2236	1922	2314	1378	1698
	(25.5)	(13.4)	(7.8)	(12.4)	(12.8)	(5.8)	(3.4)	(3.9)	(8.4)
EXPER3	2600	3164	2448	2634	2749	1886	2637	1940	2179
	(29.9)	(15.3)	(10.5)	(14.5)	(15.5)	(5.7)	(4.0)	(5.4)	(9.7)
EXPER4	3147	4095	3328	2815	3293	1497	2427	2654	2945
	(23.7)	(13.4)	(9.9)	(10.1)	(11.6)	(2.9)	(2.3)	(4.6)	(8.4)
SCHOOL1	543	562	420	637	240	635	263	886	693
	(7.8)	(3.5)	(2.4)	(4.2)	(1.7)	(2.3)	(0.5)	(3.2)	(3.7)
SCHOOL2	1711	2048	1926	1600	1353	1546	1840	1314	1698
	(17.7)	(9.8)	(7.1)	(8.3)	(6.7)	(4.0)	(1.9)	(2.9)	(5.8)
SCHOOL3	3226	3436	2904	3104	3106	2713	2929	2493	3057
	(24.4)	(13.5)	(7.6)	(11.1)	(10.9)	(4.4)	(2.4)	(3.2)	(7.6)
SCHOOL4	4354	4741	4637	4211	3749	4404	2695	3275	4401
	(32.4)	(16.4)	(12.6)	(15.7)	(13.1)	(7.8)	(2.2)	(5.6)	(11.7)
SCHOOL5	7237	7467	6799	7547	5992	5909	4964	7234	8053
	(44.1)	(24.2)	(14.9)	(25.7)	(15.6)	(4.7)	(3.2)	(8.0)	(13.2)
STAT1	701	914	571	662	760	768	170	-115	741
	(8.2)	(4.3)	(2.7)	(3.3)	(4.5)	(2.4)	(0.3)	(0.4)	(3.6)
STAT2	1368	1929	1211	1526	1214	719	509	495	964
	(18.5)	(11.7)	(6.2)	(9.8)	(7.9)	(2.4)	(0.9)	(1.6)	(4.8)
STAT3	958	1290	983	784	1086	1019	115	525	1095
	(9.9)	(6.1)	(3.8)	(3.7)	(5.6)	(2.4)	(0.2)	(1.2)	(3.8)
SEX	-2898	-3403	-2707	-2853	-2611	-2725	-2393	-2488	-2576
	(50.8)	(28.2)	(17.5)	(23.5)	(21.8)	(11.5)	(5.1)	(9.7)	(16.3)
REGION1	-685								
	(7.1)								
REGION2	-254								
	(3.4)								
REGION3	-670								
	(8.4)								
REGION4	-670								
	(6.3)								
REGION5	-348								
	(2.2)								
REGION6	-778								
	(5.8)								
REGION7	-521								
	(6.3)								
R-SQUARE	0.38	0.41	0.44	0.44	0.40	0.27	0.16	0.34	0.29

The first column identifies the hypothesis, the second shows the corresponding F - statistic and the third states the probability of the hypothesis. The first row represents the test of the hypothesis that corresponding parameters are simultaneously equal across regions [12]. The PROB - value of 0.000 indicates that this

Table 8: Results of Tests on Parameters of the Earnings Function estimated separately for each region (model 2)

Parameters	F	PROB
ALL	2.72	0.00
ALL without INTERCEPT	1.80	0.00
INTERCEPT	1.99	0.06
SCHOOL	0.63	0.95
EXPER	1.82	0.00
STAT	2.95	0.00
SEX	1.09	0.37

must be considered as extremly unplausible; a result not totally unexpected from the previous analysis. Row 2 and 3 give an answer to the question, whether the differences lie in the intercept or in the remaining parameters. The hypothesis formed on the intercept cannot be rejected at the 95%-level, whereas the parameter differences are beyond doubt at the 99.9%-level. Although the calculations on the intercept are not very revealing - at the 90%-level we must accept the differences - the results very conclusively favour the opinion, that the parameters of the variables rather than the intercept are the prime source of the interregional differences.

But do all variables contribute to this result to the same extent? We tested the 4 groups of explanatory variables of the earnings function separately for interregional differences (row 4

- 7), thereby getting the following pattern. Two variables do not show marked differences, namely SCHOOL and SEX. With regard to SCHOOL we can even infer with a 95% - probability that the parameters are equal. Correspondingly, the variables EXPER and STAT, can be considered different at the 99.9% - level.

So we yield 2 main results from this analysis:

i) The discriminatory factor between male and female workers seems to be the same across different regions. Furthermore, the returns on education are with a high probability the same in different regions.

ii) Different average incomes between regions are mainly due to a different life time pattern of earnings as well as a different relationship between occupational status and earnings.

This shows, that the assumption of a simple scale factor as a basis for the analysis of interregional income differences, may it be corrected for productivity characteristics or not, is misleading and conceals much of the structural heterogeneity inherent in the problem. Moreover, it demonstrates in our view, that the neoclassical model does not tell us the whole story about regional income disparities[13)]

Again, holding all non-regional variables constant at their means yields a regional income distribution comparable to the ones above (although now the computed income differences are dependent on the means). The result is displayed in Table 9.

Table 9: Predicted income by Region Using Regression Results of Model 2 in AS

D/A	H	M	L
H	8768 (103.9)	8140 (96.4)	8564 (101.5)
M	8149 (96.6)	8089 (95.8)	8439 (100.0)
L	--	7995 (94.7)	8263 (97.9)

4. The importance of structural dimensions

Up to now we analyzed regression coefficients of single characteristics and regions. With this type of analysis nothing can be said about the importance of the regional dimension as a whole, as compared to other dimensions (e.g. sex, formal education, occupational status, work experience) in determining personal income.

We used the inequality measure suggested by Theil (1967), which is based upon information theory. In the context of our paper, this concept can be used twofold:

i) The overall income inequality in our data set can be broken up into the amount explained and the one unexplained. This provides some information about the accuracy of the model.

ii) The information gain provided by an extra dimension of classification (e.g. Region, Sex, Experience, etc.) can be calculated by the difference between the Theil index for the

complete model and the one for the model lacking the extra dimension. This figure tells us something about the importance of the extra dimension in the model.

Of course, the value of the information gain is dependent on the variables already in the model (Adelman, Levy 1984). But, since we always extract just one dimension from the complete model, the resulting figures can be compared.

Table 10 gives the information gains for both models. Column 1 and 3 show the absolute value of the information gains, column 2 and 4 give the information gain as a percentage of the total inequality in the data set (0.08976).

A brief remark seems necessary concerning the regional dimension in model 2. In this model, the regional dimension is contained in the fact that the parameters are free to vary across regions. Thus, to extract the regional dimension, one has to restrict all parameters (including the intercept) to be equal across regions.

In both models the information gain is highest for sex, second for formal education, then experience, occupational status, and lowest for the regional dimension. If one considers regional dummies on the intercept only, these variables raise the explainatory power of the model only by 0.37 percentage points. As compaired to education (10.11%) or sex (12.19%) the regional dimension is rather unimportant in this model type.

Table 10: Information gains by dimensions of variables

	model 1		model 2	
	absolute	percent	absolute	percent
SEX	0.01094	12.19%	0.01100	12.26%
SCHOOL	0.00907	10.11%	0.00897	10.00%
EXPER	0.00294	3.28%	0.00334	3.73%
STAT	0.00148	1.65%	0.00177	1.98%
REGION	0.00033	0.37%	0.00136	1.52%

Taking into account that we found this model to be misspecified, the result is not very surprising. But even with the more sophisticated model, we gain only 1.52% additional information from the regional variables. This still is the lowest figure.

One may suspect that the reason for this result is an inappropriate regionalization. To check this argument, we decomposed the Theil-index (measuring the total inequality in the data set) in various ways. Table 11 again gives the results in absolute and relative terms.

Table 11: Theil-indices by model types

	absolute	percent
model 1, 8 regions	0.03680	41.00%
model 1, 98 counties	0.03771	42.01%
model 2	0.03783	42.15%
total	0.08976	100%

The first row gives the amount of inequality we can "explain" by the first model (41%). In this version, which allows interregional variation only in the intercept, 59 percent of the total inequality remain unexplained. Since we obtained our eight regions through aggregation from the ninety-eight Austrian counties, we can check the appropriateness of the regionalization by calculating the amount of inequality we explained by a model, which considers counties instead of regions. The second row of Table 11 shows that using ninety-eight county- instead of eight region-dummies raises the amount of explained inequality only slightly (by 1.01 percentage points). So the regionalization, although not based on a formal method (cluster analysis, etc.), seems to be quite appropriate for our analysis.

VI. Conclusions

Concerning the regional variable, the regression analysis in our paper gave some clear results. There was a significant regional influence in both versions of the model, the one with interregio-

nal variation in the intercept (model 1, section IV 3) and the one with interregional variation in all parameters (model 2, section IV 4). However, the second version revealed that the restriction to a simple scale effect hides the most interesting part of the story, the structural differences with respect to work experience and status. Although, empirically we only tested the human capital hypothesis, and, strictly speaking, we cannot say anything about the polarization argument, this result provides hints in favor of our counter hypothesis. Interregionally different returns on experience for workers of the same qualification cannot be explained by the standard human capital or by the compensating differences framework. Thus, our results strongly suggest that there are structural differences between regional labor markets in Austria.

By holding the other variables constant at their means, one can isolate the pure regional income differences (table 5 and 8). With respect to the two dimensions of our regionalization, there is a decrease of income by decreasing level of development, but an U-shape with respect to accessibility. Thus, other things being equal, income increases, when accessibility decreases from medium to low. This is in line with some other empirical observations made in the Peripol-study (Maier, 1983a; Maier, 1983b; Tödtling, 1983). There, too, regions with low accessibility showed better performance with respect to some structural variables than the corresponding medium accessible ones. For each level of development least accessible regions show higher labor productivity and a higher rate of qualified workers. In the medium and low level of development groups, they have a higher index of working population (number of jobs/persons in the working population), a lower rate of the primary sector, and a higher rate of

the tertiary sector.

These observations seem to indicate that low accessibility is rather advantageous as compared to medium. We suspect that the higher amount of interaction between centers (region "H/H") and regions with medium accessibility causes backwash effects leading to social and economic erosion. This again is in line only with the polarization argument.

However, two points should not be overlooked: First, the reverse accessibility effect occurs only between regions of equal level of development. Comparing different levels of development, we clearly find a worsening tendency in both, the income figures and the structural indicators analyzed in the Peripol study.

Second, from the viewpoint of the individual, regional factors play a minor role in determining his income. His (or her) sex and formal education are far more important, fifty eight percent are even contributed by random effects (Section V).

Nevertheless, we did find interregional differences in the performance of labor markets, which should command more attention in labor economics. Regional scientists, on the other hand, could get a more systematic view of regional income disparities by homogenizing populations by the use of an earnings function concept.

NOTES

1) See Hanushek 1981. There is some difference between Hanushek's view of demand models and our's.

2) This is the neo-institutionalistic view of segmentation theory. Besides this, also some other lines of reasoning can be found in the literature. Radical economists, for example, see labor market segmentation as the result of an active strategy of capitalists to stabilize the capitalist system (Gordon, Edwards, Reich, 1982)

3) The inclusion of the Net-Regional-Product per capita for measuring the level of development introduces some colinearity between the regionalization and the income variable. However, the relation between one variable and the final regionalization is rather weak. Furthermore, the principal results of the study are not in the least influenced by this fact.

4) It is clear that only those indirect effects are meant which are not accounted for in the analysis below. So, for example, in the case of a different educational distribution there follows a different assessment of educational influence on income but not a different regional effect.

5) The dominant explanations of discriminatory wage practices within neoclassical theory are the "taste"-oriented approach (Becker 1957) and the "error - of - measurement" approach (see for example Duncan, Hoffman 1979; Kamalich, Polachek 1982).

6) This is the F - value produced by an one-way analysis of variance.

7) This test was accomplished in the following way: We performed

a regression of income on the regional dummies and tested the hypotheses that for any given level of the one factor the parameters of the other factor are simultaneously equal. See Dhrymes 1978, pp.51-61 for details.

8) We do not consider it justified to define disequilibrium in other markets like capital markets just to maintain the hypothesis of equilibrium in labor markets. Besides, there is some evidence that capital prices are roughly equilibrated across regions (see for example Straszheim, 1971).

9) Normally, in empirical estimation of the earnings function the log of income enters as dependent variable and the experience variable enters linearly and additionally squared. Since this specification is derived from very special assumptions (Mincer 1974, Blinder 1977) we prefered the linear equation and dichotomized the experience variable in 5 distinct groups. All of the following results were calculated also with the log income, but the differences were of no importance.

10) To attain a solution it is necessary to normalize the paramters of each variable. Here, this was accomplished by setting the parameter of the 0 - category a-priori zero.

11) For details of this test, which again generates an F - statistic, see Dhrymes, 1978, pp 60-62.)

12) Thus the test involves the following hypothesis:

INTERCEPT(0) = ... = INTERCEPT (7),

SCHOOL(0) = ... = SCHOOL(7),

.....,

SEX(0) = ... = SEX(7).

13) It is worth noting that the results are also contradictory to the compensating differences model, since from this model we should expect only differences in the intercept.

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