INFOCUS

LABOUR MARKET INEQUALITY AND GEOGRAPHICAL MOBILITY IN HUNGARY

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INTRODUCTION*

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Analysis of social inequalities usually concentrates on redistribution and reallocation of resources within a society. A high level of income inequality is not acceptable to a great number of citizens in a society, thus it is the ethical and moral opposition, together with an interest rooted in political aims that motivates most research of this kind. Inequalities however manifest themselves in many forms and raise questions other than ones concerning allocation. An important question, which is nevertheless relatively rarely looked at is how inequality affects the efficiency and workings of the economy.

Although we can not disregard the problem of allocation when looking at efficiency, the most important issue is not if the situation of a particular social group is acceptable, but whether a certain change would benefit the whole economy or just part of it. Since people living close to each other are in a similar situation in their life in many respects, regional inequality is an often surveyed subject. Nearly every chapter of this year's "Infocus" points out, that differences in the degree of economic development are not only considerable in Hungary, but also tend to be permanent both in their level and pattern. Although earlier strong urbanisation trends have changed in the 1990s, mostly in favour of villages in metropolitan areas and in the centre of the country, the division of the country seems to be alarmingly permanent. The present set of studies aims to answer two questions. Firstly we are interested in what factors cause regional inequality on the labour market, secondly we look at possible ways in which the geographic reallocation of labour (people) and capital (firms) could alleviate these inequalities.

The main target of our analysis is the mobility of labour, but research on this topic based on economic rationale does not have a long tradition in Hungary. For this reason, we found it important to broaden our perspec-

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tive into two directions. On the one hand, we tried to define precisely the kinds of inequalities we are looking at by closely examining factors forming them. On the other hand, our analysis extends to the spatial allocation and movement of firms, and also to the factors that determine both. Although labour and capital behave somewhat similarly in these respects, problems are not completely analogous – for this reason, they are discussed in separate sections. Nevertheless, because they are both key and intimately related determinants of the economy, the two areas can sometimes be separated only along artificial borders. This is why both of them are allocated a nearly equal length section – despite the fact that availability of data and the traditions of empirical research are sometimes rather different.

Spatial movement, migration of the labour force is nevertheless interesting for reasons other than its own sake. Chapter 1.1 builds on two influential models to argue that if the retaining effect of transaction costs is sufficiently small, economic agents (here: potential employees) are probably willing to take on the inconvenience of moving to a new location in exchange for improved work conditions. This mechanism leads to migration on the individual level and – through the continuous decline of regional differences – to the decline of imbalances and ultimately of inequality. If however the costs associated with the decision are so high that it is not worth moving even in the presence of substantial gross gains, or if the forces that created the inequality in the first place prove to be permanent, then inequalities are there to stay even if it would be clearly socially beneficial to remove them.

While individuals are often prevented by social and psychological bonds from following strictly economic considerations, enterprises can base their "home" choices solely on expected returns. Nevertheless, Chapter 2.1., the theoretical introduction to the second part, points out that looking at only classic motives and ways of exploiting spatial differences (which are similar to mechanisms we learn about in the case of employees) and not considering the effect of the economic surroundings is a mistake that is probably the greatest in the case of firms. Empirical studies of the second part support the claim that relocation of firms can generate a positive feedback to the behaviour of other firms. Co-operation and spillovers between firms can improve the conditions of "traditionally good" areas even further, while those of "traditionally bad" areas might just continue deteriorating, if there are no external forces to break the vicious circle. Such differences shape the availability of business partners for firms and the set of available workplaces for potential employees.

The individual mobility decision is influenced by various factors, whose connection to economic interest can range from loose to strong. We picked two proxies for potential advantages that are relatively easy to grasp, re-

gional unemployment rates and average wages. Although raw data show substantial spatial variation in both, results of Chapters 1.2. and 1.3. offer different pictures about the extent to which these can actually be exploited by individuals. The insight in both cases is that differences are shaped not (only) by a variation in the response, but also in the composition of the labour force and firms, along with the local interaction of the two. At the same time we witness the well-known East-West division of the country characterised by the leading role of the North Western and the Central regions, surprisingly without the outstanding leadership of Budapest.

Based on these observations, it looks like there are differences that employees could exploit in relation to the probability of employment, if not to wages. It is an interesting question however whether it is worth trying to actually use these differences? Is it better to move or to commute to the better workplace? How important are the previously mentioned costs? Out of the latter, it is probably living expenses that influence the probability of moving house the most. Although swapping flats is not a problem in an ideal world, the Hungarian reality is far from this: Chapter 1.4. reports that in a (plausibly) bad scenario, an average person moving house might lose her/his wages earned throughout a whole year. Opposed to common belief therefore it is not the duties levied on swapping a flat, but risks associated with such a transaction that is the main factor causing the greatest problem, which is further magnified by the fact that the rental flat stock is quite small in Hungary. Until this situation changes, swapping a flat remains a "luxury". It is no problem for those who are affluent (moving typically to the green residential areas of agglomerations), but causes serious trouble to those wanting to escape from poor areas. The defensive strategy of municipalities seeking to discriminate "problematic" immigrants does not help too much in solving the problem, either.

What can then one expect who does not move, but ventures into commuting, thus avoiding the risky business of swapping a flat? Chapter 1.5. employs a special database to look at the effect of various factors on commuting probabilities, most importantly its cost and the distance to the job to be taken. A remarkable characteristic of the data is that it is informative about both the distance over which an employee commutes and the financial consequences of such a commute. Statistical results confirm intuition showing that financial constraints are transmitted to commuting too, an effect most pronounced in the case of women.

Although there are nontrivial costs to mobility, a little more than 4 per cent of the population changes its residence to a new settlement in Hungary. Is this rate small or big? Is the effect of economic incentives important? Chapter 1.6. aims at answering these questions with the use of a series of data sources. Based on micro-level data, the effect of economic incentives

is confirmed, although the economic significance of these is probably less than what is required to sustain regional equilibration processes. The reason for this can be the fact that mobility in Hungary is largely connected to sub-urbanisation, the flow of the workforce from cities to surrounding villages. These results show that in the case where the bulk of mobility takes place within a (micro) region, traditional models of mobility and migration cannot be successfully applied. Differences within a region also need to be handled with care, as the workplace is often not identical to the place one lives.

We have already seen that the labour force is not very likely to follow differences between labour markets within the country. Even if people move, it is mostly inhabitants of backward regions who cannot break free from their place of living, maybe because of the low value of their property or because their human capital is not quite compatible with advanced technology. It remains a question however how pressing is the need to move, how much enterprises are willing to move to backward regions? The introduction and the empirical studies of the second part of "Infocus" look at this question from various aspects. Although being quite important from the employees' point of view, it is neither services that grease the wheels of the economy nor the constantly changing agriculture, with its considerable share of employment that stands in the focus of the second part, but manufacturing and related industries. This prominent place is due largely to the enormous part these industries play in economic growth and their responsiveness to the economic ambience. As the presence and structure of labour demand is important to potential employees, enterprises are interested in the presence of a suitable labour force and, as Chapter 2.1. points out, the network of co-operation whose operation depends on companies that are in some sense nearby. We have been accustomed to the idea for some time that Hungary lies on the boundary of East and West, subject to the influences of both worlds. Chapter 2.2. shows that this border is present if measured by the strength of the European economic "force field", generating productive connections largely responsible for the growth of the Hungarian economy. Chapter 2.3. points out that it is the engineering (automobile industry to a great extent) and electronics companies of Western Hungary that play a central part in economic growth. A common characteristic of these enterprises is that they are situated on easily accessible sites, employ well educated workers and became an integral part of the European economic "force field". If there is a goal to decrease the almost deterministic effects of spatial differentials, it is crucial – argues Chapter 2.2. – that geographic distance of the disadvantaged regions from the centre is counterbalanced through rapid development of infrastructure and improved accessibility.

Almost every study reflects on the distribution of knowledge, of human capital. Chapter 1.6. and chapters of the second parts put together a picture showing that better educated people are much more likely to move, and this is due to a great extent to the fact that industries mostly settle in already developed regions. Educated people either move to their proximity, or do not have an incentive to move away and move to pleasant locations within reach of the newly established workplaces. The analysis in Chapter 2.2. indicates that instead of decreasing it, such distribution of human capital increases inequality even more. Knowing this, it does not come as a surprise that international investors do not play a pioneering role in either of these respects. Chapter 2.4. illustrates the behaviour of enterprises with results that look familiar, but can be numerically surprising in many cases. One of these results is that the number of jobs created by foreign owned firms well exceeded those created by domestically owned ones. Unfortunately the positive effect of the former, working through business connections, is region-specific as well.

What can we conclude from all of this? It seems that although both the labour force and capital are free to move, neither moves in such a way that the disadvantages of certain regions would diminish significantly. Since effects are cumulative, they do not reverse by themselves, which elicits the need for external help to reduce regional inequalities. Development of the infrastructure, decreasing barriers to the formation of contacts is a key element for both potential employees and enterprises. It is of equal importance that both the labour force and the business ambience of disadvantaged regions become more desirable. Although such processes benefit from the regionalisation of Central Europe and the enlargement of the European Union, helping them should stay a top priority for some time to come. We can only hope that helping the accumulation of human capital, schooling and in general education programs will become part of the official "regional agenda" just as the development of the road network did.

1 LABOUR MOBILITY AND ITS CONDITIONS

1.1 Theoretical background to the causes and effects of the regional mobility of the labour force

Zsombor Cseres-Gergely

Before we start a fundamentally empirical investigation of the regional mobility and migration of the Hungarian population, it is a good idea to organise thoughts about the issue. This is necessary not only to see more clearly the potential mechanisms behind the population flow, but also to be able to decide, which processes are possible to detect at all and which are not. Besides our focus on labour market developments, this approach is the main characteristic that can differentiate economic analysis from other approaches.

In what follows, we are going to look at four main areas. We begin with a decision problem for individuals contemplating upon mobility. After this a model of the macroeconomic consequences and potential benefits of migration is briefly introduced. Then we look at some concepts that are going to be used frequently in later chapters. Finally, the simple model is enhanced with features that close the gap between its original form and everyday experiences. The original mathematical models will be presented in a more verbal form.

The individual mobility decision

It is quite trivial that after committing to a choice of residence, one is usually located at a given place for an extended amount of time. This means not only that free time and pastime is spent near this location, but also that employment is much less costly near the place of living.[1]

The mobility decision is formulated in its now classic form in *Harris and Todaro* (1970). The authors constructed a so-called general equilibrium model describing population flow between rural villages and towns, whose main variables are not imputed from outside of the model, but generated as a result of internal mechanics. The idea is the following. Since the focus

1 Although commuting is clearly a choice for many, it merely increases the "actio radius" of a worker to a certain area. There are also professions which do not require physical presence. Nevertheless, these have not yet achieved high penetration among the majority of the population despite a recent expansion.

is on the urban minimum wage, one motivation of the relocation is the expected difference between urban and rural wages. This gap is the main decision factor. If expected wages in the towns are higher than in the villages, workforce migrates to the towns. If production capacities are fixed, then due to the relative abundance of labour, this difference decreases and is finally eliminated through the decrease of the marginal product of labour.[2] Although unemployment does not have a direct influence on individual decisions, one can easily imagine a situation where it plays a role that is equally important to, or even more important than, wage differentials.

Let us now return to our imaginary decision maker! There is a place of living given, where local labour market conditions are characterised by the unemployment rate, a proxy for the security of a workplace and the wage, a proxy for the rewards a job has to offer. The labour market opportunities of a person are of course shaped by many other factors, but let us suppose that these are, in general, good measures of them. In this case, potential employees are attracted to regions with higher wages and/or lower unemployment, ceteris paribus.

In choosing between two potential places of residence, pair-wise relationships of these characteristics will be decisive. If one unit of money is valued the same way by the poor and the rich, educated and uneducated, thus decision makers are neither risk averse nor risk takers in particular, then we can suppose that wages and unemployment rates would exert the same effect no matter their level. But if this is so, we can think about a weighted average of the two characteristics that one can measure on which the decision about residential move can be based: it is better to live in settlement X if this index is higher there than in Y.[3] The decision is of course influenced by the potentially incurred costs as well.

The complete decision process can be formulated in various ways. As an extreme case, one can suppose that everybody can take into account every location when considering a move – this allows for basically two approaches. In the first, there is a one-phase decision to be made, where every individual alternative is studied and compared to all the others and finally one of them is selected. In the first phase of the second approach, the best alternative is selected (possibly in a way that is analogous to the one described before), then it is compared to the current place of living: if the alternative performs better, the move takes place, if worse, it does not. Although this distinction might seem to be artificial, it is important in practice.

Up to now we have talked about mobility only, but if the motivation comes from the labour market, mobility might well be preceded by another phase, where decision is made not upon the change of residence, but upon the change of workplace, the plan being commuting instead of relocation. The commuting decision can be thought of as very similar to that which

2 Their point is actually that with a minimum wage, the gap does *not* in fact close.

3 This amounts to supposing a linear utility function for the decision makers. Such a utility function was used in *Fidrmuc and Huber* (2002) and will be used in Chapter I.6. here.

we see in the case of mobility. The differences come mostly through costs and benefits. While in the case of commuting, transportation is a decisive factor, successful mobility requires a well developed market for real estate (see for example *Köllő*, 1997; and *Cameron – Muellbauer*, 2001; *Böheim – Taylor*, 1999)

Migration as a vehicle for eliminating regional imbalances

Mobility of the population, between or within countries, has been of interest to economists in both the United States and Europe for some time. Migration within countries poses the question: how the net position of the country changes in terms of educated workforce as a result of migration.[4] In the second case of within country migration, the most interesting question is whether the mobility of the population can help to reduce differences in development within a country.

An extension by *Blanchard and Katz* (1992) revises the classic argument presented by Harris and Todaro.[5] Instead of spending too much time on formulating the micro level argument, the authors start from differences observed between states of the US in terms of labour market conditions and development. Their aim is to quantify the responsiveness of migration to all (both) factors creating disequilibrium gaps, therefore, it becomes an important hypothesis (even without being part of a behavioural model) that migration is responsive to differences in unemployment, too. This year's "Infocus" echoes their question, among others: are the forces of migration able to equilibrate the observed differences, and if yes, how long will it take to achieve that?

The macro-level movements highlighted by the paper are exactly the equilibrating mechanisms used by Harris and Todaro. Let us now suppose that workers think along the lines of this model and that there are indeed differences in regional national labour market conditions: unemployment is lower and the wage is higher in developed regions, while it is the other way around in less developed ones. In such a case, it is in the interest of inhabitants of less developed regions to move into a more developed one so that they can realise the gains offered by the differences. If there is a sufficiently high number of decisions along these lines, then there will be an excess supply of labour in the more developed region, wages being driven down and unemployment up in turn (depending on the elasticity of labour demand). At the same time, there is an opposite process in motion in the developed region, since wages grow and unemployment diminishes with the emigration of the labour force. As the features of the two regions become equal, a simple calculation would suggest it not worthwhile to move and the process will come to an end. Given that such a story is valid for all possible pairs of regions, the forces equilibrate the whole country.[6]

4 These problems are studied extensively for example in *Borjas*, 1994.

5 One has to note however that the idea was already developed and presented by *Pissarides and McMaster* (1990), although in a less grand format.

6 Because the low marginal product of labour can be caused by underinvestment in assets, also the mobility of capital can equilibrate the labour market. This mechanism is discussed in the second part of "Infocus".

Lacking sufficient data to apply such a model to Hungary, we can only adopt its central ideas. Besides the heterogeneity of individual decisions (we shall see more on this later), three important conditions have to be satisfied.

First, the real estate, most importantly the market in flats has to work perfectly. If prices of flats are depressed in the departure region for some reason, than much less potential migrants will be able to realise their idea of moving and that might not be enough for a significant change on the labour market.

Second, costs related to the move can trigger a selection mechanism. Facing similar costs,[7] it is the most "fit" that start first, as the move is the least costly for them – these are usually the most educated of the labour force, ceteris paribus. Productivity of the remaining population is thus diminishing, leading potentially to a shortage of the workforce in some industries or jobs requiring special training. If that workforce was not productive enough on its own without a sufficient amount of well-trained colleagues, or it did not fit in well with capital-intensive production methods, such a migration would possibly exacerbate problems instead of reducing them.

Third, only the initial state of the two regions can be different, they must fare along a similar path after that. In particular, there are no effects such as new investments that would improve the developed region more thus leading to labour market differences that are justified. If nonetheless this was the case, the emigration of skilled labour would continue and possibly accelerate. Importantly, wages in the better-developed region would stay high, since capacities that can absorb the labour force are constantly increasing, too. At the same time, wages in the less developed region would stay depressed, since their increase requires a "pull" of sufficient demand.

Two concepts

Having seen the framework for the analysis of the individual migration decision and also its potential effect on the economy as a whole, it is time to define some fundamental concepts. In what follows the term "migration" will refer to the action whereby someone changes her or his place of living by crossing borders of a large geographical unit such as a country or a region. The choice of the spatial unit has a profound effect on whom we regard as a migrant. Most often we look at migration between countries or within countries and across large regions. Since the two problems are analogous, we look at the second possibility. If one wants to form a view about the extent of migration, a suitable regional unit has to be chosen. If it is too small, "too much", if it is too large, "too little" migration will be detected. To define what is "too little" or "too much", we can look at the condition of the economy, at similar economies and the nature of the

7 The word "cost" is used here in a broad, economic sense, meaning not only monetary costs, but the loss of social connections and emotional stress, too.

population flow. The regional units among which differences are detected can also be helpful in deciding upon the suitable resolution.

The mobile population is more numerous than that of the migrants. We consider somebody mobile, if the relocation does not take place in the same settlement.[8] In contrast to migration, the effect of local relocations is local too. A move from one micro-region to another or one from a town to its suburb clearly has no effect on inequality between regions, but influences the internal distribution of the population. Although the large-scale equilibrating effect of migration is missing here, it is an important question how the relocation processes can affect the economic potential of a region through secondary channels. One such mechanism is allocating less affluent workers to affordable places that might also be closer to industries, thus reducing the burden of commuting as well. Another even tighter, but similar category is those moving *within* a settlement, labelled as "flat mobility".

Talking about commuting, a potential phase before moving house, a special form of migration, known as "commuter-migration" has to be mentioned (see for example *Illés*, 1995 on this). In this case the employee does not work at her or his place of residence, but at in an area farther away, maintaining probably some sort of accommodation near the workplace. Such "commuters" spend more than one night away from home. It is important to differentiate them from the others for they will be included in the mobile or migrant population in general statistical figures.

What else triggers moving: some more complicated relocation strategies

So far, we have considered only a simple, bare-bone model of mobility. Reality is of course much more complex with variations that have a nontrivial impact on the conclusions we draw. The most important complications will be highlighted following *Akkoyunlu and Vickerman* (2002).

In the simple model, we have not considered explicitly, whether a person or a household is the relevant decision-making unit. Actually we assumed that preferences concerning relocation are well represented and aggregated, or an even stronger structure: they are identical to one household member's preferences. But if this is not the case, we have to take into account that moving has a potentially different impact on household members. In general, the preferences of all household members are combined when making the decision, and the answer is affirmative only in the case when the household as a whole (in a more restricted case: all household members) benefits from the move.

Another aspect of the household model is the possibility of risk sharing. If all household members work at the same location, there is no protection to shocks that affect the particular region. On the other hand, if

8 Although this distinction might not be trivial, it coincides with the taxonomy of some respectable institutions, such as that of Statistics Canada: http://www.statcan.ca/english/concepts/definitions/mobility.htm.

some members work in a distant region, possibly as a commuter-migrant (defined as above), then the effects of such shocks are dampened through pooling resources.

A further source of complications arises from the observation that mobile people do not choose alternative regions with equal probability. If past migrants from a given settlement give a hand to prospective ones in finding accommodation, for example, migrants will prefer settlements that have already attracted population from their homeland. Because this is a self-reinforcing mechanism, in the absence of countering forces, small initial differences can grow substantial and strong spatial flows emerge that are hard to rationalise within the framework of a simple model (*Carrington et. al.*, 1996).

It was also implicitly assumed that only the immediate economic motivations play a role in the mobility decision, while local surroundings and other non-tradable amenities do not. If this is not true, quality and landscape of the neighbourhood, by shaping the mobility decision, can attract people with similar tastes. As a result, real estate prices at places preferred (by affluent households) go up, while those not preferred go down. Surroundings thus, begin to have an effect on the migration decision not only through the utility they generate, but also through the feedback effects they trigger.

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1.2 Regional differences in the employment probability

Gyula Nagy

This chapter deals with the regional differences in the chance of employment from 1992 to 2002. The employment probability was estimated by logit models based on the labour force survey (LFS) of the Central Statistical Office (CSO) and the differences across regions were investigated. Estimations were based on 1st quarter data of every second year from 1992 to 2002. Separate models were estimated for women and men.

Although LFS data available include labour market participation and employment data on the 15–74 years old population, we limited our sample to the 25–50 year old women and 25–55 year old men. We dropped the age group below 25 since the expansion of the education, the considerable increase in the share of participation in secondary school and higher education and as a result, the considerable decrease in employment activity of this age group in the '90s would otherwise influence our findings. Similarly, the employment and participation rate of those around retirement age has been influenced by the change of that during the period investigated and accordingly, the older age groups have also been dropped.

The employment rate (the share of employed persons in the corresponding age group) for men and women are given in Figure 1. During the first half of the '90s, the employment rate of both men and women decreased by 5 and 8 percentage points, respectively. Since 1988 employment rates have risen moderately, by 2 and 3 percentage points for men and women, respectively. Taken as a whole, during the period of 1992–2002 the employment rate decreased; in the 1st quarter of 2002, the employment rate of men was 2 percentage points below that in the 1st quarter of 1992, as for women the size of the decline reached 8 percentage points.

Figure 1: Employment rates for women aged 26–50 and men aged 26–55

Source: *Labour Force Survey*.

The employment probability depends partly on the probability of employment intentions – economic activity –, partly on the probability of finding a job for those who enter the labour market with the purpose of employment. As people with an intent to supply labour form the economically active population, some of them find a job – they are the employed –, some of them do not – they are the unemployed. The purpose of the present analysis is to show the differences in chance of employment. We distinguish two groups: the employed and the non-employed people, with the latter including the unemployed and the inactive. According to the ILO definition, the employed are those people who worked for pay or had a job or an active business during the reference week.

For the purpose of the research of regional differences of employment probability, we used the seven NUTS2 regions as defined by the CSO: Central Transdanubia, Western Transdanubia, Southern Transdanubia, Northern Hungary, Northern Great Plain, Southern Great Plain, and Central Hungary. Type of settlement – village, town, county seat, Budapest – educational level, age group, marital status and the number of children, are used as control variables in the analysis. The results of the estimations are given in Table 1.

First, we discuss the effects of control variables. *Educational level* has a strong positive effect on the probability of employment, both for men and women. Women with incomplete primary education have about 40 per cent lower employment probability than the reference group with primary school education. The same difference is 25–30 per cent for men. The chance of employment of persons with a higher education is 25 per cent higher for women and 18–20 per cent higher for men than that of those with only primary school education.[9] According to the results, differences in educational level are somewhat larger in the case of women than in the case of men.

For the *age group* variable, the age group of 25–30 is the base category. In the case of women, the employment probability of this age group was the lowest, the estimated coefficients for all other age groups were significant and positive. Women of 36–40 have the highest employment probability, but women of 46–50 are still more likely in work than those who are 25–30 years old. Since bringing up children has a definite effect on activity probability, it is likely that it influences our results. The 'number of children' variable in our model gives no information on the age of the children; consequently, we can only partly control for the effect of bringing up children on the employment probability of the women of 25–30. Beyond that, the probability to be unemployed is higher among young people. The employment probability of men decreases with age, for the oldest age group in our sample, the 51–55 year old men, it has been more than 20 per cent below that of the 25–30 year old men since 1998.

9 To show the differences we consider the marginal effects. The marginal effect in the logit function is $p\cdot(1-p)\cdot \acute{c}$, where p is the probability an event occurs, and $\acute{c}$ is the estimated coefficient

Table 1/a: Logit models of employment probability, men

	1992		1994		1996		1998		2000		2002	
	coef.	z	coef.	z	coef	z	coef.	z	coef.	z	coef.	z
Educational level												
Incomplete primary education	–0.787	–8.19	–1.092	–8.24	–1.198	–8.56	–1.160	–9.16	–1.314	–9.14	–1.484	–9.68
Vocational school	0.532	9.33	0.675	11.58	0.650	11.84	0.704	15.42	0.836	16.94	0.958	19.02
General secondary school	0.949	9.16	0.981	9.41	0.966	10.17	0.815	10.18	0.568	6.11	0.759	7.51
Vocational secondary school	0.943	12.08	1.067	13.63	1.156	15.06	1.299	19.56	1.316	19.92	1.301	19.52
Higher education	1.649	15.87	1.752	16.61	1.877	18.36	1.920	22.44	2.113	22.11	2.029	21.56
Age-group												
31–35 years	0.177	2.20	–0.052	–0.60	0.051	0.62	–0.038	–0.53	–0.019	–0.26	0.226	3.01
36–40 years	0.049	0.64	–0.212	–2.63	0.027	0.35	–0.138	–1.97	–0.243	–3.26	–0.040	–0.53
41–45 years	0.106	1.29	–0.318	–3.73	–0.176	–2.33	–0.349	–5.46	–0.529	–7.70	–0.411	–5.70
46–50 years	–0.159	–1.89	–0.679	–7.71	–0.441	–5.51	–0.588	–8.94	–0.786	–11.59	–0.651	–9.50
51–55 years	–0.514	–5.91	–0.886	–9.46	–0.877	–10.70	–1.148	–16.69	–1.177	–16.46	–1.270	–18.27
Marital status and the number of children												
Single, no children	–0.824	–13.14	–0.946	–14.37	–0.753	–12.68	–0.898	–17.71	–0.995	–18.96	–0.970	–18.22
No. of children	0.011	0.34	–0.071	–2.20	–0.018	–0.60	–0.091	–3.53	–0.050	–1.80	–0.094	–3.36
No. of children*single	–0.385	–1.76	–0.438	–2.16	–0.221	–1.46	–0.732	–4.49	–0.179	–1.24	–0.479	–3.47
Region												
Central Transdanubia	–0.033	–0.34	–0.308	–2.88	–0.178	–1.77	0.033	0.38	0.132	1.45	–0.016	–0.17
Western Transdanubia	0.478	4.35	0.302	2.49	0.203	1.86	0.453	4.82	0.396	4.04	0.368	3.61
Southern Transdanubia	0.037	0.37	–0.637	–5.96	–0.450	–4.46	–0.346	–4.08	–0.423	–4.82	–0.590	–6.57
Northern Hungary	–0.420	–4.57	–0.823	–8.18	–0.649	–6.87	–0.603	–7.64	–0.641	–7.82	–0.691	–8.13
Northern Great Plain	–0.229	–2.52	–0.771	–7.81	–0.657	–7.15	–0.597	–7.81	–0.734	–9.32	–0.789	–9.64
Southern Great Plain	0.079	0.83	–0.381	–3.70	–0.049	–0.50	–0.013	–0.16	–0.051	–0.60	–0.282	–3.25
Type of settlement												
Town	0.157	2.78	0.211	3.55	0.106	1.93	0.161	3.36	0.216	4.27	0.326	6.34
County seat	0.128	1.85	0.288	4.03	0.260	3.66	0.113	1.90	0.223	3.70	0.410	6.49
Budapest	0.461	4.78	–0.105	–1.03	0.045	0.46	0.029	0.36	0.168	1.96	0.057	0.65
Constant	1.131	10.73	1.549	13.51	1.205	11.52	1.289	14.58	1.432	15.33	1.409	14.85
No. of observations	14,444		12,072		13,062		17,385		17,489		17,269	
Pseudo R^2	0.980		0.116		0.115		0.121		0.134		0.142	

The base categories are primary schooling, age 25–30, married with no children, Central Hungary and village.

The more children women bring up the less chance they have to work outside the home. To some extent this is connected to the fact that the labour supply of women decreases with the number of children. Further, women with more children are less likely to be employed than those without or with fewer children. Having one child more, the employment probability of non-single women (married or living together with a partner) decreases by 10–15 per cent. The same effect is somewhat lower, 5–13 per cent, in the case of single women.[10] There is no difference between the single and non-single women with no child. The 'number of children' variable showed a significantly weak negative effect (having one more child decreases em-

10 In the case of single women the coefficient of the 'number of children' variable can be calculated as the sum of the coefficients of the variables 'number of children' and the 'number of children*single'

ployment probability by 1–1.5 per cent) in three various years (1994, 1998, 2002). One would expect a positive relationship between the number of children and the employment probability of men, due to the obligation to maintain the family. The reason of our opposite results can be explained by arguing that the coefficient of 'number of children' variable masks other effects not included in our model, for example the common effect of employment discrimination against Romas and the high number of children in Roma families.

Table 1/b: Logit models of employment probability, women

	1992		1994		1996		1998		2000		2002	
	coef.	z	coef.	z	coef	z	coef.	z	coef.	z	coef.	z
Educational level												
Incomplete primary education	–1.280	–12.37	–1.702	–10.88	–1.611	–9.77	–1.828	–11.47	–1.807	–10.23	–1.874	–10.36
Vocational school	0.531	8.36	0.586	9.13	0.694	11.09	0.515	9.81	0.773	14.19	0.703	12.76
General secondary school	0.602	9.16	0.826	11.43	0.792	11.74	0.705	11.89	0.673	10.44	0.693	10.22
Vocational secondary school	0.964	14.33	0.819	12.39	1.035	15.50	0.990	17.40	1.265	22.06	1.104	19.05
Higher education	1.053	13.76	1.404	16.69	1.493	19.20	1.572	22.57	1.637	23.55	1.606	22.42
Age-group												
31–35 years	0.719	11.31	0.840	11.80	0.983	14.08	0.868	14.02	0.709	11.60	0.672	11.18
36–40 years	1.067	16.46	0.952	14.15	1.133	17.04	0.861	14.17	0.928	14.80	1.012	15.70
41–45 years	0.821	11.57	0.803	10.84	0.962	13.86	0.721	12.30	0.711	11.73	0.681	10.77
46–50 years	0.639	8.42	0.472	5.98	0.512	6.95	0.289	4.73	0.387	6.37	0.299	4.97
Marital status and the number of children												
Single, no children	–0.057	–0.78	0.036	0.48	–0.018	–0.26	0.027	0.46	–0.024	–0.41	–0.022	–0.38
No. of children	–0.505	–17.91	–0.520	–16.83	–0.717	–23.63	–0.685	–25.67	–0.714	–26.40	–0.771	–27.68
No. of children*single	0.229	3.89	0.152	2.52	0.132	2.37	0.128	2.54	0.245	4.63	0.244	4.76
Region												
Central Transdanubia	–0.241	–2.54	0.006	0.07	–0.054	–0.56	–0.079	–0.97	0.118	1.41	0.135	1.60
Western Transdanubia	0.043	0.43	0.404	3.80	0.276	2.75	0.288	3.35	0.285	3.24	0.210	2.34
Southern Transdanubia	–0.115	–1.16	–0.020	–0.20	–0.083	–0.85	–0.121	–1.44	–0.166	–1.95	–0.209	–2.40
Northern Hungary	–0.389	–4.23	–0.117	–1.23	–0.292	–3.17	–0.294	–3.70	–0.287	–3.60	–0.285	–3.48
Northern Great Plain	–0.347	–3.85	–0.253	–2.74	–0.286	–3.20	–0.422	–5.53	–0.392	–5.10	–0.432	–5.50
Southern Great Plain	–0.202	–2.18	–0.038	–0.40	–0.110	–1.20	–0.121	–1.54	–0.152	–1.91	–0.263	–3.27
Type of settlement												
Town	0.144	2.66	0.179	3.12	0.189	3.46	0.135	2.86	0.186	3.84	0.159	3.21
County seat	0.283	4.39	0.341	5.01	0.244	3.66	0.272	4.69	0.359	6.08	0.234	3.95
Budapest	0.043	0.48	0.101	1.11	0.107	1.21	0.095	1.23	0.050	0.64	–0.025	–0.32
Constant	0.477	4.95	–0.035	–0.35	–0.076	–0.80	0.162	1.96	0.043	0.51	0.203	2.38
No. of observations	12,921		10,740		11,575		15,253		15,236		14,704	
Pseudo R^2	0.112		0.116		0.150		0.139		0.152		0.152	

The base categories are primary schooling, age 25–30, married with no children, Central Hungary and village.

Figure 2a: The marginal effects of region variables on employment probabilities of men, Transdanubian regions

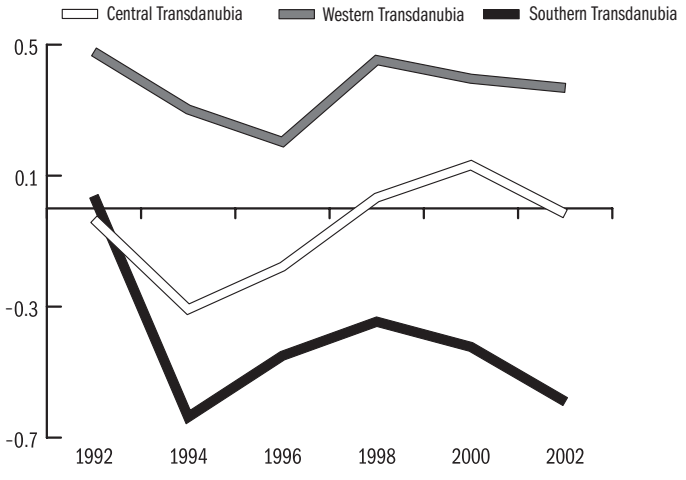
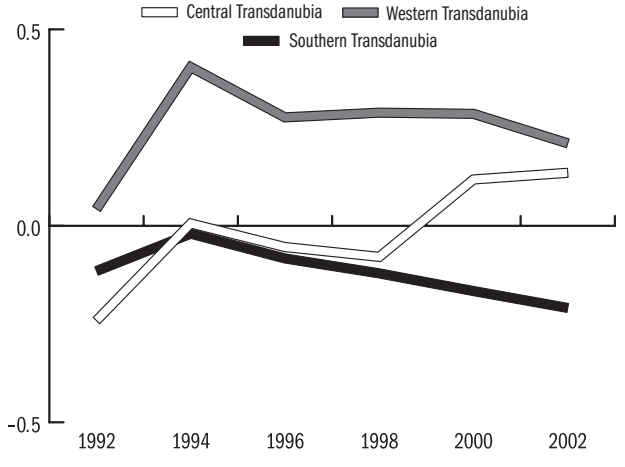


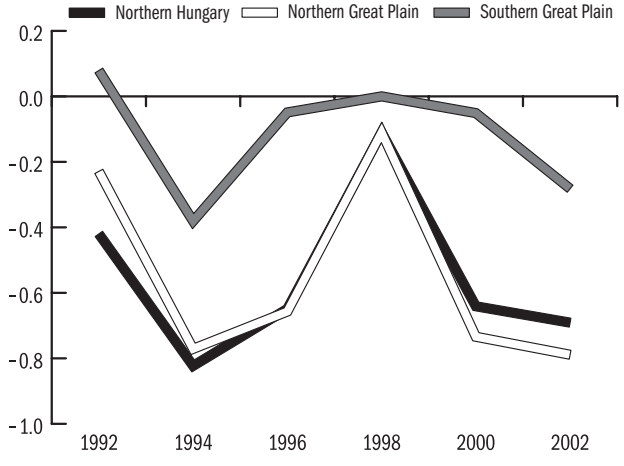
Figure 2b: The marginal effects of region variables on employment probabilities of women, Transdanubian regions



The marginal effects of the *region* variable are given in Figures 2a-2d. The base category is the region of Central Hungary, which includes Budapest and Pest county. Let us consider first the results for the Transdanubian regions (Figures 2a-2b). In the region of Western Transdanubia, the probability of employment of both men and women is higher than in the region of Central Hungary. The coefficients are significant for all but one year (1996 for men and 1992 for women) as implied by the z statistics in Table 1. Controlling for the effect of other variables in the model the employment probability of men was 3–7 per cent (4–8 per cent for women)

higher in Western Transdanubia than in the region of Central Hungary. As for the Central Transdanubia region, coefficients were insignificant for both men and women except for one year. This means that the probability of employment in Central Transdanubia does not differ from chances in Central Hungary (the coefficients were significant and positive for men in 1994 and for women in 1992, and in both cases the difference in employment probability was 5 per cent). Since 1994 in the region South Transdanubia the chance of employment of men has been significantly below that in Central Hungary, with a difference in probability ranging between 6 and 12 per cent (it decreased between 1994 and 1998 and increased after). On the contrary, there was no employment disadvantage for women living in South Transdanubia from 1992 to 2000. The only year was 2002 when the coefficient was significant (with a marginal effect of 4.5 per cent).

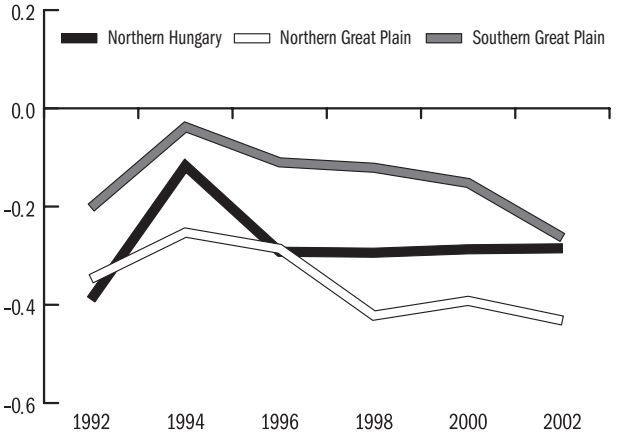
Figure 2c: The marginal effects of region variables on employment probabilities of men, Eastern regions



Results for the Eastern regions are shown in Figures 2c-2d. For the region of the Southern Great Plain, we had significant coefficients for both men and women only in two out of the 6 years. Men had a disadvantage of 6.5 per cent in 1994 and 4 per cent in 2002, women 4 per cent in 1992 and 6 per cent in 2002. In the rest of the period, there was no difference in the employment probabilities in the region of the Southern Great Plain and Central Hungary. The chance of employment for men is quite low in both Northern Hungary and the Northern Great Plain. There was a significant negative difference in all the 6 years; it reached about 6 per cent in Northern Hungary, in the Northern Great Plan it was just 3 per cent in 1992 but has been rising to 10–15 per cent in both regions since 1994. The coefficients for women were also negative in both regions and significant, with

one exception (1994, Northern Hungary), but the difference in the probability was smaller. As for Northern Hungary, results show a 3–8 per cent difference in probability. As for the Northern Great Plain the gap is 7–10 per cent, compared to the region of Central Hungary.

Figure 2d: The marginal effects of region variables on employment probabilities of women, Eastern regions



Note: For Figures 2a-2d the base category is Central Hungary.

To sum up, our findings show considerable regional differences in the employment probabilities. In the region of Western Transdanubia, both men and women have higher chance to be employed than those who live in other regions of the country. Our results show a considerable employment disadvantage for both men and women – larger for men – in the region of Northern Hungary and the Northern Great Plain. Beyond that, men have a low chance to be employed in Southern Transdanubia.

There is also a difference in employment probability by types of settlement. In towns, the chance to be employed is 2–4 and 3–4 per cent higher for men and women, respectively compared with those who live in a village. (In the categorisation of the type of settlement, the base category was village.) Those who live in county seats have an even greater advantage compared to those who live in villages: 4–5 per cent for men and 5–7 per cent for women. (The coefficients of town and county seat variables were significant in each of the 6 years for men; in the case of women, the coefficients of town variable were significant in 5 out of the 6 years, the coefficients of county seat variable in 4 years.) The 12 estimations gave only one significant coefficient in the case of Budapest. According to our results, controlling for other variables included in the model, the people who live in Budapest have no higher probability to be employed than those who live in the villages in county Pest (the base category in this case).

1.3 Regional differentials in earnings and labour costs

János Köllő

Potential earnings gains and savings in labour costs are among the most important factors shaping spatial mobility. This chapter addresses the scope for such gains by analysing wage differentials across NUTS-II regions and types of municipalities over the period of transition (defined here as 1986–2001).

Workers' potential gains can be measured by regional differences in net wages paid for a given type of job. Statistical data on regional average earnings are available but their pairwise comparison does not yield precise measures of the potential gains from moving. The personal characteristics of would-be migrants are fixed and are to be controlled for. Similarly, the effect of compositional differences (by industry, firm size and occupation) on regional average wages is to be filtered out.

Some of the potential control variables are observable and their effect can be easily removed from the data using regression techniques. The conditional expected values of wages estimated with a regression model provide more precise measures of the potential gains from mobility, and these estimates often yield quite different results than do the raw data. The difference between average wages in Budapest and small urban centres (cities and towns excluding county seats) amounted to 49 per cent in 2000, for instance, while the regression-adjusted differential relating to workers of the same gender, age, education, occupation, industry and firm size reached just 23 per cent.

While it is certainly advisable to filter out the effect of individual attributes that remain fixed while the worker moves from one place to another, the question of what else should be held constant in the regional comparison of wages is often difficult to answer. Differences in productivity and unemployment are good examples of this kind of ambiguity. Productivity levels vary largely across regions, and are partly explained by unobserved skill differentials among workers. Regional inequalities in the knowledge of foreign languages or internet literacy support that such hard-to-observe skill differentials do exist. It can not be taken for granted that the median worker of region *i*, employed in a low-productivity firm, can easily find a job in region *j*'s typical, high-productivity enterprise given his/her level of unobserved skills. Therefore a comparison based on earnings equations uncontrolled for firm productivity is likely to overestimate workers' potential gains/losses from moving between *i* and *j*. However, equations, when controlled for productivity, are likely to underestimate the true wage gap. As long as region *j*'s labour productivity is higher for reasons other than unobserved skills, and employers share the productivity gains with work-

ers, movers can acquire a wage gain larger than what is suggested by the productivity-controlled regressions. This ambiguity clearly has practical relevance: controlling for productivity reduces the estimated wage gap between Budapest and urban centres from 23 to 15 per cent.

Another question is whether one should control for *unemployment*. As will be shown later, local unemployment rates have a strong impact on local wage levels – this is one of the reasons why moving from macro-region *i* to macro-region *j* yields a wage gain. However, in many cases such a gain can be acquired by moving from high-unemployment to low-unemployment districts *within* region *i*. Comparisons based on regressions uncontrolled for local unemployment therefore tend to overestimate the wage gain from changing region. Including local unemployment to the right-hand side of the earnings equation has substantial impact: the estimated region-specific wage differential between Budapest and urban centres diminishes further to only 6 per cent.

Similar concerns arise on the part of *employers*. The labour cost differential between regions, relevant for employers, can be approximated by comparing gross wages controlled for compositional effects. (Since payroll taxes are roughly linear, they can be ignored). However, the unit cost of labour also depends on the productivity of the employees that need to be taken into account in order to have reliable estimates of the potential gains from relocation. This calls for comparing regional wage differentials between firms of identical productivity, that is, controlling the wage equation for average product or some other measures of efficiency (total factor productivity, for instance). The argument for holding local unemployment constant applies in this case, too, and it is also supported by further considerations. Relocating from a prosperous region to a high-unemployment one may raise non-wage expenses such as screening costs, and the firm is also likely to face diseconomies due to low firm density, distance from decision-makers and trade portals, and less developed infrastructure.

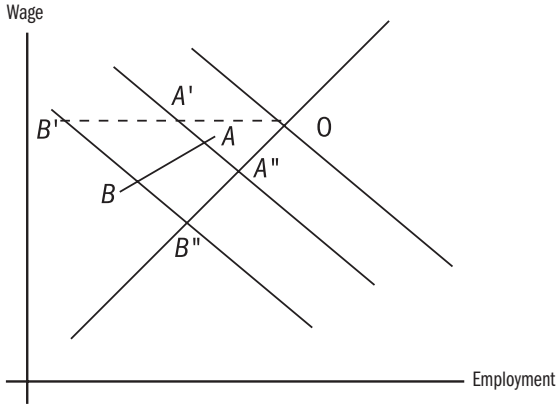
In the following sections we analyse regional wage differentials using data from the Wage Survey conducted in 1986, 1989 and annually since 1992. The survey comprises firms employing more than 20 workers (1986–1994), 10 workers (1995–98) and 5 workers (1999–2001). Wages in private firms are analysed first. This is followed by a study of earnings differentials in the public sector and micro-enterprises uncovered in the Wage Survey. Wage differentials controlled (uncontrolled) for productivity and local unemployment will be interpreted as lower-bound (upper-bound) estimates.

Regional wage differentials and the wage curve in 1986–2001

Wage differentials by unemployment rate bear great importance to economists and policy-makers interested in the flexibility of labour markets. Un-

der certain assumptions the relationship between regional wage levels and regional unemployment levels provides information on how wages adjust to regional shocks. To clarify how these linkages may come into being in a transition economy consider two regions (*A* and *B*) hit by demand shocks of different magnitudes at the start of transition. The possible outcomes are sketched in Figure 1 with an upward-sloping labour supply curve, downward-sloping labour demand curves and an upward sloping wage curve (*AB*). If wages were rigid representative firms of region *A* and *B* would shift to points *A'* and *B'*. Relative wages would not change while unemployment levels (*OA'* and *OB'*) would differ substantially at the end of the day. With infinitely elastic wages the adjustment would lead to points *A"* and *B"*: i.e. the shocks would be fully absorbed by wages and unemployment differentials would be eliminated.

Figure 1: Reactions to regional shocks



We have several reasons to expect an outcome like the one depicted by curve *AB* on Figure 1. Wages are higher and unemployment is lower (employment is higher) in *A* than *B*. There are both theoretical and empirical arguments supporting this expectation.

First, the push effect of unemployment on wages may not be linear in unemployment. High unemployment is usually associated with longer duration of unemployment spells given that in some cases a protracted joblessness erodes the human capital of the job seekers, or firms are averse to taking on the long-term unemployed for other reasons. Thus, the wage push will be a concave function of unemployment. Second, if unemployment is high the wage required to deter shirking is lower as argued by *Shapiro and Stiglitz* (1984) and other proponents of the efficiency wage theorem. Third, if workers and employers bargain over both wages and employment (as in the seminal model of *McDonald and Solow* 1982) regions will be located along a contract curve connecting regimes with low employment and

low wages with their high-employment, high-wage counterparts. (In this case regions are shifted along the *AB* curve rather than moving to *A* and *B* through *A*' and *B'*.)

Empirical research of the relationship between wages and unemployment repeatedly identified lower wages in high-unemployment regions. While the estimates vary over a wide range, a multitude of studies found the elasticity of regional wages with respect to regional unemployment to be around –0.1. (See overviews by *Blanchflower and Oswald* 1990, 1992, 1995 and *Winter-Ebner* 1997).

Note that the linkage between unemployment levels and wage levels provides reliable information on wage flexibility if the supply of labour is not highly elastic. To see this suppose that at the end of the adjustment process, the *AB* curve becomes nearly parallel with the supply curve while both *A* and *B* fall close to *A"* and *B"*, the points expected under infinitely elastic wages. Since the unemployment differentials are small, the wage curve analysis would indicate weak correlation between unemployment and wages, hinting at 'inflexibility'. The risk of this kind of misinterpretation is lower the steeper the supply curve. Fortunately, labour supply is indeed highly inelastic in most labour markets.

Table 1: Elasticities of individual earnings with respect to regional (NUTS-IV) unemployment, 1986–2000

	Net monthly earnings		Gross monthly earnings	
	Base model	Controlled for productivity	Base model	Controlled for productivity
1986	0.0000	0.0000	0.0000	0.0000
1989	-0.0197	-0.0055	-0.0238	-0.0065
1992	-0.0696	-0.0546	-0.0854	-0.0673
1993	-0.0755	-0.0591	-0.0923	-0.0726
1994	-0.0857	-0.0711	-0.1056	-0.0879
1995	-0.0955	-0.0757	-0.1177	-0.0938
1996	-0.1142	-0.0935	-0.1309	-0.1073
1997	-0.0755	-0.0527	-0.0826	-0.0578
1998	-0.0851	-0.0662	-0.0896	-0.0738
1999	-0.0936	-0.0673	-0.1014	-0.0728
2000	-0.0689	-0.0561	-0.0757	-0.0617

Keeping these caveats in mind we can conclude from the data that Hungarian wages exhibit a high degree of flexibility. As shown in Table 1, between 1986 and 1996, the elasticity of net and gross wages with respect to NUTS-IV, micro-region level unemployment increased from zero to –0.11 and –0.13, respectively. Later, the estimated elasticities decreased in absolute value and stabilised in a range between –0.07 and –0.1, rather close to the 'benchmark' of –0.1. Given an eight-fold difference in the unem-

ployment rates of the best and worst regions in this period their wage levels were estimated to differ by about 17 per cent holding other wage determinants constant. (Supposing an elasticity of –0.09 the wage difference can be approximated as $1\text{-}e^{-0.09 \cdot \ln(8)}$).

Estimates from individual earnings functions controlled for gender, age, education, experience, job grade, industry, firm size, firm ownership, firm's capital-labour ratio and NUTS-II dummies (base model). Productivity of the employer was measured by sales net of material costs divided by the number of workers in the respondent's firm. For further details see endnote J1.

Models including firm's productivity among the regressors hint at significantly lower elasticities – ones fluctuating between –0.05 and –0.07 after 1996. While the estimated wage differential between the best and worst regions amounted to about 17 per cent, the estimated wage gain of a firm relocating from the best to the worst region without a loss of productivity did not exceed 12 per cent ($1\text{-}e^{-0.06 \cdot \ln(8)}$).

Differences between types of settlements

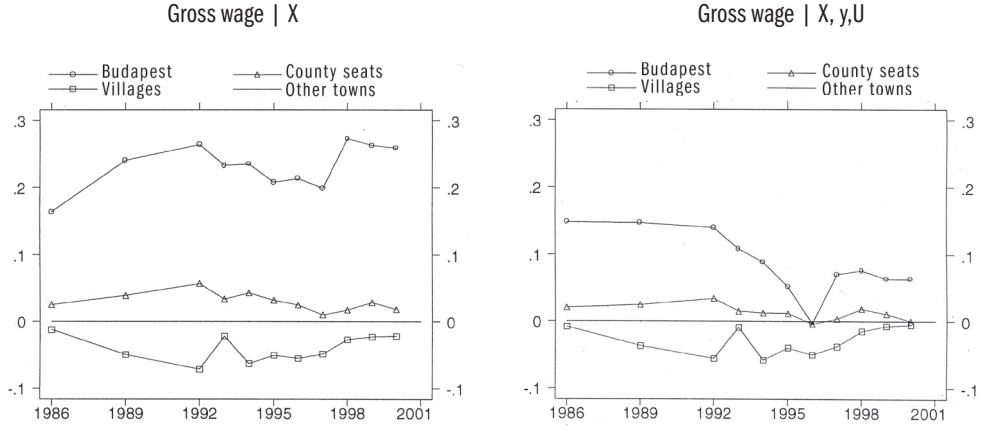
Figure 2 shows estimates of the net earnings differentials by types of settlements (Budapest, county seats, other urban centres treated as the reference category, villages). Symbol |X indicates that the difference is controlled for the individual and environmental characteristics listed in the footnote of Table 1 while |X,y,U stands for estimates holding also the firm's productivity and local unemployment constant.

The difference between villages, small towns and the 19 county seats were modest throughout the transition and had nearly vanished by the end of the 1990s.

Figure 2: Regression-adjusted net earnings differentials between settlements 1986–2000

The inclusion of productivity and unemployment into the models only affects the estimates for Budapest versus other settlements. While the estimates based on equations controlled for the *X*-s varied in the 17–22 per cent range and followed an increasing trend, those controlled for *X, y* and *U* were much lower and followed a decreasing trend. A worker, moving from a low-unemployment town to the capital finding a job at a firm of similar efficiency as the original employer, could expect a net wage gain of about 6–7 percentage points at the end of the 1990s. Considering higher costs of living in Budapest this gain seems rather modest.

Figure 3: Regression-adjusted gross wage differentials between settlements 1986–2000



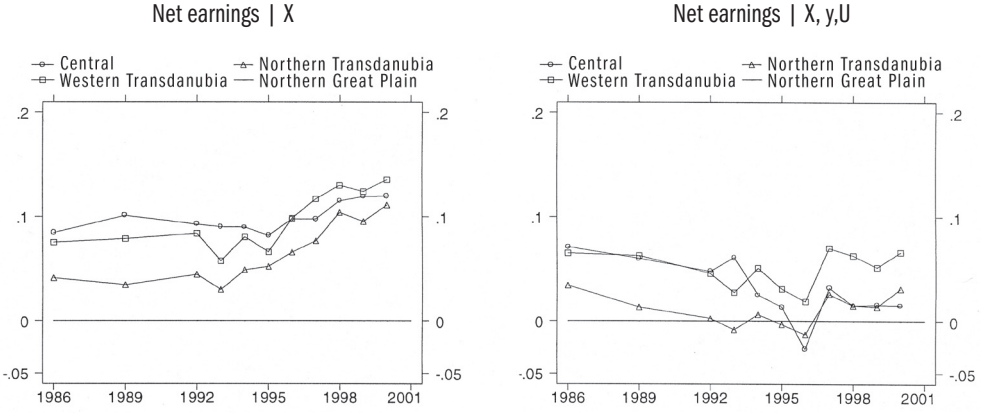
The estimates of labour cost differentials (Figure 3) yield qualitatively similar results. A firm relocating from Budapest to a small town can expect its average wage to drop by 25–27 per cent. (See the left panel). However, in order to realise this gain the firm has to maintain its productivity level – a difficult task when the positive external benefit from running a business in a prosperous, large metropolitan area is lost. Comparing firms of identical productivity on the right panel suggests a lower potential gain: about 15 per cent in 1986 diminishing to about 5 per cent in the middle of the 1990s and rising again to the range of 10–15 per cent later. The path of the adjusted gain is probably explained by the faster recovery from the transformational recession of the Budapest area. The differences between county seats, other towns and villages were widening in 1986–96 but had nearly disappeared by the end of the transition period.

Regional differences

Regional wage differentials, which seem substantial on the basis of raw data, appear to be rather small once individual and employer attributes are controlled for. We study these differences in figures 4–7. The Northern

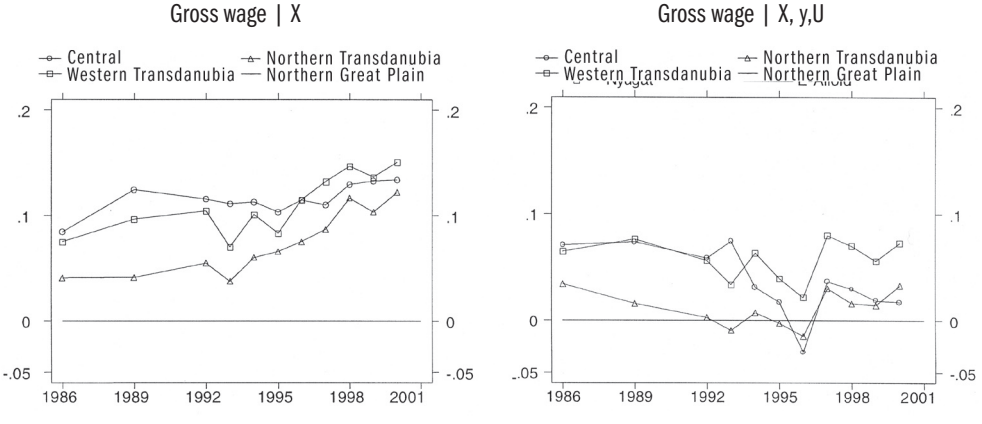
Great Plain is treated as the reference category in all of these charts. Figures 4 and 5 depict the path of net and gross wages in the most developed regions (Central without Budapest, Western, and North-Transdanubian) relative to the Northern Great Plain.

Figure 4: Regional net earnings differentials 1986–2000



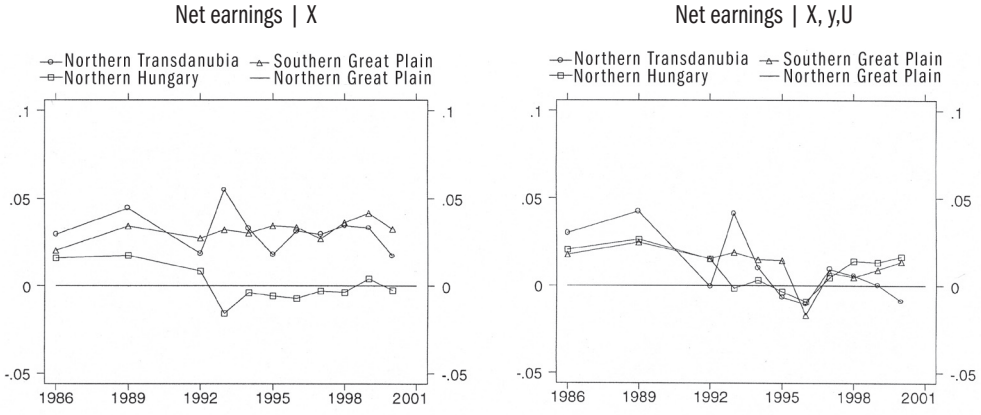
The wage advantage of developed regions increased from about 5 per cent to 10–14 per cent between 1986 and 2000. It is apparent from the comparison of the two panels, however, that the gap was mostly explained by the growing relative productivity and diminishing relative unemployment level of the central and western regions. The wage gap, when adjusted for these variables, did no exceed 6 per cent.

Figure 5: Regional gross wage differentials 1986–2000



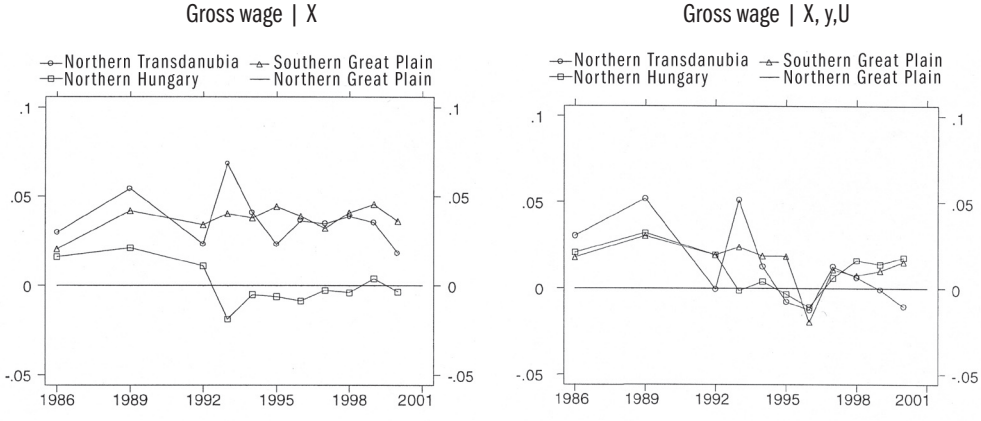
The estimated gross wage differentials followed a similar path. A firm moving from the most developed western part of Hungary to the Great Plain without a loss of productivity could expect a labour cost gain of between 2 and 7 per cent since the mid-1990s.

Figure 6: Regional net earnings differentials 1986–2000



Figures 6 and 7 show the wage path of three less developed regions (South Trandanubia, Southern Great Plain, Northern Hungary) relative to the Northern Great Plain. The net earnings differentials are small whichever estimate is considered and became negligible by 2000. The same holds for the gross wage differentials irrespective of whether they are adjusted for productivity or not. The raw wage differentials between these regions are fully accounted for by differences in observable skill endowments and industrial composition.

Figure 7: Regional gross wage differentials 1986–2000



The patterns discussed in this section hold for within-industry wage differentials as well. *Köllő* (2003) found the scope for gainful relocation to be wider in light industry than engineering and the tertiary sector. The paper also analysed the residual wage distribution and concluded that earnings regressions tend to overestimate wages in the Northern Great Plain and Northern Hungary by about 2–3 percentage points. The qualitative conclusions drawn here are not affected by these results.

Regional wage differentials in the public sector

So far we analysed earnings variations in the private sector while those in the public sector are equally important from the potential migrants' point of view. Table 2 fills the gap by presenting estimated net earnings differentials controlled for the effects of gender, experience, education and job grade. Since the differences between NUTS-II regions are very small and quite often statistically insignificant, the table only displays the unemployment elasticity of wages and the variations across types of settlements.

Public sector wages are apparently less responsive to unemployment as indicated by the elasticities varying between –0.01 and –0.04. This is explained by the bureaucratic rules of wage setting allowing no adjustment to labour market conditions. In fact, it is rather likely that the observed weak negative correlations reflect compositional differences – the fact that the depressed areas, most of them rural, have smaller schools, basic health institutions, and only low-ranked offices of public administration.

Table 2: Regression-adjusted net earnings differentials in the public sector. 1992, 2000

	Public administration		Education		Health	
	1992	2000	1992	2000	1992	2000
Unemployment elasticity	-0.0308	-0.0399	-0.0277	-0.0257	-0.0199	-0.0134
Budapest	128.5	120.3	113.0	105.6	115.1	110.5
County seats	120.7	124.2	99.9	99.6	103.7	103.5
Urban centres	100.0	100.0	100.0	100.0	100.0	100.0
Villages	90.2	93.2	102.1	97.6	102.8	100.0

Wage differentials between villages, towns and county seats are negligible in all sectors while public administration pays higher wages in county seats. The wage advantages of Budapest (and of county seats in public administration) are probably explained by the compositional differences mentioned above. The wage advantage of Budapest (controlled for X) seems marginally lower than that observed in the private sector.

Micro-firm employees and casual workers

Analyses based on the Wage Survey are often criticised for not covering firms smaller than five workers, part-timers, and casual workers. The 2001 April-June wave of the Labour Force Survey (LFS) that asked the respondents about their wages opens the possibility to fill this gap. In this paper only the regional aspects are discussed.

Using information on usual working time, industry, and firm size it is possible to determine the part of the LFS sample belonging to the target population of the Wage Survey. The sub-sample which were asked about wages

contained 18,452 such workers and 3,699 further respondents (mostly micro-firm employees). The wages of the two populations were analysed with regressions having gender, age, age squared, education, one digit industry, Budapest dummy and the local unemployment rate on the right hand side. The coefficients of the two latter variables are presented in Table 3.

Table 3: Regression-adjusted regional wage differentials in the Labour Force Survey sample, April-June 2001

	Wage Survey target population		Other wage earners	
	Net wage*	Gross wage	Net wage*	Gross wage
Employed in Budapest	0.0589	0.0753	0.0791	0.0994
Unemployment elasticity	-0.0822	-0.1027	-0.0904	-0.1084
Number of respondents	18,452		3,669	

* Adjustment for personal income tax was made by the Central Statistical Office using tax tables.

The wage advantage of workers employed in Budapest appears to be smaller than in the Wage Survey, which is based on firm-reported payroll data. This is probably explained by a much higher rate of refusal among high-income Budapest respondents – a common experience of income surveys. More importantly, there is no statistically significant difference between the two sub-samples in terms of the Budapest effect and the unemployment elasticity of wages.

Summary

Data suggest that wage differentials between Hungary's macro-regions were not substantial in the beginning of the 1990s and by the end of it, those between types of municipalities almost completely vanished, except for Budapest. Estimates concerning the capital's wage advantage vary over a wide range of 6–23 per cent depending on the choice of model. The differences are smaller if productivity and/or local unemployment are held constant and larger if these factors are considered to be irrelevant from the mobility gain's point of view. Depressed regions do not provide large savings in labour costs for relocating firms. It seems that wage differentials can not play a decisive role in worker migration decision either. Improvements in employment probabilities and quality of the environment most probably matter more than a few percentage points gain in earnings.

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Note J1.

The Wage Survey (WS) is an annual survey conducted by the National Labour Centre in 1986, 1989 and each May since 1992. In the waves used in this paper the sampling procedure was the following (i) the firm census provided by the CSO serves as the sampling frame (ii) it is a legal obligation of each firm employing more than 20 workers to fill in a firm-level questionnaire and provide individual data on a 10 per cent random sample of the employees. (iii) budget institutions irrespective of size have to fill in the institution-level questionnaire and provide individual data on all employees (iii) Firms employing less than 20 workers according to the census are sampled in a procedure stratified by four-digit industries. The firms contacted are obliged to fill in the firm-level questionnaire and provide individual demographic and wage data on all employees. The observations are weighted to ensure that they are representative. About 180 thousand individuals employed in 20,000 firms and budget institutions were observed in 1999–2001.

The regressions quoted in this section had log monthly gross or net earnings on the left hand side. The coefficients were estimated with ordinary least squares. All the coefficients (b) appearing in the tables are significant at 0.01 level after adjustment for heteroscedasticity. The tables and charts display approximations of the percentage differentials by $\exp(b)$.

1.4 The housing market and residential regional mobility in the 1990s – the case of Hungary

József Hegedüs

Housing mobility and regional mobility

Social scientists tend to agree that a strong relationship exists between the housing system and regional mobility. However, they seem to agree much less on what the causal relationships exactly are and, consequently, which social policy tools would be appropriate to apply to reach a certain aim. This chapter describes the relationships between the housing system and regional migration, primarily from the perspective of the former, and attempts to identify factors within the housing sector that affect the latter. The analysis, based on two significant household surveys by the HCSO[11] concentrating on housing conditions, seeks to underpin empirically the theoretically established relationships or, where it is impossible to produce evidence, to illustrate them.

In international comparison, housing mobility[12] (move by households) in Hungary is rather low. Annually 3 to 4.5 per cent of households move whereas in Western European countries the rate is significantly greater. (*Hegedüs*, 2001). In the theory of welfare economics, low mobility has a serious negative impact primarily by undermining the efficiency of programs targeted at reducing unemployment, and inflexible consumption of housing contributes to the under-usage of the housing stock thus creating additional social costs.

Low housing mobility is often explained by various cultural and social factors, but these explanations lack empirical underpinning and often build on historically unjustified stereotypes. Here these factors will not be discussed and the focus will be on those that explain households' behaviour, assuming that households – within the constraints of information available for them – make rational decisions.

Apart from factors determining housing demand (such as demographic conditions, household incomes and expectations), housing mobility is mostly affected by "transaction costs", which are made up of several elements.

1. The first of these factors is that changing a home in the owner-occupied sector is one of the most important economic decisions of a household, fundamentally affecting the household's portfolio. (In Hungary, 96 per cent of housing is owner-occupied). The average value of a home amounts to 5 or 6 times the average household's annual income. (The housing price/income ratio was 5.9 in 1999, while in 2003 it was 6.5.) This means that a bad decision on the housing transaction (for instance that a household undervaluates their old housing by 20 per cent or over-valuates the new housing by 20 per cent) may put more than a year's income at risk. This factor in-

11 HCSO (Hungarian Central Statistical Office) empirically surveyed housing conditions in 1999 and 2003. The sample included 10,754 respondents in 1999 and 8,000 in 2003, but through a special sampling procedure relocating families are overrepresented in the 2003 sample. The research was lead by János Farkas.

12 Hereafter long term relocation of a household is meant by housing mobility. In empirical research, "long term" means a period of time longer than six months. This definition is different from the usual definitions of migration mobility. Thus, in the housing surveys by HCSO in 1999 and 2003 housing mobility rates are somewhat lower, yet in several aspects provide a more realistic picture of long term processes in the housing market. The weight of temporary relocation is probably smaller in the Hungarian housing market as the rental housing stock, which is supposed to make it possible, is practically missing.

creases risks, i.e. constraints mobility, especially in the case when there is no reliable information available on the time trend of housing prices.[13]

2. Moving involves substantial tax and financial burdens. Duties, registration fee and the potential hiring of a real estate agent may increase actual transaction costs. In Hungary,[14] the duty is the greatest item, though the average duty of 4.5 to 5 per cent is not high by Western standards.[15] While many researchers have pointed out the negative correlation between transaction costs and housing mobility, the actual impact mechanisms, however, are supposed to be much more complex.

3. Lack of information and knowledge of the housing market is an important factor too. While this factor is naturally interrelated with risks caused by the great value of housing property as an asset, it does play a role in itself. Knowing prices, of course, is of primary importance, but there are several other risk factors that should not be disregarded, such as the reliability of ownership attestations, which can be one of the factors restraining housing mobility.[16] Also, the time requirement of selling housing is part of transaction costs.

4. Most researchers consider the high rate of owner-occupation as one of the main causes of low mobility, as indeed owner-occupation increases transaction costs partly because of the above listed factors.

High transaction costs necessarily reduce housing mobility and the efficiency of the housing sector.[17] Housing mobility, however, is also connected to the systems of housing finance and subsidy. For instance, it is a widely known relationship that low and controlled rents limit mobility as families are reluctant to relinquish the "hidden" subsidies (*Hegedüs – Tosics*, 1992). The underdeveloped housing finance system discourages mobility as buying a place to live without affordable loans is not an option even for middle and upper-middle income households.

Factors influencing mobility within the same settlement naturally work in the case of relocation between localities too. Regional mobility, however, is more intensively influenced by certain different factors. In the communist regime, the lack of a housing finance system lead to the strengthening of a self-help system of housing construction in which people, relatives or friends, received and gave help in building homes both financially and "in-kind". This system greatly contributed to the conservation of the regional structure of settlements. Current municipal housing policies also contribute to the rigidity of this structure and to the low regional mobility.

Regional differences in housing prices and housing investments

The regional difference in housing prices is a serious constraint on housing mobility. Affordability of housing is generally expressed by the price-to-income (P/I) ratio. In Western European countries, this ratio is between 2 and

13 The efficiency of the automobile market is greatly increased by highly standardised prices of second hand cars, thus making " the probability of loss" much smaller than in the real estate market.

14 The amount of the duty is 2 per cent of the market value of housing in the case where the price is less than HUF 4 million, and 6 per cent of the value on top of the HUF 4 million limit. The law provides two kinds of relief: in the case of newly constructed housing by a company the buyer is exempted from paying the fee, and first time buyers under 35 are granted a 50 per cent reduction, limited at HUF 40 thousand (if the price of the housing is not more than HUF 8 million).

15 In France and Belgium the duty is over 10 per cent, but in the UK and Italy it is less than 3 per cent. (*Mclennan*, 1998)

16 No wonder that in developed countries a separate insurance product, the title insurance, has been developed to reduce risk of loss due to "erroneous" registration.

17 According to *Lruvrnsteijn and Ommeren* (2002), a one per cent increase in transaction costs reduces the probability of moving within the owner–occupation sector by 8 per cent.

3.5, whereas in Hungary in the past decade it was 5 to 6. In general terms, the higher is the P/I ratio, the lower is mobility (*Strassman*, 2000).

In the early 1990s, housing prices were declining in real terms but started to soar again after 1999. Although no single reliable time series data are available for housing prices, our estimates based on various sources, confirm this trend. The price/income ratio grew from 5.9 to 6.5 between 1999 and 2003, which means that housing prices grew more rapidly than did incomes. Nevertheless, affordability of housing improved with the greater accessibility of housing credit.[18]

The 1999 and 2003 HCSO Surveys provide information on regional differences and trends of housing prices.[19] Clearly, regional differences in housing prices increased over the past four years. Looking at housing by types of settlement, the difference between villages and the capital city agglomeration has grown from 2.5 to 3.7. By regions, the relative difference between the Central Region and the Northern Great Plain region has grown from 2.0 to 2.3. Increasing regional differences make mobility between geographical units (regions and types of settlements) harder within the private sector. An efficient rental housing sector (which would include a workable rent assistance scheme both for private rental and the communal sectors) could eliminate this obstacle to regional mobility.

Table 1: Average housing prices in 1999 and 2003 by types of settlement and by regions (HUF million)

Type of settlement	1999	2003	2003/ 1999	Region	1999	2003	2003/ 1999
Budapest	5.15	13.35	259	Central Hungary	5.11	13.85	271
Bp. Agglomeration	6.18	19.51	316	Central Transdanubia	3.82	8.98	235
City with county rights	3.91	9.93	254	West Transdanubia	4.85	10.59	219
City	3.19	7.43	233	South Transdanubia	2.99	7.60	254
Rural agglomeration	5.18	11.89	230	Northern Hungary	2.48	6.04	244
Village	2.48	5.33	215	Northern Great Plain	2.49	6.10	245
Average	3.72	9.33	251	South Great Plain	2.83	6.04	213
				Average	3.72	9.33	251

Source: *HCSO 1999, 2003 Housing conditions*.

Regional differences in housing prices are reflected in the different housing/income ratios as regional differences of incomes tend to be much smaller than those of housing prices.

Regional differences in the housing price/income gap reinforce our earlier findings that the access to housing varies by regions. Acquiring a home is easier in villages and less developed regions, where employment and earning prospectives are limited.

18 The affordable housing price/average housing price ratio is the measure of the price of housing affordable through borrowing as a percentage of average (average or median) housing prices. Another indicator of affordability is the ratio of affordable homes/homes for sale, which is a measure of what percentage of homes for sale is affordable for average income households.

19 Values of housing are specified through regressive estimates in which parameters of homes (location, type of home, state of home, size and amenities etc) are used to explain the values attributed to the housing by respondents (the hedonic model). Variables included in the model proved to be relevant for more than 70 per cent of the variation of estimated housing values.

Table 2: The housing price/income ratio in 1999 and 2003 by types of settlement and regions.

Type of settlement	1999	2003	2003/ 1999	Region	1999	2003	2003/ 1999
Budapest	7.4	8.2	111	Central Hungary	7.4	8.5	114
Bp. Agglomeration	8.6	11.5	133	Central Transdanubia	5.7	6.2	109
City with county rights	6.0	6.9	115	West Transdanubia	7.3	7.4	101
City	5.3	5.8	108	South Transdanubia	5.1	5.7	111
Rural agglomeration	7.4	8.5	115	Northern Hungary	4.2	4.8	117
Village	4.5	4.3	96	Northern Great Plain	4.4	4.9	113
Average	5.9	6.5	111	South Great Plain	5.2	5.1	99
				Average	5.9	6.5	111

Source: *HCSO 1999, 2003 Housing conditions.*

Owner-occupied housing and mobility

The literature seems to agree that the ownership structure of the housing stock, i.e. the large share of owner-occupied homes is one of the key reasons for low housing mobility, which in turn reduces the employees' ability to adapt to the uneven regional distribution of jobs. Consequently, there is a correlation between the lack of rental housing and unemployment.

The explanation to this is that not only are transactions costs of moving owner-occupied housing high but the rental housing sector is missing in regions offering good job opportunities. A further consequence of the dominance of owner-occupied housing may be that employees are forced to accept jobs that are the nearest to their homes even if the job does not pay well and requires less expertise than their professional qualifications. Furthermore, the lack of adequate housing supply increases the costs of investment that would create jobs. (*Oswald*, 1999)

While the share of rental housing had been low (21 per cent) in Hungary before 1990 by European standards, after the privatisation in the 1990s, similarly to the rest of Eastern Europe, the share of rental housing dropped to just 4 per cent of the overall stock (*HCSO*, 2003). Note however, that extremely high mobility in the private rental sector is due to the chaotic tenant-lessor relations rather than to a healthy mobility.

Still, housing privatisation cannot be considered to be the primary cause of low mobility as tenants in the council rental sector had quasi-ownership rights and could practically move freely (i.e. "sell their home"). Although the Housing Act of 1993, which defines the legal framework of the management of the rental housing stock, limited these rights, tenants (and direct descendants living in the same home) have their home more or less freely at disposal.[20] The share of tenants (especially in the private rental sector) having reported their intention to change their housing situation within the next five years is twice as large as that of owner-occupiers (47 and 19

20 The so called fictitious exchange of housing is a still existing practice, yet it is up to the housing department of the individual municipalities how strictly they enforce compliance with the law.

per cent, respectively). However, this is the result of the temporal and disadvantageous status of renting rather than of the difference in transaction costs involved in moving.

New constructions and moving (transaction chains)

Housing policy and especially new constructions influence the volume of moving and regional mobility. Dwelling construction is interrelated with moving both indirectly and directly through the so called transaction chains.[21] Newly constructed housing is bought by households who "vacate" and sell their old housing, which then can be occupied by other families. In this sense, a substantial part of moving is connected to new housing construction. The significance of new housing is measured by the length of the transaction (moving) chains, which shows how many families can move by building a new housing unit.

Empirical research shows that in the early nineties the length of transaction chains of new housing was 1.87, which means that 100 new housing units brought 87 existing housing units into the market. The same kind of research on the period 1980–1985 identified 1.3 to 1.6 long chains (*Hegedüs*, 1993, *Hegedüs – Tosics*, 1992). In the light of international comparisons, these figures suggest low mobility. The value of indicators with similar content is 2 to 3.5 in Western countries, but in certain partial markets the mobility is found to be as low as in Hungary.

Based on the HCSO Surveys of 1999 and 2003, the length of chains is assumed to grow: while in the transactions of the 1970s vacancy (the probability that the chains can be continued) was 0.33, in the 1980s it was 0.42, in the early 1990s 0.49 and between 1996 and 2002 0.56. This means that the estimated value of the transaction chain grew from 1.5 to 2.2. "Vacancy" indirectly signals the chance that movers can sell their old homes, which differ by types of settlement and regions. These data indirectly refer to the regional differences of the length of transaction chains (filtration).

Table 3: The vacancy rate of moves between 1996 and 2002 by regions and types of settlements*

Region	Vacancy rate	Type of settlement	Vacancy rate
Central Hungary	0.58	Budapest	0.57
Central Transdanubia	0.59	Bp agglomeration	0.67
West Transdanubia	0.53	City with county rights	0.60
South Transdanubia	0.54	City	0.55
Northern Hungary	0.49	Rural agglomeration	0.56
Northern Great Plain	0.44	Village	0.42
South Great Plain	0.55	Total	0.54
Total	0.54		

* In cases of households which moved their current housing between 1996 and 2002.
Source: *HCSO 1999, 2003 Housing conditions*.

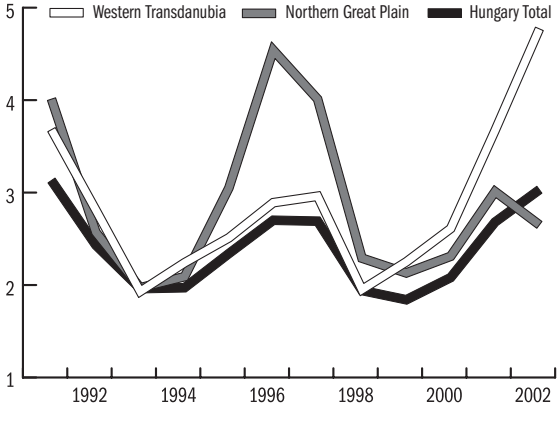
21 This is connected to the problem of filtration. Filtration is a process by which the situation of a family or a housing unit changes within the housing system due to housing mobility or any other change taking place in the housing system. The filtration process can be described as follows: Building high cost (expensive) new housing increases supply in the housing market, which reduces the relative prices of high cost homes. As a result, higher income families move out of their old homes and occupy the new stock, which reduces demand for older housing (provided supply is constant). Thus relative prices fall in this sector of the housing market, too. Consequently, this part of the housing stock becomes affordable for relatively lower income families, who quit their old, poorer quality housing. This again reduces demand – and prices – yet in another segment of the housing market and lower income families can move in. This process goes on and reaches the poorest and those in the worst housing situation.

The housing subsidy system and the regional distribution of new constructions

Because of the cuts in subsidies and the drop of household incomes, housing construction fell from the annual 80–90 thousand in the 1980s to 20–30 thousand in the 1990s. Despite shrinking sources, the housing subsidy system favoured new constructions, and interventions resulted in two booms, the first of which took place in the period between 1995 and 1997, while the second followed after 2001 and is still in progress, so it is not clear yet whether it is a temporary or a permanent trend.

The relative boom in 1995 was triggered by changes in the housing construction subsidy system: to offset the effect of the cancellation of the VAT allowance, the support (earlier called the social policy support) available for new constructions and depending on the number of children, was raised.[22] The volume of housing construction temporarily grew, quite interestingly, primarily in less developed regions and counties. The reason for this was that the support/housing price (construction costs) ratio was higher in these less developed areas. This effect was further increased by a separate program,[23] through which, over a period of two to three years, several large families could acquire new, though poor quality and badly located housing without own assets.[24] A positive aspect of this program was that it benefited – though not intentionally – large, low income households (many of them Roma). Its regional impact, however, was controversial as housing was built in areas with relatively high unemployment and bad earning prospects. Theory says that in depressed areas demolition (cuts in the supply) should be used to ensure that relative differences in prices do not increase. (*Isoda*, 2003)

Figure 1: Housing constructions per 1000, 1999–2002 (national total and two regions)



Source: *HCSO, Housing statistics year books 1990–2000.*

22 This support was renamed because the earlier scheme called social policy subsidy did not really target those in need for they were less likely to enter the market of newly built housing. Paradoxically, the subsidy became available for lower income households when it was changed. By assuming that the share of households with three or more children in the population is so small (around 5 per cent) that raising the subsidy would not be perceivable, decision makers did not foresee the effect of changing the subsidy system: for 1996 HUF 12 billion was allocated, the actual spending was HUF 31 billion; for 1997 the plan was HUF 16 billion and the actual amount was HUF 30 billion. This is similar to the situation with forecasts concerning the effect of interest subsidies after 2000.

23 The National Roma Minority Council and its Social Constructions public use company was allocated HUF 20 million in 1996, HUF 20 million in 1997 and HUF 300 million in 2001 to help Roma families with several children and who did not have the necessary own resource to build homes. The basic aim of the project was to enhance equitableness by allocating resources only to those in need and to make the allocation of subsidies transparent and stop abuses related to constructions without adequate resources.

24 The controversial nature of the subsidy system is well illustrated by the fact that subsidised housing was often built in settlements where they could not be sold for 50 to 60 per cent of the amount of the subsidy.

The second boom came after 2000 with the change of the housing policy when the interest subsidy for housing loans was raised. This subsidy targeted the middle class, and accordingly, the demand surplus shifted to more prosperous regions. Figures of housing constructions in two regions forcefully illustrate the different impacts of the two periods. In the Northern Great Plain region the number of housing constructions per 1000 in the period 1995–1997 significantly surpassed the much more developed other region (Western Transdanubia); in the boom starting after 2000 the relationship was just the opposite.

Local housing policy and regional mobility

Housing and social policies of local governments play an important role in shaping the "transaction costs" of moving municipality. Within the housing subsidy system, local governments control 15 to 17 per cent of subsidies (1998–2001). In granting these subsidies, local decrees explicitly prefer local residents. The analysis of local housing decrees suggests that criteria of the assignment of council rental housing and granting local subsidies include several years' residence or employment in the municipality. Municipalities (39) covered by the research provide rental housing exclusively for people who have lived there for several years (in about half of the municipalities at least 5 years), probably fearing to some extent that by opening up the possibility of renting for non-residents would lead to a heavy inflow of the poor. In the case of local subsidies, eligibility criteria do not include local residence in only five municipalities. (*Teller*, 2003)

On the one hand moving to another municipality involves losing the local housing subsidy, while on the other hand to meet the criterion of a local residence for several years is a serious problem owing to a narrow private rental market and high prices. In Budapest, the average private rent in 2002 (HUF 935 /m2) is nearly two and a half times that of other cities or towns (*HCSO*, 2002). Thus, regional differences are reflected in private rents, too. The private rental housing market is a problem not only in terms of high prices but also in relation to legal uncertainties. The share of landlords not letting their tenants officially register in the housing was estimated at 30 or 40 per cent by a research on the private rental sector in Budapest (*Kis*, 2003). This implies that such tenants will not become eligible for subsidies connected to residence even after several years of living there.

Conclusions

Housing mobility in the Hungarian housing system is low by international comparison but is clearly on the rise. The process is influenced by conflicting factors. Rising housing prices and rents of private rental housing, the high housing price/income ratio and transaction costs have an adverse

impact, while macroeconomic developments (inflation, interest rates) and the improvements in the housing subsidy system affect housing mobility positively.

Regional housing mobility involving a move between municipalities, however, remains seriously constrained by institutional factors. The lack of private rental housing and the un-regulated nature of the sector, lack of information on the housing market and the role of local governments in the subsidy system conserve the regional structure of settlements and are an obstacle to inter-municipal mobility. The existing housing system and the lack of adequate housing policy greatly contribute to the risk born by individuals if they move municipality. Mobility towards regions with good job prospects reduces the common burden of the society, yet risks are unilaterally born by employees. It seems appropriate to launch housing assistance programs aiming at a more even distribution of risks.

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1.5 Commuting

Tamás Bartus

Introduction

Although the unemployment rate has been decreasing in Hungary for the last ten years, it is still high in those villages where it was the highest (above 20 per cent) in the mid 1990s. In their earlier papers, János Köllő and Gábor Kertesi formulated the hypothesis that the cause of persistent unemployment in villages is that commuting costs substantially exceed the returns to commuting in terms of wages (*Köllő,* 1997; *Kertesi,* 2000). The hypothesis of commuting costs can be summarized as follows. Suppose an unemployed person receives two job offers. One of the jobs is located in the current place of residence, while the other job is located in another settlement at distance *d* from the place of residence. The unemployed person prefers commuting if the value of the latter wage offer (w_d) minus the costs of commuting (c_d) is higher than the value of the local wage offer (w_0),[25] so the hypothesis of commuting costs simply states that

$$w_0 > w_d - c_d. \tag{1}$$

Otherwise the unemployed person prefers to work in his place of residence (and thus becomes a *stayer*).

Several attempts were made to test this hypothesis empirically. *Köllő* (1997) constructed a *transportation database* with settlements as unit of observation. Using this database he showed that if there are no public transportation links, commuting with cars would use up a substantial part of the expected wages. Public transportation links are especially underdeveloped in regions where villages with high unemployment rates are typically located. *Kertesi* (2000) used the 1996 Microcensus of the Hungarian Statistical Office, but he measured commuting costs with the help of the transportation database. Kertesi found that the probability of commuting decreases with commuting costs, measured as the unemployment rate of the place of residence and that of those settlements that can be reached with a fixed amount of HUF 4,000.

The above mentioned studies have a common weakness: The types of commuting as developed with the help of the transportation database are an imperfect measure of the actual commuting costs. The types of commuting are properties of settlements, but not properties of individuals. The measurement would be precise if commuters used means of transportation that are assumed by the researcher who developed the estimate of commuting costs when preparing the transportation database. This assumption however cannot be verified in the absence of information about individual commuters.

25 Standard models concerning value of time imply that the full cost of commuting is the sum of the monetary costs (c_d) and the costs associated with travel time. See, for example, *Fujita* (1989) and *Brueckner, Thisse* and *Zenou* (2002).

This chapter tests the hypothesis of commuting costs using individual-level data. Our aim is to examine the relationship between commuting distance and the probability of commuting. Knowing this relationship is of high social and theoretical importance, especially when commuters bear all costs of commuting. This is because local unemployment rates are likely to be persistent if the probability of commuting substantially decreases with commuting distance.

Data and variables

Our analyses are based on a survey that took place among unemployed people who were entitled to unemployment benefits and got a job in the period between the 18th of March and the 7th of April 2001 (N = 105,924). In this period 9,474 people got a job, out of which 8,339 people completed the questionnaire (*Köllő,* 2002). The survey provides information about the characteristics of both the new and the previous job, the names of the settlement where the job is located, place of residence, and commuting time.

Unfortunately, the questionnaire did not contain questions about the actual costs of commuting. Commuting costs will be measured with a dummy variable that identifies those for whom commuting is costly. More precisely, this variable takes the value 1 if the employer does not cover travel expenses, while it takes the value 0 if the firm covers a part or the full amount of travel expenses or organizes the travel of workers on its own expenses.

The actual value of the wage offer is also unknown. Respondents were asked to estimate their prospective gross monthly wage with the help of a minimum and a maximum value. The monthly gross wage variable used in this chapter is the simple average of these two estimates.

Commuting distances were matched to our data from a unique database containing the distance matrix of Hungarian settlements.[26] Since there are 3,157 settlements, the database contains $3{,}157^2 = 9{,}966{,}649$ (almost ten million) observations and three variables (the codes of two settlements and the distance between these settlements). It is important to note that the distance of a settlement from itself is zero, thus people working in their place of residence are characterized with zero commuting distance.

Besides these variables, our analyses control for unemployment rates. All unemployment rates used in later analyses are calculated from the TSTAR 2000 database of the Hungarian Statistical Office and the Institute of Economics HAS. The TSTAR databases have settlements as observations and covers information about several economic, social and demographic variables. Our unemployment rates are defined as the ratio of the number of the unemployed to the number of the economically active population.

As in almost all survey data, our sample is not free of data problems. We deleted those cases in which settlement codes or values of variables were

26 The data were obtained from Psoft Kft. at a reduced price.

nonsensical. Additionally, the sample size was further reduced by three additional deliberate decisions. First, we excluded those unemployed who changed their place of residence during their unemployment spell. The reason is that migration might disturb the empirical relationship between commuting distance and commuting decisions (*Ihlanfeldt – Sjoquist,* 1998). Second, in order to increase the homogeneity of the sample, we neglected people with a college degree, those employed part-time or only for one month, and those who were not working under an employment relationship. Finally, we excluded those cases in which the estimated wage figures are probably unreliable. To repeat, wages in our data are means of subjectively estimated minimum and maximum values. For the majority (approximately 80 per cent) of respondents the difference between the maximum and the minimum was either zero or less than HUF 10 thousand. An estimate is treated unreliable if the difference exceeds the (admittedly arbitrary) limit of HUF 10 thousand. As a result of these decisions, we are left with a sample size of 4,448 for further empirical analyses. I will refer to this sample as the estimation sample throughout this chapter.

The empirical model of commuting decisions

Our aim is to assess the impact of the distance between the place of residence and work (d) on the chances of commuting. The probability of commuting is the function of wages (w) and the monetary costs of commuting (c_d):

$$\Pr(I = 1) = F(w - c_d), \tag{2}$$

where I is a binary variable measuring commuting ($I = 1$ for commuters, and $I = 0$ for stayers)[27]. It is reasonable to assume that the monetary cost of commuting is a linear function of distance. Let c be the monetary cost of traveling one km and assume that traveling has no fixed costs. Then equation (2) can be reformulated as

$$\Pr(I = 1) = F(w - cd). \tag{3}$$

Unfortunately, our data does not allow a direct estimation of equation (3). First, the monetary cost of traveling 1 km (c) is unknown. What we know is whether or not traveling involves monetary costs. Second, the measurement of commuting distance is not perfect. Due to the use of the distance matrix, people, who work in their place of residence, are assumed to travel 0 km. If $d = 0$ for workers who do not have to travel to other settlements then equation (3) cannot be estimated using the standard statistical models for discrete choice problems, like the logit or the probit model.[28] Thus, we have the problem of not being able to estimate the effect of commuting distance on the probability of commuting.

27 The notation used here and throughout the chapter is a slightly modified and generalised version of that proposed by Wilkinson and Rogers, 1973: Symbolic Description of Factorial Models for Analysis of Variance; In: *Applied Statistics*, Vol. 22, No. 3. [the ed.]

28 This is due to technical reasons. Measurement creates a deterministic relationship between the absence of commuting and zero commuting distance. In probit and logit models, deterministic relationships are modeled with infinite parameter estimates, since in these models infinitely large coefficients guarantee that the occurrence of an event is one. Unfortunately, the convergence of the probit and logit models might be difficult to achieve if one of the coefficients is infinitely large. In order to secure the convergence of the iterative estimation, one should discard those observations in which the relationship between distance and commuting is deterministic. After deleting these observations, however, the sample will cover only commuters and thereby the model cannot be estimated.

This problem can be solved using additional assumptions. The commuting costs variable expresses the fact that the employer does not cover the travel expenses of his or her workers. Paying such coverage depends probably on the voluntary choice of the employers. The choice of covering travel expenses is likely to be influenced by local and regional unemployment rates, commuting distance and commuting time. On the one hand, coverage of travel expenses is beneficial if the employer finds it difficult to find or attract workers. This difficulty appears if the local unemployment rate is high. On the other hand, coverage of travel expenses is obviously costly, especially under three conditions. The first condition is commuting distance: the larger is this distance, the more money is spent on the workers. The second condition is the wage level at the firm: the same amount of coverage is perceived more costly by employers who pay high wages. The final condition is commuting time. A long travel time makes workers tired, thus such workers are likely to exercise less effort than other workers. Additionally, commuters are less willing to be happy with unofficial extra working hours. In short, the time spent on commuting should decrease the quality of the worker in the eyes of employers (*Brueckner – Thisse – Zenou,* 2002).

These additional assumptions imply that the probability of receiving no travel contributions is positively related to the monthly salary, to commuting time and commuting distance, while negatively related to the local unemployment rate. Thus,

$$\Pr(c_d = 1) = F(w_d + t_d + d - u_{ws} - u_{wm}), \tag{4}$$

where u_{ws} and u_{wm} denote unemployment rates in the place of work and in the micro-regions of the place of work, respectively.

Of special theoretical and social importance are those commuters whose travel expenses are not covered. We are therefore interested in modeling the event of costly commuting. Our empirical analysis aims at testing the following equation:

$$\Pr(I = 1;\ c_d = 1) = F(w_d - c_d;\ w_d + t_d + d - u_{ws} - u_{wm}). \tag{5}$$

Since the probability at the left hand side of equation (5) is a function of commuting distance, estimating (5) provides an answer to the question of how does commuting depend on commuting distance.

Empirical analysis

The empirical analysis proceeds in three steps. First, we analyze the impact of wages and commuting costs on the probability of commuting. Then we turn to the question of who the people are who do not receive contributions to commuting costs. Finally, we examine the question of how do

commuting choices depend on commuting distance in the absence of travel contributions.

Before estimating these models, it is useful to examine the data. *Table 1* shows the means of the variable in four different samples. The figures displayed in the first column are calculated using the sample of those unemployed people who are *not* included in the sample used in the subsequent analysis. The data on gender, educational level and age are taken from the registers of Employment Bureaus. The second column shows the same statistics for those who are members of the sample used in the analysis. The third and fourth columns show means of the variables if the analysis is restricted to the immobile workers and commuters, respectively.

Table 1: Means of variables in four different samples

Variable	Cases not included in the estimation sample	Estimation sample	Stayers	Commuters
Number of observations	101,418	4,448	2,479	1,969
Commuters (%)	46.08	44.27	–	–
Montly gross wage (in thousands of HUF)	59.15	51.25	48.14	55.18
Travel hours	0.86	0.79	0.41	1.29
Travel costs (%)	57.69	57.10	86.92	20.43
Distance between places of work and residence (km)	9.60	9.71	0.00	22.99
Gender: 1 if male (%)	52.91	74.06	72.09	76.54
Educational level: apprentice (%)	40.90	51.44	53.13	49.31
Educational level: secondary (%)	25.49	16.73	16.05	17.57
Age	36.82	37.99	38.66	37.14
Unemployment rate in the place of residence (%)	8.82	8.18	7.96	8.46
Unemployment rate in the place of work (%)	7.55	7.81	8.05	7.50
Unemployment rate in the micro-regions of the place of residence (%)	7.17	7.25	7.96	6.22
Unemployment rate in the micro-regions of the place of work (%)	7.35	7.48	8.05	6.66

Comparison of the first two columns answers the question of whether the estimation sample can be considered as a random selection from the sample of unemployed who got a job. There are no substantial differences in the means of the dependent variables such as commuting and travel costs. There is a substantial difference of about 8 thousand HUF in the mean of monthly gross wages. The reason is that the minimum wage, which was 40 thousand HUF at the time of the study, is perceived as an upper limit on the estimates concerning the minimum value. Contrary to this, there are no salient figures that would constrain the estimates concerning the maxi-

mum value. To illustrate this point, consider two individuals who will have the same wage. The only difference is that the first of them is more uncertain concerning the actual value of the wage. Then the second individual is more likely to report a high maximum, and thereby to exceed our arbitrary criterion (HUF 10 thousand) of sample inclusion. Finally, there are large differences in the means of human capital variables. Men and people having an apprentice education are overrepresented, while high school graduates are underrepresented in the estimation sample. This might be due to the fact that men and people with an apprentice education are more likely to get a job. Note that choosing a general secondary (or grammar) school instead of an apprentice education is more popular among girls than among boys. Then these differences can be reduced to a single difference: men are more likely to be included in the estimation sample.

The figures shown in the last two columns help us to describe the commuters. Commuting is not a rare phenomenon: About 44 per cent of our successful job seekers commute. An average commuter spends 1.29 hour (80 minutes) on travel. The average commuting distance is 23 km. Thus, an average commuter needs 40 minutes to get to his or her work. Commuters, on average, report a monthly wage higher by about 7000 HUF than stayers. These results imply that an average commuter cannot spend more than 7,000 on travel expenses. Finally, note that men and people with an apprentice education are more likely to be found among the commuters than among stayers.

Now we move to the empirical test of the hypothesis of commuting costs. We begin with answering the question of how the probability of commuting is influenced by commuting costs. In our sample, commuting is costly only for 20 per cent of the commuters. Since the travel expenses of the vast majority (87 per cent) of stayers are not covered, there is a strong negative relationship between commuting and commuting costs. To put it simply: those people will commute whose travel expenses are covered. Since coverage of travel expenses is a decision of employers, job seekers will accept a job offer outside their place of residence only if the employer is willing to cover the travel expenses of the worker.

To test our hypothesis, we will make use of a well-known multivariate statistical technique: the logistic regression. The multivariate analysis is indispensable since acceptance decisions of job seekers depend not only on commuting costs but also on individual characteristics such as gender, age, education and the characteristics of the local labour markets. *Table 2* shows the estimation results. We expect the wage variable to have a positive, while the commuting cost variable to have a negative effect on the probability of commuting. The signs of the parameter estimates of these two variables are consistent with our expectations. The parameter estimates

are statistically significant. Thus, the probability of commuting increases with the wage offer, but it decreases if commuting is costly. Apart from the commuting cost variable, the variables have similar effects among both men and women. Note that unemployment in the place of residence has a positive, while unemployment in the micro-region has a negative effect on commuting.

Table 2: The probability of commuting: parameter estimates from logistic regression (numbers in parentheses are standard errors)

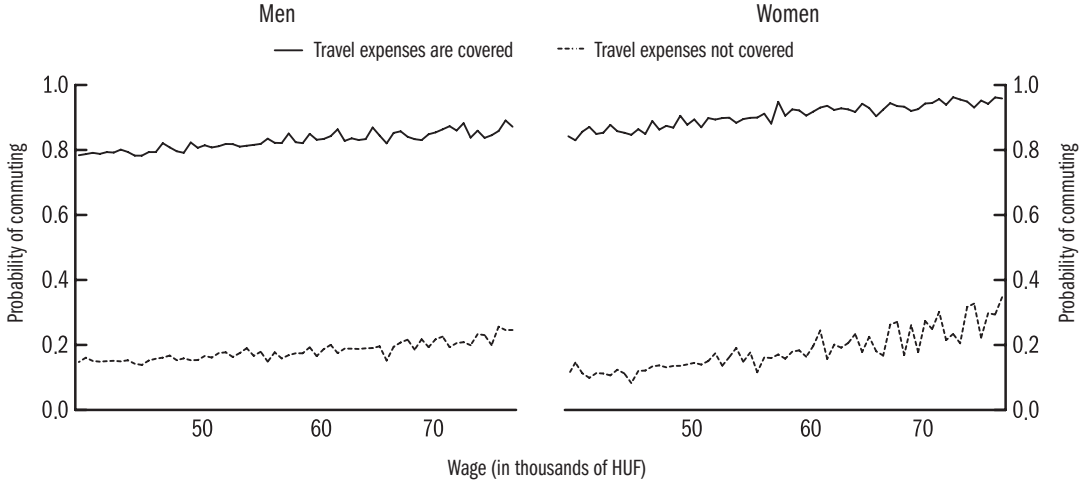
Variables	Full sample	Men	Women
Monthly gross wage	0.015	0.014	0.015
	(0.003)**	(0.003)**	(0.010)
Commuting costs	–3.495	–3.288	–4.344
	(0.093)**	(0.103)**	(0.225)**
Gender	–0.067		
	(0.113)		
Educational level: apprentice	–0.209	–0.184	–0.428
	(0.103)*	(0.113)	(0.261)
Educational level: secondary	–0.222	–0.250	–0.245
	(0.146)	(0.179)	(0.285)
Age	–0.017	–0.016	–0.017
	(0.005)**	(0.005)**	(0.013)
$(Age - 40)^2$	0.000	–0.000	0.003
	(0.000)	(0.000)	(0.001)*
Unemployment rate in the place of residence	0.127	0.122	0.127
	(0.015)**	(0.016)**	(0.046)**
Unemployment rate in the micro-region of the place of residence	–0.113	–0.108	–0.140
	(0.019)**	(0.021)**	(0.053)**
Constant	1.508	1.340	1.952
	(0.283)**	(0.305)**	(0.842)*
N	4,067	3,077	990
Log-likelihood	–1,620.48	–1,298.82	–308.60
χ^2 statistics	2,335.23	1,642.29	705.93

* $p < 0.05$; ** $p < 0.01$.

Figure 1 shows the effect of commuting costs on the probability of commuting. The panels show the predicted probabilities of commuting as a function of wages, separately for men and women. The upper curve shows the predicted probabilities for those who receive contributions to travel costs, while the lower curve shows the predicted probabilities for those who do not receive such contributions. When preparing the curves, it was assumed that the unemployment rates in the place of residence and in the micro-regions are 20 and 10 per cent, respectively. These figures are typical for villages that can be found in the economically backward Northern-Hungarian region.

The figure clearly shows how large the effect of the monetary costs of traveling is on commuting decisions. If the travel expenses of a prospective commuter are promised to be covered, then he or she will commute with an estimated probability of at least 90 per cent. However, if all of the travel expenses must be paid by the worker, the predicted probabilities of commuting are much smaller. Assuming a monthly wage of HUF 40 thousand, the predicted probabilities are 30 per cent for men and 20 per cent for women. Assuming a higher wage of HUF 80 thousand, the predicted probabilities are slightly larger, 40 per cent for men and 30 per cent for women. This means that only very high wages will make commuting likely, provided the travel expenses are not covered. Thus, coverage of travel expenses has a large impact on commuting, and this effect is larger than the effect of wages.

Figure 1: The predicted probability of commuting as a function of monthly gross wage



Notes: Predicted probabilities are calculated from the parameter estimates shown in Table 2. It is assumed that unemployment rates in the place of residence and in the micro-region of the place of residence are 20 and 10 per cent, respectively.

We proceed by examining the question of who are the workers whose travel expenses are covered, and who are the workers who should pay all costs of traveling. Again, we estimate a multivariate logistic regression model, since the employer's decisions to support the traveling of workers might depend on the human capital characteristics (such as gender, age, and education) of the workers.

Table 3 shows the estimation results. The coefficient of the wage variable is negative, and it is significant in the full sample and among women. This means that wages are negatively related to travel costs. In other words, the higher the wages the larger is the chance that employers contribute to travel costs. The distance and travel time variables are negative and significant for

both sexes. Thus, contrary to our expectations, distance and travel time decrease the chances of receiving coverage of travel expenses. This means that employers support workers who live relatively far from the place of work.

Table 3: The probability of the existence of commuting costs: parameter estimates from logistic regression (numbers in parentheses are standard errors)

Variables	Full sample	Men	Women
Monthly gross wage	–0.006	–0.005	–0.021
	(0.003)*	(0.003)	(0.010)*
Distance between places of work and residence	–0.111	–0.082	–0.288
	(0.006)**	(0.006)**	(0.022)**
Travel time	–1.121	–1.183	–0.891
	(0.087)**	(0.097)**	(0.222)**
Gender	–0.188		
	(0.101)		
Educational level: apprentice	0.083	0.006	0.261
	(0.097)	(0.109)	(0.239)
Educational level: secondary	0.058	–0.048	0.319
	(0.135)	(0.168)	(0.272)
Age	0.011	0.014	–0.000
	(0.004)*	(0.005)**	(0.012)
$(Age - 40)^2$	0.001	0.000	0.002
	(0.000)	(0.000)	(0.001)
Unemployment rate in the place of work	–0.013	–0.004	–0.037
	(0.018)	(0.019)	(0.049)
Unemployment rate in the micro-region of the place of work	0.089	0.094	0.062
	(0.021)**	(0.022)**	(0.054)
Constant	1.204	0.688	2.897
	(0.277)**	(0.306)*	(0.770)**
N	3,775	2,824	951
Log-likelihood	–1,678.30	–1,302.64	–326.91
Ë statistics	1,769.35	1,256.70	598.57

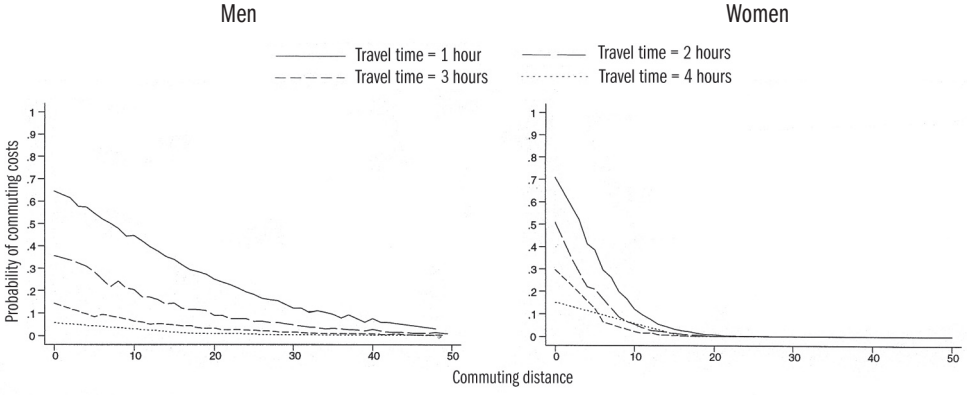
* $p<0.05$; ** $p < 0.01$

Figure 2 offers a visual interpretation of the estimation results. The two panels display the predicted probability of commuting costs as a function of travel distance and travel time for both men and women separately. When drawing the curves, it was assumed that unemployment rates at the place of residence and in the micro-region are 10 per cent, and the wage is relatively high, HUF 80 thousand.

There are two relationships that are of special interest. First, the probability of paying all travel expenses substantially decreases as the commuting distance increases. An average male employee will not pay all travel expenses if commuting distance is 50 km. For a female employee, the commuting distance associated with zero commuting costs is only 20 km. Second, the

probability of the existence of commuting costs decreases with travel time. Employer contribution is received by those workers for whom commuting to work takes a long time.

Figure 2: The probability of the presence of commuting costs as a function of the distance between places of residence and work for four different values of travel time



Notes: Predicted probabilities are calculated from the parameter estimates shown in Table 3. It is assumed that unemployment rates in the place of work and in the micro-region of the place of work are 10 per cent, and monthly gross wage is HUF 80 thousand.

We conclude the empirical analyses with the simultaneous analysis of commuting decisions and commuting costs, as described by equation (5). The estimation technique is the bivariate probit model (*Greene,* 2000). The bivariate probit model is relatively complicated and rarely used. However, it enables us to study the relationship between commuting decisions and commuting distance indirectly because it is possible to compute the predicted probabilities of commuting in the presence of commuting costs as a function of commuting distance.

The bivariate probit model was estimated separately for men and women. *Table 4* displays the estimation results. With one exception, we obtained results that are similar to the analyses of commuting decisions and the presence of commuting costs, which were reported in Tables 2 and 3. The only exception is that we did not find a significant effect of the wage variable. Again, the effect of the commuting cost variable is negative.

To interpret the estimation results, consider *Figure 3*. The two panels show the predicted probability of commuting in the presence of commuting costs as a function of commuting distance for male and female employees. When computing the predicted probabilities, several assumptions were made concerning the labor market. It was assumed that the unemployment rate is 20 per cent in the place of residence, while it is 10 per cent in the settlement where the work is located and in the micro-regions of both set-

tlements. Besides, it was assumed that the wage offer is HUF 80 thousand, which can be considered as very attractive. Clearly, there is a substantial difference between men and women in the probability of commuting if travel expenses are not covered.

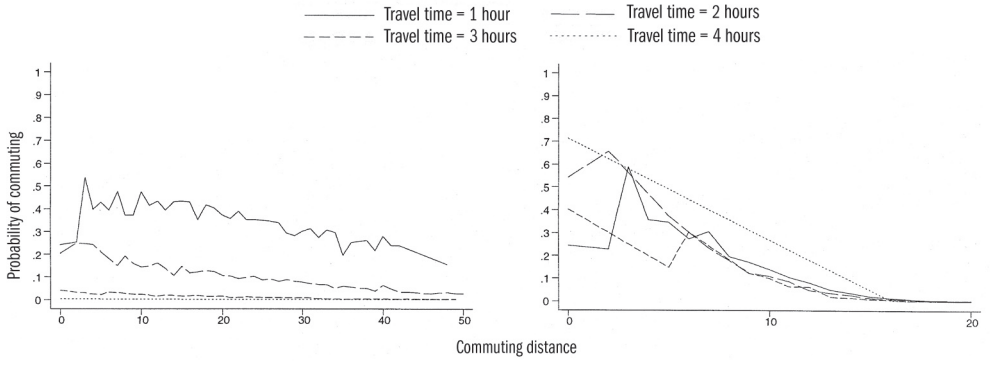
Table 4: The probability of commuting in the absence of coverage of travel expenses. Parameter estimates from bivariate probit model (numbers in parentheses are standard errors)

Variables	Men		Women	
	Commuting	Commuting cost	Commuting	Commuting cost
Monthly gross wage	0.000	–0.001	–0.004	–0.009
	(0.002)	(0.002)	(0.005)	(0.005)
Commuting costs	–3.334		–3.124	
	(0.062)**		(0.106)**	
Distance between places of residence and work		–0.026		–0.204
		(0.003)**		(0.011)**
Travel time		–1.013		–0.133
		(0.053)**		(0.090)
Educational level: apprentice	–0.053	–0.005	–0.144	0.160
	(0.070)	(0.066)	(0.131)	(0.129)
Educational level: secondary	–0.063	–0.062	–0.038	0.179
	(0.109)	(0.099)	(0.145)	(0.146)
Age	–0.004	0.009	–0.003	–0.007
	(0.003)	(0.003)**	(0.007)	(0.007)
$(Age - 40)^2$	0.000	0.000	0.001	0.001
	(0.000)	(0.000)	(0.001)*	
Unemployment rate in the place of residence	0.001		0.001	
	(0.010)**		(0.022)*	
Unemployment rate in the micro-region of the place of residence	–0.044		–0.034	
	(0.012)**		(0.026)	
Unemployment rate in the place of work		0.030		0.004
		(0.011)**		(0.022)
Unemployment rate in the micro-region of the place of work		0.057		0.003
		(0.013)**		(0.025)
Constant	1.585	0.165	1.683	1.896
	(0.194)**	(0.183)	(0.437)**	(0.428)**
Correlation of residuals across the equations	0.805**		1**	
N	2,820		949	
Log-likelihood	–2,413.65		–494.74	
Ẽ statistics	3,734.67		1,189.54	

* $p<0.05$; ** $p < 0.01$

Whatever the traveling time, there is a small portion of men who are willing to commute to a workplace that is 50 km away. However, there are no women who are willing to commute to another settlement if the commuting distance would exceed 20 km. Note that these are the women who are more likely to prefer commuting if commuting is costly and the commuting distance is very small, say, 5 km. Thus, women react more sensitively than men to a small increase in commuting distance. This pattern holds regardless of commuting time. To summarize, the presence of commuting costs constrain the commuting opportunities of both sexes, but this is valid especially for women.

Figure 3: The predicted probability of commuting in the absence of coverage of travel expenses as a function of the distance between places of residence and work for four different values of travel time



Notes: Predicted probabilities are calculated from the parameter estimates shown in *Table 4*. It is assumed that unemployment rate in the place of residence is 20 per cent, unemployment rates in the place of work and in the micro-region of the places of work and residence are all 10 per cent, and monthly gross wage is HUF 80 thousand.

Summary

This chapter addressed the question of how commuting behavior is influenced by the distance between place of residence and place of work. The most important findings are as follows. 1) Commuting occurs frequently, almost half of the successful job seekers in our sample are commuters. A more surprising finding is that commuting is strongly associated with the absence of commuting costs: 80 per cent of commuters receive coverage of travel expenses. 2) The presence of travel costs drastically reduces the probability of commuting. Our findings indicate that commuting is almost a sure event if employers cover travel expenses. However, if travel expenses are not covered, the predicted probability of commuting ranges between 20 and 40 per cent, depending on gender and wage. 3) The distance between the place of work and place of residence has a stronger effect on the prob-

ability of the coverage of travel expenses among women than among men. An average female employee receives such coverage with a very high probability when she has to travel at least 25–30 km, while an average male employee receives coverage of travel expenses for sure if the distance between the place of work and that of residence exceeds 50 km. 4) Parallel to this fact, if travel expenses must be paid by the worker, the probability of commuting is zero for women if the commuting distance were larger than 20 km, while for men it is zero if commuting distance were about 50 km.

In the light of previous research, the most interesting finding is the gender difference in the relationship between commuting costs and commuting distance. Our findings imply that travel costs constrain the commuting behavior of women more than that of men. Note that these are the women who are usually in a more disadvantaged labour market position anyway. We found that the unwillingness of employers to cover the travel expenses of their workers is an additional cause of the disadvantaged position of women. Another important result is that large-distance commuting is likely to compensate for the disadvantaged spatial position of the place of residence among those who receive partial or full coverage of travel expenses.

Our findings might suggest that coverage of travel expenses on the part of employers is a necessary condition for the reduction of persistent regional inequalities. This conclusion, however, neglects the possibility that employers will reduce labour demand as a reaction to increases in labour costs. If employers cut labour demand, it is difficult to predict the net effect of coverage of travel expenses on regional differences in unemployment rates. Knowing the precise effect of coverage of travel expenses on labour demand is a necessary condition for formulating firm policy recommendations on the basis of our empirical results.

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1.6 The effect of economic incentives on regional mobility in the 1990s in Hungary[29]

Zsombor Cseres-Gergely

We have followed important elements of mobility and migration decisions in earlier chapters. Having seen the framework for these decisions, we used empirical evidence to motivate the research on the role of unemployment and wage differentials, surveyed the role and situation of the real estate market that is relevant from an uncertainty point of view and looked at commuting, a step often taken before or instead of moving house. This chapter builds on the previous ones and looks at the actual flow of the labour force. It is organised as follows. First, a brief survey of the macro-level population flows in the 1990s is presented showing departures from previous trends and international experiences. Second, we investigate which non-economic factors need to be looked at when studying mobility. Finally an attempt is made using econometric techniques to quantify the extent to which economic incentives affect mobility, and to find out whether these provide sufficient motivation for moving house.

Developments of temporary and permanent migration at the macro-level

The Hungarian economy went through extraordinary changes during the 90s. Gross output fell sharply at the beginning of the period, returning only slowly to its higher, pre-transition level. The collapse of industrial centres established artificially under the socialist regime often resulted in a mass destruction of jobs making poor economic conditions a threat to large regions. The Hungarian economy is thus characterised by various and fairly stable regional inequalities (see *Köllő and Nagy* in previous chapters).

To be able to account for inequalities and population flows precisely requires data of the finest possible geographic resolution. The TSTAR database, the best source of data in the present context (described in Appendix B), allows for analysis at the settlement and micro-region level. Using these data, I created a panel[30] of settlements, to which data on registered unemployment and estimated average wages (coming from the Wage Survey, already used in Chapter 2) were merged. Using these data, issues that are of interest to us can be studied.

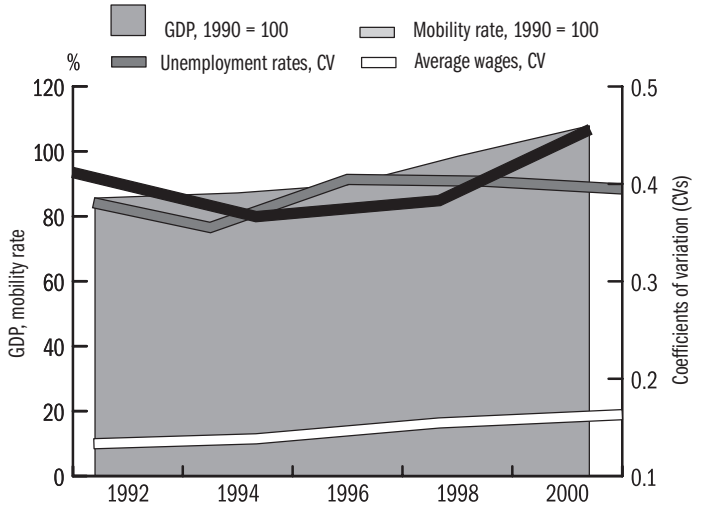
Figure 1 shows the evolution of the overall mobility rate, GDP and inequality in terms of both unemployment and average wages across 150 micro-regions through time using coefficients of variation.[31] Note that both measures of inequality tell the same story. Before 1992 inequality does not change substantially (if anything, it decreases), but starts increasing after 1995. From that point on, this pattern of growth is rather permanent.

29 The research on which this account is based was supported by the European 5. Framework Programme.

30 A panel is a series of cross–sections in which the same observation units can be tracked over time.

31 This standardised measure is the ratio of the standard deviation and the mean of a variable.

Figure 1: Evolution of the mobility rate, GDP at the country and labour market inequality at the micro region-level between 1990 and 1999



Source: Own calculations based on the *TSTAR, LFS and Wage Survey of the NLC.*

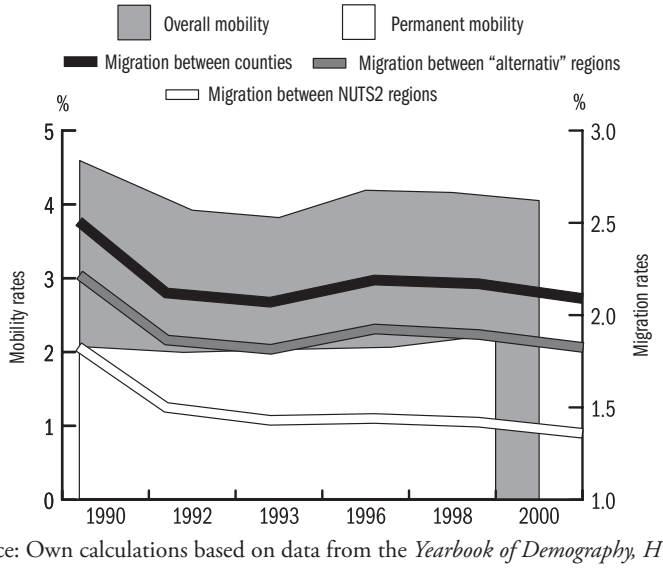
Let us return briefly to the situation of our imaginary Chapter 1 decision-maker who is contemplating moving. For someone who has already embarked upon migration with little success in the past, increasing inequality can indeed be good news. Good news, for if someone longs to move away from the current residence in order to get rid of unfavourable conditions a greater in the indicator variables shows the existence of a wide range of possibilities. Such advantages are of course useful only in the case when other counter-inductive effects do not annihilate them. If a lower rate of unemployment for example goes together with a lower level of wages then a change might not be profitable. By the same token, it is not worth moving if the higher wage observed in another region is a product of a labour market, which is not in reach for the individual for some reason, such as a lack of qualifications.

We can also observe the changes in the mobility rate over time (its value in 1990 is used as a 100 per cent base) on Figure 1. Referring back to the definition in Chapter 1, we have defined mobility as a relocation in which the settlement of residence is changed. This definition is thus different from the narrower category of migration, which includes only those crossing regions when moving house. Mobility rate, the ratio of mobile persons and the population is around 4 per cent in every year and it does not change over time. This happens despite the changes in motivations captured by the average wage and unemployment inequality, our labour market proxies. Although there is a slight dip to be observed in 1994, this has to be

treated with caution due to administrative changes (see *Ekéné*, 1998 for details). However, there are other economic motivations that can drive mobility apart from inequalities the key one being the overall uncertainty of the economy proxied by the GDP in this context. Studying Spanish labour flows, *Bentolila* (1997) argues that a high level of total output indicates that the economy is working in a "higher gear" yielding engagement more likely than it is in a recession. Nevertheless, our data do not reveal any strong relationship between the respective variables.

Let us take a look now at migration, instead of mobility only. Figure 2 uses three possible definitions of the migration rate to show its evolution (dashed lines) and for comparative purposes also depicts overall and temporary mobility (dark and light grey areas). The line with small crosses marks NUTS2 regions, small triangles are for "alternative" regions used in the calculations and small squares mark the use of micro-regions.[32] The trend of migration is very similar to that of mobility. After a strong initial decline up to 1994 all variables show an increase with individual variability only. The relative magnitude of individual rates are explained by the difference in the regional units (counties versus regions) as well as the position of Budapest. Indeed, regional classifications differ in this respect: while the NUTS2 lumps Budapest into the Central Region with Pest county, the "alternative" one separates it. The gap between the rates brought about by this difference indicates that there is an important exchange of population between the capital and Pest county. Later we shall come back to this issue.

Figure 2: Evolution of mobility and migration based on different definitions



Source: Own calculations based on data from the *Yearbook of Demography, HCSO*.

32 NUTS2 regions are: Central Hungary (Budapest and Pest county), Central Transdanubia (Fejér, Komárom–Esztergom, Veszprém counties), Western Transdanubia (Győr–Moson–Sopron, Vas, Zala counties), Southern Transdanubia (Baranya, Somogy, Tolna counties), Northern Hungary (Borsod–Abaúj–Zemplén, Heves, Nógrád counties), Northern Great Plain (Hajdú–Bihar, Jász–Nagykun–Szolnok, Szabolcs–Szatmár–Bereg counties), Southern Great Plain (Bács–Kiskun, Békés, Csongrád counties). The "alternative" regions are: Budapest, Eastern Transdanubia (Pest, Komárom–Esztergom, Fejér, Veszprém counties), Western Transdanubia (Győr–Moson–Sopron, Vas, Zala counties), Southern Transdanubia (Baranya, Somogy, Tolna counties), Region Between the Danube and Tisza Rivers (Bács–Kiskun, Csongrád counties), Great Plain (Békés, Hajdú–Bihar, Jász–Nagykun–Szolnok counties), Heves and Nógrád Counties, Borsod and Szabolcs Counties.

It is interesting to note that mobility in Hungary is low and still migration seems to be high by international standards. Although the size of the regions and the different density of the population renders such a comparison difficult, the NUTS2 migration rate of 1.4 per cent is comparable to 2.5 per cent in Sweden (see *van der Gaag and van Wissen*, 2001), or even 4.2 per cent in Britain, the highest in Europe (reported by Jackman and Savouri, 1992). A comparison with the first table presented in the paper of *Peter Huber* (2002) reveals even starker differences. According to this, the comparable numbers are 0.5 per cent in the Czech Republic, 0.7–0.44 in Poland and even lower in Italy and Spain, and even in the Netherlands it is just 1.6 per cent. Although these seem to be considerable differences, one has to be careful for it is not clear whether all national statistics include both temporary and permanent migrants. Although there is no evidence on this, a conservative approach might be to divide the Hungarian rates by 2, thus approximating the rate of only permanent migrants. The result is 0.7 in this case. This number is very similar to the international results, but in no way smaller than those.

Changes in the structure of mobility

Although the evolution of the mobility rate tells no easily interpretable story, early signs suggest that some major changes in the structure of mobility may actually be in effect. Thinking about structural change, some interesting questions emerge. How have different settlements "performed" during the decade in terms of mobility gain? Could the previously attractive ones keep their status, or was there a radical change behind the relatively calm scenes? Aggregate developments in the first part of the decade and in the preceding periods are well documented, among others in *Illés* (1995). However we know less about the 1990–1999 period as a whole including structural changes. The extensive study of *Kupiszewski et al* (2001) focusing on the entire second half of the twentieth century is of great help here. To look briefly at mobility in the '90s, I use the micro-level data of the TSTAR database permitting the use of a smaller unit of analysis: settlements.

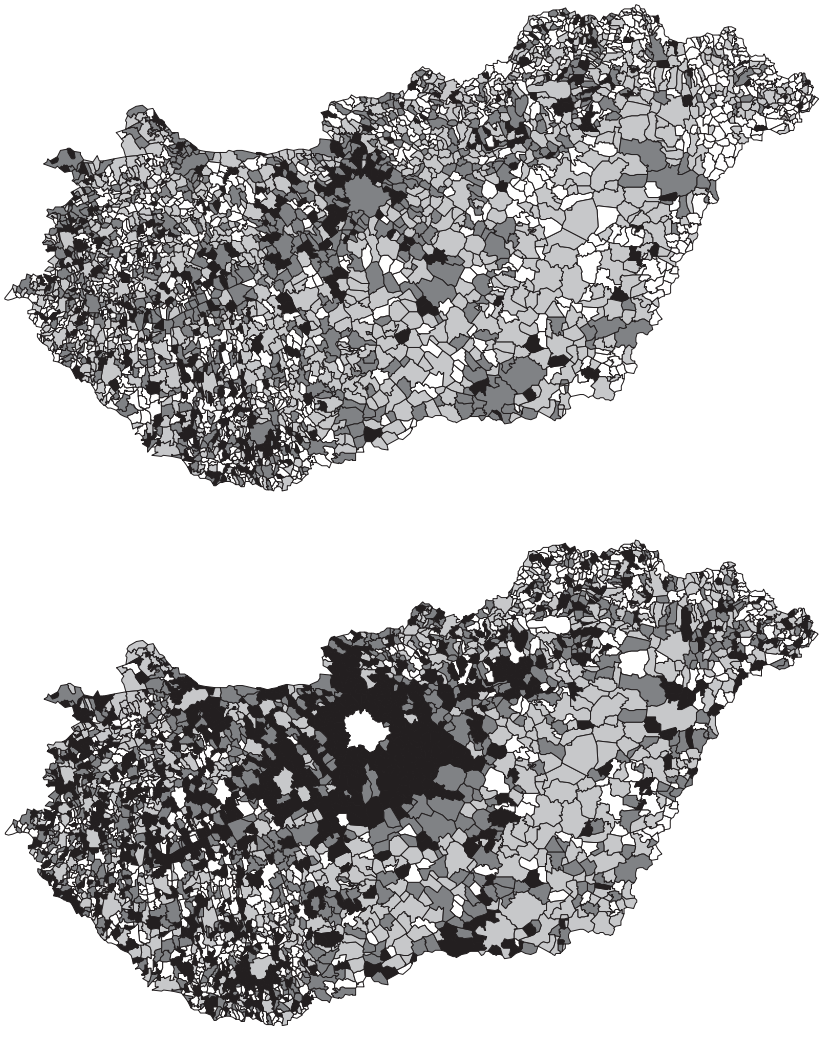
Table 1: Persistence of settlements' status in terms of mobility gains (correlation of relative gains in time periods)

	1980–1990	1990–1999	1990–1994	1995–1999
1980–1990	1			
1990–1999	0.48	1		
1990–1994	0.44	0.83	1	
1995–1999	0.34	0.81	0.34	1

Source: Own calculations based on *TSTAR* and data from the *1980 Census*.

As a first step, it is worth carrying out the comparison *Kertesi* (1997) used, looking at a former period, calculating the correlation between the net relative gains of settlements in different periods. Table 3 presents the results for the 1980–1990, the 1990–1999 periods as well as for the 1990–1994 and 1995–1999 sub-periods. It is evident that the correlation between the net relative gains is positive, but decreasing: the average relationship between the1980s and the second half of 1990 is quite small. The fact that only a small portion of previous winners were able to stay on top suggests a strong structural change.

Figure 3: Relative mobility gains of settlements on the beginning and end of the 1990s



Maps of Figure 3 present a more detailed picture of the nature of the change, showing relative gains of the settlements at the beginning and at the end of the 1990s.[33] Areas shaded in black indicate the largest gains, completely white ones indicate the largest losses, while dark and light shades of grey indicate smaller gains and losses respectively (shading is constant across the time periods). Even if the maps were not created in a way to make the precise identification of regions or counties possible, one can clearly see the fundamental difference between the two time periods. In the first one, distinct regions of winner settlements can not be identified. A metropolitan region being formed around Budapest is notable, but there are successful settlements all around the country. Losses are similarly patchy if concentrated on regions of the Great Plain, a classic area of population loss.

The second map shows a characteristically different situation, with three strong tendencies emerging. Firstly the further growth of the Budapest metropolitan area is hard to miss. It is important that settlements here apart from Budapest itself are almost all quite small and have the village status. This process is documented in *Dövényi – Kok – Kovács* (1998) pointing out that such a suburbanisation process is dominated by the move of wealthy and educated families leaving for green-belt areas. Secondly it is apparent that small regions seem to perform well also in other parts of the country. Many settlements of the Great Plain for example, which previously seemed to be completely hopeless, are not among the ones with the greatest population loss. Nevertheless, most of the winners are still clustered around a central town. Almost around every large town such as Miskolc, Pécs, Szeged, Debrecen or Győr, a strip of steady population gain has been forming. As a third observation one can identify the counterpart to this effect, too. Centres of the forming agglomeration areas that used to be attractive destinations in the beginning of the decade turned out to be net losers. This is true for all centres, but shows itself most strongly in the case of Budapest.

Setting the regional perspective aside for a moment, let us look at this process focusing on types of settlements only. A complete picture could only be obtained from a database with all possible flows between settlements (this is unavailable for confidentiality reasons). Thus, we have to put up with figures on marginal flows showing in- and outflows to and from all settlements without any indication of the composition of the flow. Table 2 shows relative net gains for different years between 1991 and 1999 for different types of settlements and population categories.

The figures reinforce the impression created by the two maps we have seen before. It is clear that Budapest is the greatest loser of all: its negative balance in 2000 is greater than what its gain was at the beginning of the decade. Although the composition is not presented, raw data suggest

33 Data for 1990, 1991, 1992 and 1998, 1999 and 2000 are averaged to obtain a less noisy figure for the beginning and the end period, respectively.

that there is not only a persistent and high degree of outflow hidden in net figures but that a steady decrease of inflow is a key determinant, too. County seats perform similarly to Budapest, showing similar effects with a two year lag – they turn from being winners to be losers, too. The status of the smaller cities is rather mixed as both smaller and bigger ones gain over time, but those in the middle lose and the reason for this is not clear. Nevertheless, the table shows that the clear winners of the decade are small settlements. Every year, the group of largest villages increased their population by the same amount as if an average sized large village was created. Although their situation was by no means good at the beginning of the decade, villages and small settlements could recoup their losses by the end of it to such an extent, that they closed with an overall positive balance. Although their average performance is remarkable, we have to bear in mind that the most successful villages are to be found in the agglomeration area of large towns, as *Kupiszewski et al*. (2001) pointed out.

Table 2: Relative migration gains by settlement types and population categories, 1991–1999

		1991	1993	1995	1997	1999
Budapest		0.35	-0.06	-0.59	-0.66	-0.80
County seats		0.27	0.16	-0.35	-0.45	-0.31
Other cities	20,000-	0.04	0.12	0.11	0.01	0.05
	10,000-20,000	-0.26	-0.13	-0.04	0	0.11
	-10,000	-0.27	-0.21	0.24	0.27	0.20
Villages	5,000-	0.04	0.51	0.84	1.05	1.24
	2,000-5,000	-0.15	0.02	0.55	0.56	0.49
	1,000-2,000	-0.3	-0.15	0.35	0.38	0.30
	-1,000	-0.5	-0.34	-0.03	0.22	0.07

Source: Own calculations from *TSTAR*.

Motivations for mobility besides economic incentives

Given that migration is under scrutiny here largely due to its potential equilibrating effect, the small theoretical model and its extensions in Chapter 1 focused primarily on the effects of economic incentives. In the empirical investigations however, even when not to be modelled explicitly one has to look at the potential weight of other factors.[34] A reason for this is that such forces might influence our estimates concerning mobility, and in an extreme case mask the forces that we are interested in.

To look at the motivations behind mobility, I used the data from the 1997 "Regional Development Survey" conducted by Szonda Ipsos, an opinion research company (a fuller description is given in Appendix B). This representative survey asked adults if they had moved house in the past and if so, what the key motives were. It is important that the survey did ask spe-

34 *Kok* (1991) attempted a much more comprehensive analysis of the problem, accounting for non–economic factors as well, but looking at the pre–1990 period only.

cifically about the reason for moving since from 1990 on there is no official statistic on the distribution of such reasons even though it used to be a common practice. Although these pieces of information would be interesting to relate to the actual direction of the move, this is not possible due to lack of information on the identity of the "sending" settlement.

Table 3: Relative incidence of mobility motivations by time of moving house and results of factor analysis relating to them

	Proportion of those answering "yes"			Factor weights	
	1970s	1980s	1990s	"active"	"defensive"
Life too expensive	5	10	15	–0.09	0.54
Poor job opportunities	28	26	24	0.44	0.04
Problems with paying utility bills	9	13	18	–0.04	0.53
Condition of the building was poor	10	12	17	0.15	0.32
Safety in the neighbourhood was poor	3	6	7	0.06	0.45
People were too poor	3	5	4	0.22	0.32
Buying rented accommodation helped in moving	3	6	8	–0.01	0.26
Bigger, better flat	35	35	33	0.23	0.36
Schooling facilities	25	24	17	0.78	–0.04
Medical care facilities	24	21	18	0.8	0.04
Shopping	26	23	20	0.85	0.02
Pleasant surrounding; less pollution	19	23	24	0.04	0.48
Cultural facilities	21	20	15	0.79	–0.01
Transportation not being cut off	25	22	20	0.78	0.05
Back to relatives	37	36	36	–0.02	0.02

Source: Own calculations from the *Regional Development Survey of Szonda Ipsos*. Cell sizes are above 37, except for "Safety was poor" and "People were poor".

Respondents had to mark if various motives played a part in their decision to move. Because of the general nature of the survey, the list of possible choices is far from being complete,[35] but sufficiently detailed to draw some cautious conclusions. The proportion of affirmative answers are shown in the first three columns of the table, including figures for those who moved (for the last time) in the 1970s, 1980s or 1990s.

Among the motives, prevalence of poor labour market conditions in the previous place of living is one of the most important reasons to move house. Similarly important reasons include conditions of regional amenities such as access to facilities and pleasant surroundings. A large increase in mentioning "too expensive" and "paying utility bills" is notable, suggesting that besides working conditions and amenities, financial pressure associated with a place of residence emerged as an important issue. There is a decreasing incidence in the mentioning of "man made" features of the surroundings while the mentioning of the role of natural ones increased.

35 It was not possible to state a general family reason or marriage as a motivation, which is nevertheless a quite frequent one, according to casual observation and outside evidence.

Even the importance of transportation is falling owing to a marked rise in the stock of personal vehicles. Comparing these factors with aggregate figures of mobility, these appear to be in line with sub- or counter-urbanisation starting in the early 1990s.

The only way to isolate migrants from the pool of mobile people in this database is to constrain the population to those who moved across counties. This operation however yields so little cell sizes in most cases that confident evaluation is impossible. The remarkable exceptions were the role of labour market motivations and moving back close to family. Unfortunately we do not know the labour market status of the migrant and it is uncertain if their move was temporary. In the latter case aggregate data suggest that the proportion of students is likely to be high among them, which would explain the phenomena to a great extent. Some moved to a town but having found no job – maybe as a result of the manufacturing industry moving towards the countryside – returned to their homeland. This would strengthen the same phenomenon (see *Eké*né, 1998 for this).

On the subject of attitudes, it would be interesting to know to what degree the hypothesis of rational decision making based upon unbiased choice is in line with reality. Although information is also available on the perceived success rates for each type of motivation, these are so high with so little variance[36] that they hardly convey any information. Nevertheless, unsatisfactory working conditions, the prime reason to move, have been successfully improved in about 87 per cent on average in every period. This is a high number in absolute terms as well as relative to others in the list.[37]

If the incidence of mentioning the above motivations is random, we can not draw conclusions about typical underlying strategies in mobility or suggesting possible tradeoffs between motivations. To explore the covariance pattern behind them, a principal component analysis was carried out. Two factors emerged from the analysis, whose weights are shown in columns 4 and 5 of Table 3.[38] These weights show the strengths of the underlying variables within the factors – dominance of one or the other helps interpreting the given factor. Factor scores or "values" of the factors are created by weighting the values of the underlying variables with their respective weights.

Factors gather motives that are attached to one of two strategies that I term "active" and "defensive", respectively. The first one characterises an upwardly mobile behaviour, seeking better working conditions and man-made amenities that a place of living can offer.[39] The second one describes a potentially more defensive strategy. People here seem to flee from costs and financial pressures, taking advantage of selling previously rented or purchased accommodation. Man-made amenities, unlike natural ones, are not particularly valued. Labour market opportunities may not be considered a driving force either.

36 Questions were similar to the ones regarding motivations asking "To what extent do you feel that your expectations were fulfilled in this respect?" Scores vary between 60 and 93 per cent in the first block of questions (with the exception of a 22 per cent rate for "too expensive") in 1986–1990 – and between 92 and 98 per cent in the second block.

37 It might be tempting to draw the conclusion that migration is an extremely effective relief to labour market difficulties. However, at this point we need to keep in mind that our sample contains probably the most successful migrants of all.

38 Factors with an eigenvalue higher than unity survived and they were rotated using the varimax method. I experimented with different retention rules other than the one based on eigenvalues and also with creating factors for people migrating in different periods. Retaining different number of factors did not produce any better interpretable results, also shown by the fact that the eigenvalue of the third factor was only 0.38 as opposed to 3.6 and 1.3 for the first two. One important loss is a factor that (retaining a total of five) collects the motive to move in order to move back close to relatives, even at the expense of losing labour market opportunities and other amenities. Using different periods provided no further insights as structures were almost unchanged.

39 Characteristics of such a strategy is described in *Eké*né (1998) in detail.

It is important to stress however that categories "active" and "defensive" can not be replaced with "wealthy" and "poor", as if the responses could characterise two sub-populations. City life can serve as the only possibility to break away from poor living conditions, but also a way to satisfy a refined taste for cultural entertainment. By the same token, it is not only the less well off who plan to move out of a town, but also those who are successful professionally and the ownership of cars makes crossing distances (and commuting) manageable, an effect that was already mentioned in connection with the suburbanisation of Budapest. Labour market conditions are irrelevant in the first case because those fleeing the towns have a weak chance to be employed anyway. It is also negligible for the second group since well educated people must almost certainly expect a good job opportunity in the town nearby.

Table 4: Average factor scores by different mobility routes (scores for the "active" factor on the left and for the "defensive" on the right, in italic)

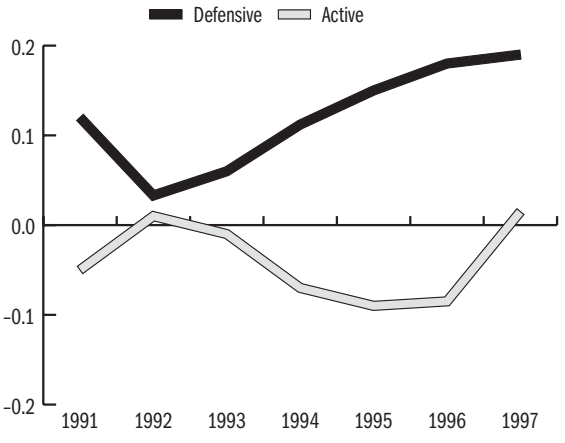
	Budapest		County seats		Other cities		Villages		Together	
Budapest			–0.46	*0.48*	–0.52	*0.28*	–0.44	*0.65*	–0.47	*0.52*
County seats	0.25	*–0.34*	–0.38	*0.18*	–0.38	*0.13*	–0.49	*0.67*	–0.37	*0.37*
Other cities	0.36	*–0.15*	0.36	*–0.23*	–0.26	*0.07*	–0.44	*0.17*	–0.12	*0.02*
Villages	0.66	*0.04*	0.92	*–0.11*	0.49	*–0.19*	–0.16	*–0.10*	0.27	*–0.11*
Together	0.47	*–0.10*	0.40	*–0.04*	0.08	*–0.03*	–0.32	*0.21*	–0.02	*0.08*

Source: Own calculations from the *Regional Development Survey of Szonda Ipsos*. Cell-sizes are above 50, except in the Budapest-County seat relations.

The two types of strategies suggest a mainly urban and rural type of lifestyle. To check this intuition, I have calculated average factor scores for those moving after 1989 for both the "sending" and for the "receiving" settlements. Table 4 shows the results.

There is a clear picture emerging from the combinations of the two factors. Moving upwards in the settlement hierarchy almost always goes hand in hand with a great "active" motivation and a low level of "defensiveness" whereas moving downwards is characterised by the opposite pattern. Terming the two factors as "active" and "defensive" is thus probably not too misleading. There is a decreasing flow of workers from villages to towns and an increase in the other direction. Thus, we can conjecture that motivations change over time along with the composition of movers. The smoothed trend of the factors, shown in Figure 4. justifies this only partially. There is no definitive trend in the first, "active" factor (light line) although it takes mostly negative values in the second half of the decade. The second, "defensive" factor (heavy line) on the other hand shows a steady rise over time starting from 1994, which is in line with what we found so far.

Figure 4: Average factor scores by year of relocation (smoothed using the lowess method)



Source: Own calculations from the *Regional Development Survey of Szonda Ipsos*.

Characteristics of the mobile population

Although aggregate figures can capture certain characteristics of the mobile population, there are at least two important deficiencies of this method. First, there is very little background information available on the movers themselves since data comes from administrative sources. Second, because of this aggregate nature of the data, the researcher is not able to combine various traits, therefore no single own (or "marginal") effect can be established. If, for example, there seems to be evidence that younger and more educated people are more likely to move, we can not really tell whether this is the case because younger people (i.e. members of younger cohorts) are better educated on average than their ancestors were, or because it is really the more educated, also among the younger ones, who are more likely to move. Such pitfalls can be avoided if instead of aggregate data, one uses micro data on individuals.

There is of course a cost to these advantages. Micro level data are collected through sampling, yielding (theoretically) less precise information than that which may be obtained from the aggregates based on the whole population. A further problem comes from the fact that generally surveys are representative of the population as a whole, which does not necessarily guarantee that it is also representative for a specific group. There is only one large and general enough survey that supplies data of the desired nature: the 1996 Microcensus conducted by the Hungarian Central Statistic Office. For each individual, this survey records the place of residence in 1990 and 1996 and also the place of work in 1996.[40] Another important

40 Unfortunately we do not know whether there was a move between the two time points, and if yes, how many. For this reason, the migration rate calculated from the Microcensus can not be compared to those coming from aggregate data, as there are two factors at work against each other. On the one hand, the data cumulates the proceedings of six years, so we see the result of many changes over a longer period. On the other hand, since mobility is not a one–way process, and we have seen reasons before for movers returning to their previous residence, the data most certainly documents less moves than the sum of all moves over six years. The problem comes from the fact that we do not know the proportion of returns neither on macro, nor on micro level. Nevertheless, if we are not interested in the proportion of the movers, but their behaviour in relation to characteristics, than this might not be such a great problem.

advantage is that we are able to tell temporary and permanent residences apart. We can identify not only geographic but also individual and family-level characteristics. Despite the fact that information is abundant, unfortunately everything refers to 1996, so searching for traits that make an individual more likely to move, one can use only a limited subset of them. In what follows, these data will be used.

Before I characterise the mobile population, it is worth a detour to match the overall story told by the micro data to that of the macro level evidence. This is useful not only to make sure that the former reflects reality well enough, but also to differentiate the behaviour of permanent and temporary migrants.

Distribution of the population across types of settlements is shown in Table 5, with rows denoting types of settlement in 1990 and columns marking types of settlement in 1996. It is apparent that the dominant direction of flow, pointing to villages from larger towns, is set primarily by permanent movers. Only 10 per cent of such movers settle in Budapest or in towns, and this figure is less in absolute terms than those originally living there. However, movements of temporary migrants show a different picture. Many of them moved away from Budapest, but many moved in, too. At the same time, a much smaller proportion of these people move to or between villages. The two types of mobility, having almost the same proportion in the aggregate, are markedly different in terms of spatial orientation. Yet the path traced by permanent mobility seems to be stable and its effect is cumulative in nature. Note that neither of these features is true for the temporary mobility. This finding may seem to be trivial, but this is actually not the case. The reason for such a pattern might be that amenities that are attractive for permanent movers (pleasant environment, lifestyle) are stable over time, but factors that attract temporary movers (seasonal employment, schools) do not have such a permanent effect. It would of course be interesting to look at the long term changes in amenities, but unfortunately neither of our data sources are long enough to permit such an analysis.

When selecting key characteristics of the mobile population, one can rely on the models introduced in the theoretical summary of Chapter 1. Note that even if these frameworks are not formalised, they are the explanations we normally bear in mind. According to these, people contemplating moving away from their current residence, compare their readily available labour market conditions to those in the best of all alternatives. Action is taken only if it seems to be "worth" moving, taking into account all the non-pecuniary costs and benefits. It is the various individual traits that determine how costly a move is for a particular individual. In theory therefore we are interested in the possible features that may influence the probability of moving.

Table 5: Mobility of temporary and permanent migrants across types of settlements

Residence in 1990	Residence in 1996				
	Budapest	County seats	Other cities	Villages	Together
Permanent					
Budapest	1	1	5	6	12
County seats	2	3	4	10	19
Other cities	3	5	6	11	25
Villages	4	9	11	20	44
Together	9	18	25	47	100
Temporary					
Budapest		3	7	8	19
County seats	5	4	4	6	19
Other cities	8	9	5	6	28
Villages	8	10	8	8	34
Together	21	26	24	28	100

Source: Own calculation using the *1996 Microcensus*.

The data at hand unfortunately limits our attention considerably, since many of the characteristics are observed only *after* the move. This causes a problem, since we can not be confident that the move was not affected by some unobservable event that was in some relation with the actual characteristic whose effect. An example of such a case is when a young man inherits a flat in a larger city, to which, for a long time, he has wanted to move, but could not afford the move beforehand. If this very young man marries at the same time, the two events would coincide and this may mask individual reasons. Indeed, our imaginary data is not informative about inheritance and we would thus conclude that young married people move to towns in order to build a foundation for their fortune.[41] Such pitfalls can be avoided if only those characteristics are looked at that do not change over time (or changed between the two time periods in a way that is "harmless" to the problem). Such characteristics are the basic demographic ones: age, gender and schooling if handled carefully.

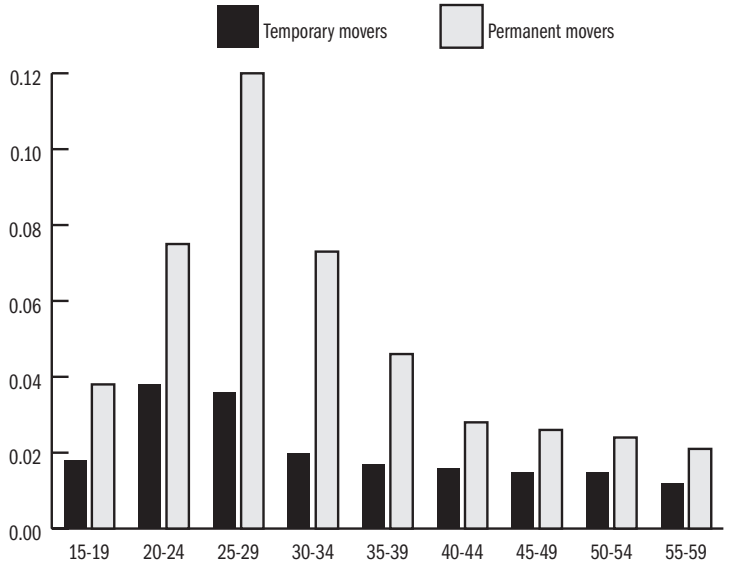
Whatever is the motivation for the move, it is a demanding enterprise and because of this, we can expect that the probability of a move is changing over the lifecycle. Figure 5 shows the share of movers, both temporary and permanent, by age groups. It is worth noting that while the highest proportion of permanent movers are to be found in the age group 25 to 29, those moving temporarily are clustered close to the age of 20. If we think strictly about labour market motivations, such a pattern might be surprising.

An interesting supplement to the problem of many young temporary movers is to be found in the Demographic Yearbook of the HCSO (see for example page 328 in the 1998 yearbook). Looking at a time series of

41 This is of course true only if the event happens frequently enough. In a flat market with very high prices, this is far from being unlikely.

monthly changes in mobility, one can see that after approximately balanced monthly figures, there is a large increase in the temporary movements around September. This is exactly the time when students start their terms and those studying far from home take their places in dormitories. In the case of the capital and county seats, this spike amounts to more than 25 thousand, but even in the case of villages, it is more than four times the usual amount. Because of this, often in September about third of the total annual mobility takes place.

Figure 5: Proportion of permanent and temporary movers by age categories



Source: Own calculations using the *1996 Microcensus*.

The level of schooling affects the likelihood of the mobility of the population between 18 and 40 years of age: average schooling is markedly different between the spatially mobile group and the rest of the population, and difference can also be detected between the two types of movers. Table 6 shows that the proportion of movers is well above the average in two groups: those having less than primary education and those with higher education. This wedge is even more pronounced when schooling of the temporary movers is compared. A comparison of activity, education and schooling status shows that on the one hand, around 20 years of age there is a high proportion of *active* temporary movers, and on the other, there is a similarly large proportion of them among those attending secondary education. Seasonal change of temporary mobility and this observation corroborate the hypothesis that a large proportion of temporary movers are simply students.

Table 6: Proportion of permanent and temporary movers in education groups

	Not mobile	Permanent	Temporary	Together
Incomplete primary	91.85	7.43	0.72	100.0
Completed primary	90.30	8.23	1.47	100.0
Vocational education	91.09	7.29	1.62	100.0
Secondary schooling	89.88	7.51	2.61	100.0
College	82.38	12.53	5.09	100.0
Together	89.64	8.13	2.24	100.0

Source: Own calculations based on the *1996 Microcensus*.

Although economic activity could have changed several times between 1990 and 1996, it is worth taking a cautious look at the proportion of movers within categories of activity. Table 7, showing such proportions, confirms our previous findings. Given that economic activity is very different among women and men in this age-group, two panels of the table refer to the two sub-populations. In the case of men, we find movers in above-average proportions among working or unemployed persons (the active population) and among those, very few are actually taking advantage of childcare leave. Students, if they move, are among the temporary movers. In the case of women, we see a similar although even more pronounced picture. Mothers on child care leave are twice as likely to move (or rather: having moved) than the average, a proportion surpassing even that of students'.

Table 7: Proportion of permanent and temporary movers in activity groups

	Not mobile	Permanent	Temporary	Together
Men				
Working	89.5	7.9	2.5	100.0
Unemployed	91.2	7.0	1.8	100.0
On child care leave	91.1	8.9	0.0	100.0
Pensioner	94.9	4.3	0.7	100.0
In full-time education	90.2	3.3	6.4	100.0
Other	93.8	4.9	1.3	100.0
Women				
Working	90.5	7.0	2.4	100.0
Unemployed	90.9	7.4	1.7	100.0
On child care leave	82.8	15.2	1.9	100.0
Pensioner	91.4	6.7	1.8	100.0
In full-time education	87.2	4.7	8.7	100.0
Other	89.7	8.2	2.1	100.0

Source: Own calculations based on the *1996 Microcensus*.

Based on the above characteristics, we can imagine the typical mover or family. If the move is permanent, then the family is young, with or expecting a child and economically more active than the average. If the move is temporary, then the typical person is even younger, mostly studying or

working. Although raw data show these relationships quite well, it would be interesting to know if these effects are in work alone or if they are just transmitting some other effect (because all of them are strongly related to the person's position within the life-cycle).

Estimating the probability of relocation using a multivariate technique

To separate the potentially distinct effects of individual characteristics, we can build on the theoretical motivation of Chapter 1 and estimate the impact of our effects on the individual probability to move.[42] Besides the characteristics discussed in the previous chapter, the model also includes two key variables representing labour market conditions in the original place of living: the average unemployment rate and wages (as discussed in chapters 2 and 3). Since individual data is not available on these, they are supposed to capture the general condition of the labour market in the sending region.

First I estimated the probability of mobility focusing on the population between the ages of 18–60 for whom a labour related move matters a lot. Results of this estimation are to be found in the Appendix in Table F1. Although the model captures only a small proportion of the variation in the data, thinking about the many factors influencing mobility, this does not come as a surprise. The impact of key variables is nevertheless well-determined and predictions at the mean of them are not far from the observed values.

Summarising the results of the estimates, one can state that the hypotheses that we were considering until now have been confirmed. Labour market condition variables have a statistically significant effect on the individual probability of permanent mobility and also have the expected sign: higher unemployment rate induces mobility, while higher wages decrease it. The same is not true for temporary mobility, which can be attributed to the fact that the temporary movers have very diverse motivations for moving. Labour market effects do not exert a significant impact on mobility in their case. Education has the theoretically predicted effect: people with at least secondary education are much more likely to move than those with vocational training or less, regardless of being permanently or temporarily mobile. Taking the 18–24 year olds as a reference, older people are less and less likely to move – the result we have seen in the raw data depicted on Figure 5. If one restricts the sample to only those not in full-time education, people in the 25–39 age group are more and not less likely to move (results are available on request). Using this as a robustness check, we also find that estimates do not change considerably.

Having seen the advent of suburbanisation during the 1990s, one might also wonder how the behaviour of those, who do not move to suburbs, is

42 More formally: we model the choice using two outcomes and fit a logit regression model. Relating that to individual decision is simple, using for example the index–function type approach common in labour economics.

different from those who do. Table F2 of the Appendix gives estimates similar to the previous ones, but without people who moved to suburbs.[43] The difference for the whole population and for permanent movers is slight with labour market effects being more significant and that of secondary education less. However, in the case of temporary movers, we find that the effects of labour market indicators are appropriately signed and those of other variables are of similar significance and magnitude as those of permanent movers. Overall, it seems that although the model employed captures the effects of the variables of interest, suburbanisation begins to erode its universal applicability.

Conclusions

This chapter looked at mobility developments in Hungary in the 1990s on both the macro and the individual level. We can draw two important conclusions on the aggregate level. Although comparability of the relevant statistics is not trivial, relative mobility in Hungary is low by international standards, whereas the 1.4–0.7 per cent range for the rate of longer distance migration is comparable to European migration figures. Although the evolution of mobility- and migration rates do not show a substantial change over time, the underlying structure does. Previously dominant mobility routes, from villages to towns have been reversed. This is partly due to the actions of the affluent but partly of those, who can not keep up with the pace of life in a town and move to villages. This reflects the suburbanisation processes documented in demographic-statistical literature.

Surveying the characteristics of the mobile population, it becomes apparent that although labour market conditions play an important part as a motivation for relocation, they are clearly not the only, or the dominant one. It is important to acknowledge this fact not only to understand that the full explanation of a move is well beyond the scope of a single paper, but also to see clearly that not every single move can be included when one thinks about alleviating regional inequalities through migration. Individual data also confirmed that movers are particularly often found among young adults, educated individuals and those planning to have a family. Seasonal data hint at the possibility that a large proportion of the 2 per cent temporal mobility rate is generated by students, which is again something to bear in mind in connection to regional inequalities.

Finally, individual data were used to look at how individual characteristics as well as labour market indicators such as average wages and unemployment rates influence movements between settlements. Results show that all of the factors included in regressions have a significant impact on mobility, even if the total explanatory power of the model is not particularly great. The impact of labour market indicators have the expected sign and

43 We used the categorisation of the HCSO to tell if a settlement belongs or does not belong to the suburbs.

those of individual characteristics show a similar result that we have already seen in the raw data. Although these results were not completely valid for temporary movers, filtering out those who moved to a suburban belt not only strengthens results both in terms of overall significance and size of impact, but in the case of temporary movers also yields the expected results.

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Appendix

A) Numerical results of multivariate analysis

Table F1: Marginal effect of factors influencing mobility in the case of permanent, temporary and all movers (age between 17 and 60)

	All mobile persons		Permanently mobile		Temporarily mobile	
Unemployment rate – sending	0.0011**	(0.0001)	0.0010**	(0.0001)	–0.0001	(0.0001)
Average wage – sending	–0.0005	(0.0002)	–0.0003	(0.0002)	–0.0002	(0.0001)
Primary education	0.0090	(0.0047)	0.0044	(0.0039)	0.0068*	(0.0033)
Vocational education	0.0106*	(0.0048)	0.0051	(0.0039)	0.0094**	(0.0036)
Secondary education	0.0249**	(0.0051)	0.0074	(0.0040)	0.0231**	(0.0047)
Higher education	0.0704**	(0.0076)	0.0373**	(0.0059)	0.0473**	(0.0087)
Age: 25–39	–0.0038*	(0.0018)	0.0049**	(0.0016)	–0.0074**	(0.0007)
Age: 40–59	–0.0673**	(0.0019)	–0.0471**	(0.0017)	–0.0194**	(0.0009)
N	110,339		110,339		110,339	
Pseudo R^2	0.04		0.04		0.05	

Data: *1996 Microcensus*.

Table F2: Marginal effect of factors influencing mobility in the case of permanent, temporary and all movers, without those moving to suburbs (age between 17 and 60)

	All mobile persons		Permanently mobile		Temporarily mobile	
Unemployment rate – sending	0.0009**	(0.0001)	0.0008**	(0.0001)	0.0001**	(0.0000)
Average wage – sending	–0.0021**	(0.0001)	–0.0008**	(0.0001)	–0.0010**	(0.0000)
Primary education	0.0004	(0.0027)	–0.0015	(0.0023)	0.0017	(0.0013)
Vocational education	0.0003	(0.0028)	–0.0019	(0.0023)	0.0027	(0.0014)
Secondary education	–0.0008	(0.0028)	–0.0079**	(0.0021)	0.0068**	(0.0019)
Higher education	0.0139**	(0.0039)	0.0007	(0.0027)	0.0168**	(0.0043)
Age: 25–39	–0.0033**	(0.0012)	0.0014	(0.0011)	–0.0027**	(0.0003)
Age: 40–59	–0.0377**	(0.0014)	–0.0268**	(0.0012)	–0.0072**	(0.0005)
N	106639		107597		109307	
Pseudo R^2	0.05		0.04		0.1	

Data: *1996 Microcensus*.

Heteroskedasticity robust asymptotic "t" statistics in parentheses. ** indicates significant difference from zero at least 1 per cent, * at least at 5 per cent level, while no stars indicate other, higher levels. The impact of the variables is evaluated at the mean. In the case of binary indicators, the impact corresponds to a discrete change, not to the derivative proper. The hypothesis that regressors have no joint explanatory power is rejected in all cases at all significance levels.

B) Databases used for the calculations

TSTAR. TSTAR,[44] a comprehensive database contains administrative information on more than 3,100 Hungarian settlements. Data are available on a variety of topics including demographics and the number of persons moving into and out of the actual settlement, regardless of whether it is a temporary or a permanent change. One shortcoming of these data is that there are no time-series spanning a whole decade available for most variables due to constantly changing definitions and scope of data-gathering at governmental offices.

The TSTAR is not originally built as a panel database of the settlements. Some settlements looked for and gained independence and new ones were created by a split. To improve on the dataset we put them back together and treated these places in the form of 1990 status. This reduces the number of settlements to 3,070. Using this database, a panel is created with selected variables.

	N	Mean	Std. dev.	Min.	Max.
Mobility rate	1,350	4.2	0.8	2.3	7.9
Unemployment rates	1,200	12.7	4.6	2.9	30.2
Average earnings	1,050	18.8	3.6	11.6	36.2

Microcensus. The "Microcensus" (MC) is a large representative sample of the population, conducted by the HCSO, providing extensive information on around 200 thousand individuals, their homes and households. Answering this survey is mandatory, so there is virtually no bias from non-response (but due to discrepancies between the population registry and reality, the sample is weighted). In the MC, we know the identity of the settlement where people lived in 1990 and 1996, but we do not know what happened in the meantime and have no information on past characteristics of the respondents.

Omitting children who were not yet born in 1990, the sample size is 183,589 with 10,127 movers. Constraining age to the 18–60 year age band, we are left with 111,205 observations, of which 7,445 are movers. 5,699 of them are permanent and 1835 are temporary movers. Taking only people over 30 years of age into consideration, we have 77,532 observations, with 2,657 permanent and 755 temporary movers. Looking at the effect of back-commuting to the previous place of living, I excluded those who do (809) and those who do not (9,318) commute back and these observations were eliminated from the sample altogether.

Mobility here is defined as living in different settlements in 1990 and 1996. This means that repeated movers and those moving only once during the period are both counted only once, but movers returning to a previous address never. Masking repeated and temporary moves will bias the fraction

44 TSTAR is a Hungarian acronym for "Településsoros Statisztikai Adatbázis Rendszer", Settlement–level Statistical Database System, created at the Institute of Economic, Hungarian Academy of Science with the Hungarian Central Statistics Office from several sources.

of movers and possibly weaken signs of the relations we are interested in. Nevertheless, if the moves are time-consistent and every choice dominates a previous one, the signs of the relations should not be affected.

Regional Development Survey. The "Regional Development Survey" (RDS) of the Szonda Ipsos market research company elicited questions on individuals' living circumstances and reasons for moving house. The sample size is 26,800 with 1200 observations from every county except from Budapest, where 4,000 interviews took place. Because of the disproportionate sampling and possibility of non-response, the data is weighted.

Movers here are defined as those not having been born in the present settlement of residence. Out of the 26,736 respondents of the RDS, only a little more than half (57 per cent) were born in the current place of living and about 1 per cent moved in from elsewhere. The sub-sample without these people (and the 200 moving house within Budapest) will be designated as "movers" (also excluding those without a date of relocation), reaching a total of 11,344.

In the RDS, we do not know the identity of the sending settlement, just its type and for every type its approximate spatial relationship to the current place of living ("far", "close"), which makes it unsuitable to estimate individual mobility propensities. The benefit here is that the year of moving house for the last time is known, so it is possible in some sense to trace the change of motivations over time and relate those to aggregate observations. Also, here we have a departure from the definition of mobility used in the aggregate data. Here we record moving in every year, but only the last one for everybody. This means that a yearly snapshot will include all movers conditional on staying at the new residence. Accordingly, the more frequently one moves, the later she or he is recorded.

Auxiliary Data Sources. I imputed wage and unemployment data from auxiliary data sources. For the former, I used the Wage Survey of the National Labour Centre (NLC), comprising years 1992, 1994, 1995, 1996, 1997, 1998 and 1999. This is a sample of around 150 thousand employees of firms with more than 11 employees, providing high quality payroll wage data. The number of observations makes it feasible to estimate the mean wage for the 150 small regions, but not for smaller units.

Unemployment figures refer to the number of registered unemployed, coming from records of the NLC and are valid on the settlement level. Lacking real time-series on the number of active persons, we use two feasible measures: the number of active persons in 1990 (known from the Census) and the number of persons of active age (18–59 year old men and 18–54 year old women) registered in the TSTAR database. Estimation using both measures revealed that the choice between them does not have any important influence on the results.

2 MOBILITY AND SPATIAL DISTRIBUTION OF CAPITAL

2.1 Motives of corporate location choice

Gábor Békés

In this chapter we discuss the main motives behind the location choice of companies. Contrary to the traditional approach of international economics, we consider not only the choice among countries but look at the determinants of selecting a particular geographical unit such as a region or a city. When making a decision, a firm would consider a wide range of variables such as the price and availability of its input factors, wages and features of the local labour market (education, skills). Furthermore, firms will take into account the presence of other firms, especially those they intend to conduct business with. As a result of many individual decisions, industrial agglomerations will develop, and the spatial structure of the economy will change. Some regions and cities will see their economic potential rise while others see it diminish.

This chapter aims at providing a theoretical background for the empirical studies on capital mobility published in this volume. In order to be brief and focus on relevant issues only, we concentrate on determinants of those firms that may consider all potential production sites. Also, we focus on determinants relevant for a small and open economy such as Hungary. In what follows, we discuss the background of these location choices using results from international, regional and urban economics as well as research on industrial organisations.

We analyse corporate decision problems in two frameworks. First, in a *static* setting, we simply consider the key comparative advantages and opportunities a given site needs to offer in order to lure in more investments given its actual structure of production and demand. Our second, *dynamic* approach takes into account not only the decision of the given firm but also examines externalities that a decision imposes on other firms' location choice. For example, when a car manufacturing company chooses a par-

ticular region for its new plant, it influences the profit and cost functions of tyre manufacturers or steel producers. Further, it changes conditions at the local labour market thus having an effect on all local firms. The static approach is a relevant analytical framework for small and medium sized firms, while governments and multinational corporations need to think in a *dynamic* setting. In what follows, we describe both structures.

In laying out the theoretical background, we make no difference between Hungarian and foreign owned or small and large multinational firms. It can be assumed that any corporation makes a decision based on (location dependent) expected costs and profits. However, a large company with production sites and a sales force all over Europe has much more options then a medium sized Hungarian manufacturer. There are two crucial reasons for this. First, there exist barriers to entry (legal and market information, languages, etc.), especially to foreign markets. Second, in order to profit from a greater division of labour, the firm should reach a certain size or the fixed costs of investment will not be recouped. A large firm that has enough resources to finance start-up costs and benefit from production technologies exhibiting economies of scale, will indeed be able to consider many location options. Hence, small firms are more likely to stay alive where they were established – maybe just out of luck, and respond to a deterioration of conditions by shutting down production.

The static approach

When companies consider options, they first tend to think in a static mindset and compare pros and cons for all potential sites. There are a few key motives distilled from theory and empirical approach.[1]

One of the oldest motives for investing in a particular area is to exploit its resources. This leads to the development of a vertical production structure setting production of each component wherever inputs are available thus enhancing overall productivity. In economic theory, in the absence of barriers to trade (tariffs), transportation and other transaction costs, intra- and international trade would fully equalise input and final good prices. However, in reality there are tariffs and more importantly, transport and information costs and so prices differ. Hence firms may relocate whenever relatively cheaper inputs such as natural resources or trained labour are found. As a result of capital investments the changing production structure will reflect the regional comparative advantages. A relatively cheaper labour force invites the entry of labour intensive industries (e.g. textiles), while regions with a relatively superior skill and education base should attract research and development intensive sectors (e.g. pharmaceuticals). It is worth noting that R&D intensive sectors are likely to be part of an international organisation thus contributing to a rise in the volume of trade.

1 For more details on national and international location choice, see *Dunning* (1993), *Helpman and Krugman* (1998), *Markusen and Venables* (1998) or *Szanyi* (1998).

A key dilemma of international (or inter-regional) expansion is whether (and when) local production should be added to local sales force. Starting production involves a range of costs including administration (learning about legal and tax obligations and making necessary adaptation), fixed investment (such as creating infrastructural background) and variable costs depending on the size of production (buildings, machinery, etc.). Further questions to consider are the loss of economies of scale as well as management costs arising from decentralized production. Advantages of local production must be related to cheaper inputs and importantly, to lower transportation costs (including the burden of bearing exchange rate variability). Further, local supply allows for meeting local demand more flexibly. Strategies aimed at serving local markets involve horizontal direct investment, i.e. firms replicate production structures in various countries/regions. One example is motor vehicle production in Europe, where similar cars are produced in various countries and sold principally locally.

In addition to the above, there are further determinants of location choice. As for FDI to less developed economies, the key variables include (see. e.g. *Veuglers*, 1991):

- barriers or high costs of foreign trade (e.g. tariffs, quotas);[2]
- openness: opportunity to participate in global production structures, market integration – option of larger "home" market;
- geographical proximity (common border, shared language and culture) as well as cheaper transportation to meet demand of nearby regions;
- urbanisation – greater concentration of demand, modern society;
- political, legal and regulation stability;
- risk management – diversification of production in order to hedge country risk (of exchange rate variability, nationalisation, introduction of tariffs, etc.).

Finally, let us point out that it is not only market forces but state support and public policy actions as well that should influence corporate location choice.[3] In our view, a set of the most important investment-friendly public policies would contain market liberalisation, tax breaks and other forms of financial support such as export subsidies, public investment and labour force development support (e.g. enhance the skill base of workforce via education and vocational training, assist labour migration). In a broader sense, an economic policy that provides a stable political and monetary climate shall be considered as part of an investment enhancing public policy.[4] In addition to this, development of infrastructure, especially that of transportation and communication networks will influence location choice. A new express train will for example cut commuting time and reshape cost structure for a company in services, thus prompting some firms to move to cheaper areas or on the contrary, concentrate dispersed offices.[5]

2 This is one of the first ideas that appeared in the literature. In his famous work on "tariff factory", *Haberler* (1936, pp 273–278) analysed the impact of tariffs on trade and showed that an increasing tariff in one sector leads to a rise in capital inflow for it becomes cheaper to produce locally than it is to import goods.

3 On the role of public financial support, see *Dicken* (2000), *Antalóczy and Sass* (2000) or *Kalotay* (2003)

4 A foreign policy that ensures foreign markets or promotes market integration may well be considered part of such policy.

5 *Vives* (2001) looks at the impact of a new speed train line between Madrid and Barcelona.

In a policy-oriented paper, *Martin* (2002) looks at the impact of various regional policies. He considers alternative actions, such as inter-regional highways and plain monetary transfers to find that different policies yield different spatial impacts both in terms of equity and efficiency. In many cases higher efficiency would reduce spatial equity. For example motorway construction allows for a concentration of production by making use of the now cheaper means of transport. The side effect is a loss of industry in some other regions, a consideration often missed by policy-makers. For example, *Puga* (2001) quotes a report of Committee of the Regions that emphasises positive impacts of a better infrastructure but disregards agglomeration forces that may lead to a loss of industry in the poorer region that was originally to be developed.

A dynamic approach

By the basic (neoclassical) model of economics textbooks, economic activity is dispersed evenly through space since the flow of production factors levels out differences in development and prices alike. Wherever there is a scarcity in one good or factor, its relative price will be higher making it worthwhile to ship goods from other places in the world as long as prices are equalised. Equalisation may be reached via trade and/or capital investment and labour migration. It is easy to see that this is not the case in reality: there is a concentration of activity in cities, industrial or financial centres, and there is a marked difference between developed and underdeveloped regions even within one country.[6]

There are many reasons for the concentration of production, cheaper production with economies of scale technology being probably the most important. However, there are various reasons why companies would not only build large plants but target settlements close to each other – thereby creating industrial centres. Our dynamic approach backed by its key theory called "new economic geography" aims at uncovering the essential reasons behind both agglomeration and dispersion of economic activity (i.e. firms choosing distant locations for starting new production).[7]

The set of determinants of location choice sampled in the previous section will be extended when dynamic considerations are taken into account and their relative importance may also be shuffled. Now the strategic interaction of companies turns out to be a key issue and furthermore, expectations of future developments are becoming part of the decision making process. Our comments are grouped in the following categories: input factors, proximity of markets and transaction costs.

1. *Input factors*: These are the variables that can be found in the static approach as well, although in a dynamic setting their expected values also come into play. Determinants of the labour market include present and

6 A classic example for agglomeration is the international region called "Blue Banana" that encompasses North–Italy, Southern Germany, South–East of France and the Île–de–France, Benelux countries and South–East England. There are actually cities with a distinct specialisation, such as Palo Alto in California, City of London, the rug–specialist Dalton or the Chinese city that is responsible for producing some 50 per cent of Chinese clothing buttons. For more, see *Krugman* (1991) or *Porter* (1990).

7 Key books on the theory are *Fujita, Krugman and Venables* (1999) and *Baldwin et al.* (2003)

expected wages, their skill and education content, and other features of labour supply and demand. For capital, the relevant factors are investment costs such as project financing fees, availability of bank loans and venture capital, taxes and subsidies. Other variables will include the price and availability of land and raw materials.

2. *Proximity of markets*. Distance among various firms and distance between producers and consumers are key determinants of location choice in an economic geography approach. Being close to potential suppliers allows a firm to concentrate on its core business and buy intermediate goods from local businesses. The final price and thus profits will depend on the size of the local market as well as on the proximity of all other consumers (market potential). In a dynamic setting one must also take into account the fact that a location decision of a firm will have a long running influence on the local labour market, potentially affecting adjacent labour markets, or even prompting inward migration. Thus, not only will the labour supply rise to meet its demand, but more customers will yield a larger market that in turn will have repercussions on production.

3. *Transportation and other transaction costs*. Prices of both final and intermediate goods are dependent on the costs of their transportation and the related fees of making business abroad, thus shaping patterns of trade and investment alike. Transaction costs include a variety of fees and expenditures related to communication, legal advice, hedging, or even bribery.

4. *Strategic interaction.* Another benefit may stem from strategic interaction among firms, as local investment signals determination for the given market and this may alter competitors' behaviour. *Dunning* (1963) added that in a global competition firms may have to simply invade a market to survive competition.

Comparative advantages and the static approach help understand why diverse regions develop in a diverse fashion, possibly specialising in areas of production where relative strength is present. The dynamic approach is set to explain why similar regions may develop different production structures and how agglomeration and dispersion forces influence convergence or divergence of regions or countries.

New economic geography: theoretical background and results

Let us put forward here an element of the economic intuition that lies behind theories of *new economic geography*. Most of the models in this class assume that firms produce with increasing returns to scale technology, market transactions are costly and these costs determine whether firms benefit from settling close to one another thereby giving rise to agglomerations. In the lack of transaction (trade) costs, production would be determined by supply side considerations (such as efficient scale size) only. However, if

transportation is costly, the demand side becomes a determining factor of location choice as being close to customers gives lower operating costs. Accordingly, a shift in transaction costs may lead to the relocation of industries as both the optimal level of concentration and the optimal distance from customers is altered.

To better grasp the key ideas of the new economic geography, let us consider a simple framework with two regions, one of them having slightly more firms than the other. Firms can decide whether to settle in the first, second or in both regions. The more firms are present in a region, the more easily can they find the required intermediate goods locally. Hence, there is a lower import share and saving on transport costs will make final prices lower as well. Greater competition among firms will also lead to higher wages that, along with lower prices help raise living standards. Better prospects will draw migrants from the other region and the labour pool will rise, which will lower wages to some extent. The size of the market however will increase, helping firms to sell more, which allows them to lower prices. Also, a larger market (more customers locally and the possibility to make an even better use of increasing returns to scale) will make new firms enter the region. Thus, in this case labour market development and capital flows reinforce each other: efficiency of production and stronger purchasing power of customers will offset rising wages and agglomeration forces lead to a growing concentration of activity in one region. The Swedish Nobel-laureate economist Gunnar Myrdal dubbed such developments "cumulative causation" (*Myrdal*, 1957).

Of course, agglomeration forces do not prevail without boundaries; there are dispersion forces in action, too. First and foremost, high wages will make certain wage-sensitive industries incapable of offsetting rising costs. These companies will at some point opt for locating in the other region. Although they will face much higher transaction costs when selling to the larger (and richer) region, production costs will be much lower in the other region. Another reason for moving is falling final prices as a result of greater competition. In this case the benefits of lower competition in the other region will offset the disadvantages of losing suppliers and some customers in the larger region. As we have seen, the size of transaction costs and thus the distance between markets plays a pivotal role. Note, that remoteness not only incorporates physical distance "as the crow flies" but also the quality of the transport network, language and cultural barriers, differences in corporate management styles or the regulatory environment.

Building on the classic "static" findings and working with the framework sketched above, let us enumerate the main variables that determine the result of agglomeration (or centripetal) and dispersion (or centrifugal) forces and some features of outcomes.

Transaction costs and wages. These are the key variables. The level of transportation costs determines market structure and the (optimal) size of companies as well as the industrial structure of the economy. Lower transportation costs will make companies more likely to concentrate production and export to distant markets thereby affecting the properties of the given market. Market integration, industrial specialisation, and the appearance of industrial clusters are all interrelated in this framework. As for the labour cost, its level determines the capacity of the given region to lure in investment and prevent existing investment leaving. High wages may only prevail in highly agglomerated areas with strong market potential and efficiently producing firms. While a certain wage level may just prevent new firms in some of the industries from entering, excessively high wages will lead to a massive exodus and the break up of clusters. As for very low wages, in the early phases of development it will be the key factor in making firms enter and possibly create the seeds of a future agglomeration.

Dynamic considerations matter. Wage level and other costs influence decisions by individual firms but these decisions are interrelated: future decisions by firms will influence overall conditions of companies already present. There is room for cumulative causation to influence firm location and the spatial structure of economic activity. Apart from comparative advantages, firms need to take into account the pluses stemming from proximity to other firms and the minuses caused by higher wages and fiercer competition.

Non-linear relationship. One of the most interesting results is that the number of firms in a region or even the general level of development in a region does not hinge linearly upon wages and transportation costs. Let us assume that costs in an industry are falling gradually. Up until a certain level it remains optimal for the mainstream technology users to produce in one particular region, and hardly any firm would find it optimal to move. However, when costs reach a certain level, some firms will find it optimal to shift production to another region thereby changing optimality conditions for other firms who then choose to relocate, too. Thus, the landscape is reshaped as transaction costs fall, but not in line with changes of the cost level.

Small changes may yield large reallocation – and vice versa. As a result of non-linear relationships, a small change (like a minor drop in transport cost) will lead to a large-scale shift provided that the economy features the cost level just dividing two agglomeration equilibria. The opposite case may be true as well: if the economy is locked in a particular spatial equilibrium, and transaction costs are very low or very high, a fairly large cost change would not imply a shift of production.

The policy consequences of the arguments above are of crucial importance. In various cases, granting tax breaks will have no far-reaching effect for the companies attracted will not make others follow. Policy will be effective only when the economy is close to a critical level of costs: only then will a policy action have an impact that is strong enough to be worth spending taxpayers money on. Also, capital should be taxed (or wages allowed to rise) only when the agglomeration is strong, i.e. co-location externalities are strong enough to offset higher costs.

History matters. As a result of cumulative causation and non-linear relationships, the starting point does matter considerably as it will determine which production structure will be actually reached out of the various possible equilibria. A small advantage in the beginning may well grow over time. Despite investment incentives, the process of agglomeration will only kick in when necessary features co-exist. In a similar fashion to history, luck or accidents may play a key role. A personal contact born out of sheer luck can make a company choose a particular region prompting other firms to follow suit.

Some international evidence

Carr, Markusen and Maskus (2002) consider US investments abroad and show that per-capita inward direct investment into developing countries is positively related to the host-country market size and per-capita income. They argue that that US outward investment is looking for labour skills and large markets as well as low barriers to investment and high-quality infrastructure. Importantly, the lack of labour skills, legal institutions, and infrastructure makes poor places unprofitable locations for production despite a large and cheap labour pool. As for Central and Eastern Europe (or CEE), various studies such as *Baniak et al* (2002) also emphasise the role of legal and macro-economic stability in securing foreign investment flows.

Working with international data on various industries, several studies investigated national specialisation of production. One key question is whether comparative advantage or geographical considerations (such as proximity to suppliers and customers) would dominate. For European countries, *Midelfart-Knarvik et al*. (2001) found that besides comparative advantages such as skills and education or access to capital, access to suppliers is an important determinant of location choice. This confirmed findings of previous studies carried out on US data by *Ellison and Glaeser* (1997). An interesting feature of the European development is that specialisation patterns in less developed EU countries, such as Greece, Portugal or Ireland, are much more in line with economic rationale (both for comparative and geographical advantages) than is the case in developed EU states. One explanation is that in these countries industrialisation took place later and the role of

foreign investors, choosing a location based on strategic considerations was more significant. Thus, one should expect manufacturing location to be even more determined by the local advantages in the CEE countries.

Regional clusters

A central topic of theories on location decisions is the notion of clusters. One basic definition of an industry cluster is "geographical concentrations of industries that gain performance advantages through co-location" (*Doeringer and Terkla* 1995, p. 225). Thus, a cluster simply denotes a group of firms that are fairly close to each other, i.e. transportation of goods and services between any two is very easy and cheap or the workforce can flow easily. Another source of common faith is when production draws on the same source of raw materials, business services and labour pool. What is more, economic geography emphasises that proximity fosters technological externalities or spill-overs, i.e. when innovation (in production technology, management, etc.) by one firm is easily revealed and imitated by others.

Studies of industrial organisations find that the development of clusters is similar to that of metropolitan agglomerations, for in both cases externalities and accidents play important roles. *Porter* (1990) studies corporate networks located in one small region and distinguishes two types of cluster: vertical ones (linked through buyer-seller relationships), and horizontal ones (where firms share a common market, technology or labour force). The approach of *Rosenfeld* (1997 p.10) emphasises joint access to needs by defining an industry cluster as "a geographically bounded concentration of similar, related or complementary businesses, with active channels for business transactions, communications and dialogue, that share specialised infrastructure, labour markets and services, and that are faced with common opportunities and threats". *Jacobs and Man* (1996) emphasises the importance of the settlement of a key player in the region. This core of development may be a University such as Stanford University in California giving rise to Silicon Valley, or a multinational corporation as was the case with the computer manufacturer Apple Corporation in Singapore.

The exact location of industrial clusters may be explained by various factors with the most important determinant being proximity to main export markets, especially in newly developed countries. This explains the spatial structure of Central European electronics and motor vehicle manufacturing clusters – located primarily along the Western border (see figure 3. in chapter 2.3 in this volume). Capital cities and their satellite towns and villages may also attract manufacturing driven by access to concentrated consumer demand and supply of business services. In order to economise on transport, proximity to major means of commerce (motorways, waterways and airports) will also determine the exact location of clusters. However,

there are many individual cases suggesting that personal contacts or pure chance are still important determinants.[8]

Learning about the structure of clusters, determinants of firm location and forces of agglomeration will help to formulate a more effective regional as well as industrial policy. Equipped with such knowledge, economic policy can be tweaked to better serve region-specific needs (be it labour market intervention, infrastructure, adult education, etc.) so that investments become more desirable. Such specific programs are carried out in some US states.[9] However, it is far from clear if state intervention is capable of creating seeds of clusters or if economic policy has the capacity to manage them.

The impact of European Integration

Finally, let us touch upon a topic that has become relevant for the CEE region lately: accession to the European Union and its effect on location choice. Integration of European markets is certainly driving transaction costs down. Most of the tariffs have already disappeared and membership in a customs union finished the process of trade integration. Further, adopting European-wide regulation and standards or facilitating information flow within the bloc will all lower the costs of starting a new business abroad or managing international business contacts.

We should bear in mind that the impact of market integration, just like that of a new motorway, is two-sided. It allows local producers to export more easily to developed markets, but imports will reach less developed regions more cheaply, too. Also, the alteration of transaction costs makes the relationship between geographical advantages and disadvantages shift. Recalling arguments on dynamic impacts and non-linear relationships, we can posit that integration will not have a balanced impact on CEE regions. Some regions will catch up relatively rapidly while others will find it difficult even to keep the present pace of development. The common currency will lower costs of currency risk and also have a twofold impact: on the one hand exporting will be less risky to new members, but on the other hand export oriented production will become even more profitable in those areas. Overall, spatial inequality is likely to rise.

Of course, EU accession will influence the limits of economic policy and alter the capacity to grant investment incentives. Customs-free zones will be abolished, state aid will be supervised and in most cases prohibited by Brussels, and new companies will have to meet stringent environmental regulation.[10]

8 One may just consider the example of Polish and Hungarian expatriates "luring home" firms they work for.

9 *Rosenfeld* (1997) presents the case of two US states, Arizona and Oregon.

10 This point was kindly raised by Györgyi Barta.

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2.2 The influence of location and education on regional inequalities in Hungary

József Nemes-Nagy

Introduction

The pattern of regional development and spatial structure in a country is a function of numerous factors. Former comparative studies have already convincingly confirmed (*Williamson*, 1965) the *dependence* of regional differentiation *on development* – namely that developed countries are more balanced than less developed ones not only concerning social but also with respect to spatial structure.

Although around the turn of the millennium a smaller or greater oscillation is observed in regional inequalities in developed countries (e.g. in members of EU-15), the regional development gap is not anywhere getting wider. Developing countries are strongly differentiated still today – taking either stagnant continents (e.g. Africa) or dynamic regions as an example, regional inequalities are large everywhere (perhaps the best known case is the sharp regional division – coastal vs. inner regions – in China).

There are general factors behind the definite tendency towards regional polarisation in the Hungarian transition process to market economy, and those are primarily *market effects* replacing (downwards) equalising mechanisms of the socialist era (*Nemes Nagy*, 2001). In the international literature, *natural resources* and *environmental conditions* are appearing as locating and dividing factors influencing regional differentiation as frequently as models of *unitary versus federal* government. Along with all these, the most often reviewed groups of factors are beyond doubt the "harder", *material*, *infrastructural* (location, accessibility, traffic and communication) frameworks (*Kulcsárné Kiss – Nagy*, 2003) together with a group of "softer", *human factors* (primarily qualification and education).

Empirical analyses evoke a whole series of *dilemmas* related to methodology and review as well as limitations to research. Almost all conceptual components of analyses (regional *development* as well as *accessibility* or *human capital*) are typically *multidimensional* and *multi-indicatory*, thus the sets of indicators contain plenty of heuristic elements. Also, a basic methodological feature of the question is that relationships may remarkably vary *on different regional levels* (in global, continental or within-country differentiation the weight and role of various factors and mechanisms may differ). The same variability also turns up in the *historical, time* dimension: not only the spatial structure of development itself but its influencing factors change. This is indeed a common case.

In what follows, the main characteristics of the actual spatial structure of development as well as trends shaping regional inequalities in Hungary will

first be presented briefly. Following that we will talk about national accessibility and location conditions together with geographic characteristics of education and qualification. Then the joint impact of the two groups will be discussed through regression analyses of registered unemployment on the level of micro-regions. Finally we present some prospective hypotheses.

Regional differentiation and increasing inequalities in Hungary

Regional inequalities – considering most of the spatially accessible indicators – showed an *increasing* tendency in the last 15 years (*Table 1*). However, at the same time *two periods* are to be definitely separated considering almost all features. In the '90s, the income gap was definitely opening, and in the second half of the decade inequality stagnated at the high level attained. Comparing different regional levels one should note that the most important segment of regional inequalities in Hungary is the Budapest-countryside dualism. This characteristic is responsible for some two thirds of total income inequalities: according to the data of *Table 1*, the ratio of total, settlement level values and the dual value capturing only the difference between the capital and the whole country was 7.1/10.8 = 0.65 in 1988 and 9.3/15.4 = 0.60 in 2001. In addition to this there are further income differences across regions, counties, micro-regions and settlements. The series of indices show that inequalities measured on the level of seven regions or twenty counties are almost completely the same. This indicates that the seven regions are relatively homogenous in terms of income and development, and regional differentiation exhibits county-level differences even more explicitly. The unequal income level of the population in micro-regions and settlements (cities and villages, local centres and their neighbours) adds another 15 per cent to the measure of total inequalities.

Taking another simple example by describing a peculiar space-time process, we can point at the decisive role of the regional dimension in transformation (*Table 2*). Taking income as a special "diffusion process" indicator, it can be determined when a certain city reached a given level of (nominal) income. Out of 256 cities there are seven that reached the HUF 100,000 level of per capita taxable income already in 1990. On the contrary others caught up only at the end of the decade (also seven more cities in 1998–1999). Viewed from a historical perspective, 1992 was the peak year (this also was the year of the highest, over 30 per cent inflation) and by 1994 more than half of the cities passed over the limit value, then the circle broadened year by year. From the viewpoint of special processes, this process is more interesting. In two regions – Central Hungary with the capital inside and the neighbouring Central Transdanubia – every city had already reached the above-mentioned level by 1994, West Transdanubia held off one year and then all other regions followed with a one-year delay. Also in the case

of regions, the peaking year moves clearly between 1992 and 1996 with the "diffusion" wave heading eastwards.

Table 1: The formation of spatial inequalities of taxable income on different regional levels (Robin Hood indices measuring deviation of population and income share, per cent)

Years	Budapest–country (n = 2)	Regions (n = 7)	Counties (n = 20)	Micro-regions (n = 150)	Settlements (n = 3100)
1988	7.1	7.6	7.7	9.1	10.8
1989	7.5	8.1	8.2	9.8	11.7
1990	8.3	8.6	8.7	10.7	12.9
1991	7.5	8.0	8.2	10.6	13.3
1992	9.6	9.3	9.8	12.0	14.8
1993	9.9	9.6	10.2	12.6	15.1
1994	9.9	10.0	10.4	12.9	15.5
1995	9.5	9.7	10.1	12.6	15.2
1996	9.0	10.1	10.3	12.7	15.2
1997	9.3	10.5	10.7	13.2	15.4
1998	9.4	11.0	11.2	13.2	15.5
1999	9.7	11.1	11.2	13.6	15.8
2000	9.3	11.3	11.5	13.5	15.6
2001	9.3	11.1	11.4	13.4	15.4

Source: *PM–APEH database* of settlement level personal income taxes.

Table 2: Space-time process of urban income growth (number of cities by region reaching the level of HUF 100 thousand specific income)

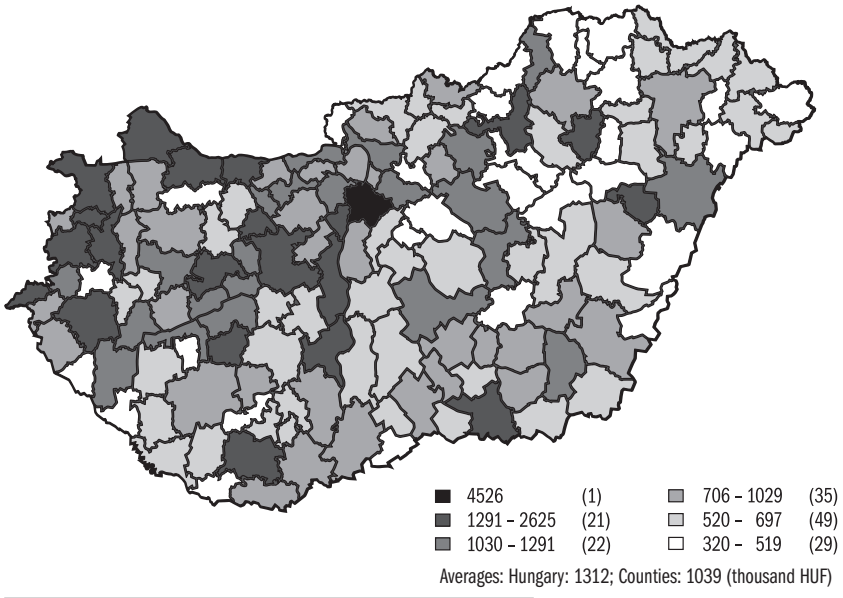
Years	Central Hungary	Central Trans-danubia	West Trans-danubia	South Trans-danubia	North Hungary	North Great Plain	South Great Plain	Total
1990	4	1	0	1	1	0	0	7
1991	2	8	3	3	1	2	1	20
1992	*14*	*13*	*14*	7	9	6	5	*68*
1993	8	2	4	*15*	5	7	7	48
1994	5	6	3	5	*14*	8	9	50
1995			2	2	0	*10*	8	22
1996				1	3	8	*10*	22
1997					1	8	3	12
1998						2	1	3
1999						4	0	4
1990–99	33	30	26	34	34	55	44	256

Source: See Table 1.

Until the beginning or middle of the 90s, polarisation processes created a spatial structure broadly unchanged up to the present. Its major features are the development gaps between the *capital and the country*, the *West-East* differentiation as well as the *mosaic-like* characteristics of *micro region* or

city-village differences. On all these factors settle – only partially modifying the basic scheme – the dynamic lines of *growth axes* connected primarily to previously constructed motorways with a starting point in the capital. Most research found practically the same spatial structures, even if the position of one or two regions was naturally moving. This basic scheme of spatial structure is presented by the multi-indicatory development analyses of the HCSO (*Faluvégi*, 2000), but a similar picture is also given by the micro region level analyses collectively evaluating the income and human resources, educational and health conditions (*Obádovics – Kulcsár*, 2003). Another recent research estimated (*Figure 1*) GDP output per micro-regions (for methodical details, see *Kiss*, 2003).

Figure 1: Spatial structure of estimated per capita GDP in micro-regions, 2000



Source: *Kiss,* 2003, Figure 3.3., p. 52.

Location and accessibility

Good location and favourable accessibility are basic factors of location choice. It plays an important role in running a business owing primarily to transportation costs, but indirectly to other factors as well. Although the "pathless and wireless" communications and connections have undoubtedly an increasing role in a modern global economy, the effect of location does not fade away, especially not in less developed countries, where even traditional contact channels are missing. Examining the influence of location and accessibility on spatial differentiation of economy, three typical interpretations can be separated.

1. The favourable traffic and network connections allow *fast and cost-saving travel and transport*. This approach is represented by traffic maps featuring the lines of the same travelling cost or time (isolines, *isochrones* in the latter case) around a selected or important centre. An extension to this approach is calculating time-distance between all settlements in a greater region – e.g. in a country – and then mapping the averaged values for all settlements. This scheme is presented in *Figure 2.*, which nicely indicates that according to this approach the central zone of the country is in the best position, with the situation becoming worse towards the peripheries.

Figure 2: Accessibility in time on public roads, 2000

Source: *Szalkai,* 2001, Map 5., p. 8.

These maps (similarly to the maps of railroad distances) reflect the radial, Budapest-centred basic structure of the national road- and railway network. This aspect of location and accessibility creates an excellent opportunity to model the effect of network-development conceptions, such as the plans of new roads and railways. A (long-time planned) cross-motorway or railway line detouring the capital would improve primarily the traffic position of peripheral regions in the country (for details see *Szalkai*, 2001).

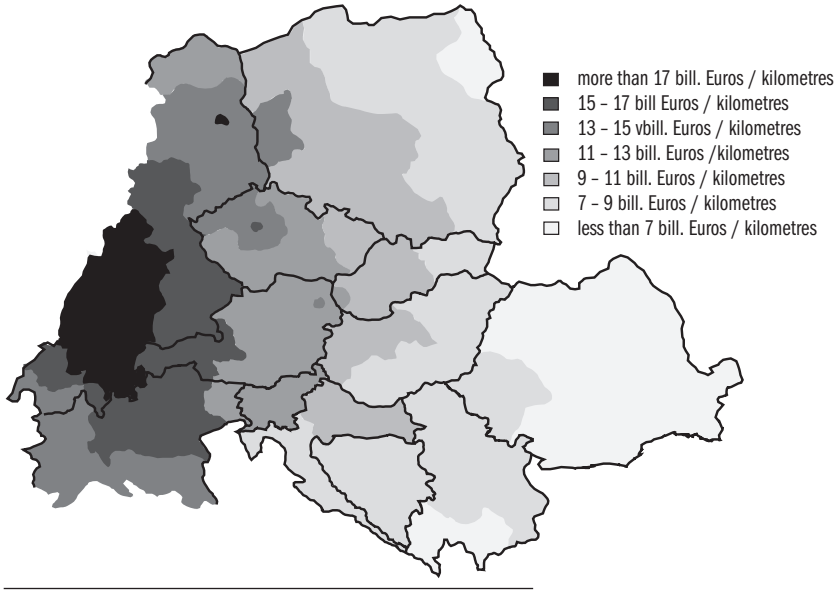
2. A specific feature of the above approach – though also a barrier in analysing wider economic processes – is that it assumes base points (settlements) with equal role and weight. In reality, *the economic, settlement space is far from homogenous*, since it includes smaller or greater populations or economic concentrations. In the regional organisation of the economy however the determining location factor is how near one locates to these. Only models fitting such an approach can give good explanations for the

spatial differentiation of the economy (thus we should hardly wonder that *Figure 2* shows, for example, almost no common feature with the spatial structure of development on *Figure 1*). Describing economic space as a *force field*, a regional experimenting method generally applied also in the international practice of regional analyses (belonging to the model-family called *social physics*) is the *model of regional potential* (*Nemes Nagy*, 1997). This generalises space on the basis of regional or settlement "masses" (usually the number of population, the production value, the absolute volume of GDP) and distances between regions. According to this model, the places and regions in the best position are those that also concentrate *high economic power* themselves and/or *are to be found near to most substantial centres of power*. The market targeted can be accessed from these places in the fastest way and also these places are rich in potential partners for co-operation. This is represented in *Figure 3*, depicting Hungary in a broader Central European space (for methodology and content details see *Tagai*, 2003). The centre-periphery differentiation as a central feature in Europe appears obviously on the map. Starting from the most Western regions of Germany and moving in an East-South-easterly direction, the economic field intensity gradually decreases. Among Hungarian regions it is the North-Western region that has the most favourable position. Spatial processes of the '90s unambiguously confirm that in the new regional differentiation, *proximity to the developed European economic space* had a decisive role (note for example that dynamic development in West Transdanubia originates in no way from the capital).

3. The third approach to the role of location is a certain combination of the above mentioned two theories. Here the focus is on the balance of the role of substantial and highly influencing spatial elements. Among these elements, borders deserve accentuated attention by embodying very strong development and diffusion gaps in many places. The East European transition created a completely new situation in their roles, for example in Hungary, border areas became dynamic zones, although in different measures and "colours", occasionally in different shades of "grey". It can be observed that the different forms of dynamics are the most obvious along the encountering lines ("stairs") of regions strongly *differing* in respect of development and structure. One such area is unambiguously the Western border zone of the country, and the least typical one is the North-Eastern one i.e. the bordering zone with Slovakia, where the adjoining regions of the two countries have approximately the same level of development and are equally struggling with depression. Also the influence of location, which is definitely favourable from an economic point of view, appears in the proximity of main traffic lines (mainly in the neighbourhood of *motorways* being constructed at a snail's pace). Some studies confirmed a dynamism-generating

power of main roads. However, this effect also relies on the fact that these routes exactly connect the (large) cities that are relatively stable anyway. Thus, location effects are combined with factors of settlement structure or urbanisation (*Nemes Nagy – Jakobi – Németh*, 2001, *Tóth*, 2002).

Figure 3: The economic field of force in East Central Europe, 2000



Source: *Tagai,* 2003*,* Figure 3., p. 17.

Differentiation of human capital

In empirical surveys analysing influences of versatile and multidimensional human capital, spatial studies typically should be satisfied with the quantitative indicator of *education*. This appears even with two components in the so-called human development index (*HDI*), a famous synthetic indicator of the UN (*Human Development…*, 2003). The indicator is also reviewed on the regional level in ever more countries. For all synthetic indices such as the different education indicators (average number of school years, share of attendance at different educational levels, share of people with a college degree or illiteracy) are so important, they can not demonstrate the role of finer relationships, subjective human factors or modern social networks. However, a low level of education defines the space in which an activity providing values that meet today's requirements can appear.

In Hungary, the spatial characteristics of education in the 90s are specific exceptions to the general polarising trend. Taking any education level into consideration, disparities are not larger than they were 15 years ago. *Formal education* is one of the spatially most balanced social factors. How-

ever, the so called "*settlement slope*" is a basic differentiating dimension even today: education characteristics are getting worse by moving from greater cities towards smaller villages. In this respect, regional differences are somewhat weaker with several large intellectual centres, university towns showing economic development despite being located in stagnating regions of the country. (*Figure 1.* also supports the notion that these large cities – e.g. Pécs, Szeged, Debrecen – stand out in their region in terms of economic activity, development or income). The indirect influence of the regional dimension – although it cannot be quantified – in most appreciated elements of education and qualification (command of language, computer studies, undertaking skills) shows the advantage of Budapest and the western regions. Also in most dynamic cities (in the capital, and in Győr and Székesfehérvár, which are treated as cities of this kind despite some recent signals of crisis) the diversified, easily convertible skills, the concentrations of efficient management knowledge are all important elements of an urban attracting force as *synergetic* power.

Factors of unemployment differentiation

The joint effects of the two great groups of factors on economic spatial structure can be analysed by regression models. By setting out part of a comprehensive analysis with such an aspect (*Nemes Nagy – Németh*, 2003), the Hungarian characteristics are presented on the level of 150 micro regions.

The dependent variable of the regression model was the estimated unemployment rate of micro regions in the period 1991–2001. Eight indicators were used as explanatory variables. Accessibility or location was described by the average road distance from the western border or Budapest. The human potential was measured by the share of the uneducated and the share of people with a college degree (based on data from the 1990 census, representing initial conditions). Other four indicators take the population-demographic characteristics into consideration (ageing indices with the share of old people and children, as well as ten years average of migrating indices, population density and the number of the urban population in 2000). As for the calculations, the so-called *backward elimination* method was applied in regression analysis. In order to illustrate the weight of the explanatory variable the so-called *beta parameters* are presented here: the greater their absolute value, the more important the role the given explanatory variable has in shaping unemployment, while the sign of the parameter indicates the direction of influence. The variables taken into account explain spatial differences of unemployment to a notable extent (the *determination coefficient,* R^2 varies between 0.65–0.8, which is considered to be high in cross-section analyses).

Our results show that until the middle of the decade the regional inequalities of unemployment on the micro-region level were mostly explained by the distance from the Western border, namely this "new" socio-economic feature was already strongly regionalised at the moment of appearance (*Table 3*) Beside the West-East division, however, the variable representing the lack of intellectual capital and also the share of uneducated persons became similarly important at this time in shaping regional inequalities. Namely, the farther away a micro region from the Western border and the higher the rate of uneducated people, the higher the unemployment in the region. The share of urban citizens and people with a college degree are significant variables in our model with an influencing force still high at the beginning of the decade, although weakening slowly of late. The standardised betas of both variables had a negative sign, therefore both a greater share of highly-qualified people and urban citizens are likely to reduce the average unemployment of a micro region.

Table 3: Regression analysis of factors influencing unemployment in micro-regions

Explanatory variables	Standardised regression parameters of the significant variables										
	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Distance from western border	0.475	0.373	0.445	0.384	0.375	0.330	0.317	0.364	0.347	0.356	0.328
Share of uneducated persons	0.138	0.328	0.288	0.233	0.248	0.313	0.358	0.325	0.332	0.334	0.398
Share of high level graduated persons		-0.160	-0.206	-0.303	-0.231	-0.184	-0.093	-0.119	-0.107	-0.109	-0.146
Aging index	-0.176	-0.100	-0.122	-0.117	-0.162	-0.170	-0.140	-0.117	-0.089	-0.109	-0.117
Share of urban citizens	-0.251	-0.174	-0.137		-0.136	-0.171	-0.155	-0.117	-0.141	-0.122	
Migration balance	-0.234	-0.289	-0.230	-0.225	-0.257	-0.275	-0.289	-0.281	-0.283	-0.282	-0.258
Distance from Budapest		-0.198	-0.169								
Population density					0.084	0.089					
R^2	0.664	0.704	0.737	0.745	0.777	0.808	0.797	0.796	0.780	0.790	0.775
Adjusted R^2	0.652	0.689	0.724	0.736	0.766	0.799	0.788	0.788	0.771	0.781	0.766
Standard error	1.963	3.791	4.802	4.143	3.735	3.355	3.609	3.745	3.727	3.902	4.057

Source: *Nemes Nagy – Németh,* 2003, Table M1., p.48.

Two further demographic features are strongly connected to these factors both in context and impact: the migration balance as well as the ageing index. Both of them have unemployment-reducing effects. Considering its importance and influencing force, the migration balance is more relevant: beside the presence of uneducated population and the position in a West-East relation system, this variable has the greatest influence on regional heterogeneity of unemployment. On the one hand, the higher the migration gain in a micro-region, probably the lower the unemployment rate is of the given area. On the other hand, the ageing index has the opposite influence. This is not surprising: we have also hypothetically expected that the younger the age structure the population has, the smaller the problem of unemployment is in a micro region. Overall, results indicate that mi-

cro-regions having a more urbanised, educated population as well as more central functions were more able to cope with employment problems of the transition. Among them, regions with fast and easy access from the western border excel the most: the economy had the opportunity to switch quickly to the new system here, and also capital investment was tending to favour these areas the most.

Conclusion

Assuming that macro-regional traffic and communication networks will be broadened in the coming years, it can be expected that *human capital, education* and innovation skills will be even more decisive factors of regional development in Hungary.

The evolution of the nearly similar location and accessibility conditions may improve the use of the intellectual potential of the Eastern part of the country, and the international economic relationships in an Eastern or Southern direction may also have dynamism-generating effects. This does not mean that *location* is not a space-shaping factor any longer, but mostly only in local structures, and it would serve less and less as a source of strong macro-regional disadvantages.

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2.3 Spatial processes of Hungarian industry

György Barta

Slowing spatial differentiation

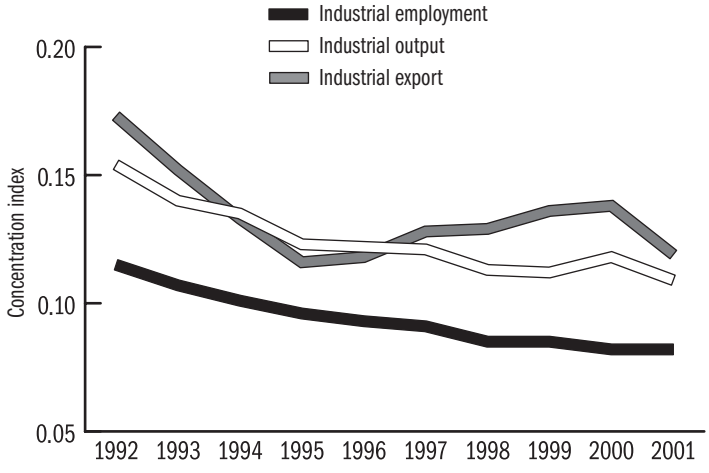
The role of industry in economic modernisation and particularly in economic growth has been greater in Hungary than in most Central and Eastern European countries. An important feature of the Hungarian economy is that industry remained its major driving force after 1990 as well. Manufacturing attracted the bulk of foreign direct investment, primarily in the first half of the '90s and has gone through a remarkable progress that is often considered to be one of the success stories of the transition. Two key developments have shaped the spatial structure of industry during this period: a dynamic growth of manufacturing industry and an ever increasing spatial inequality of production.

Differentiation of the spatial structure has been quite vigorous in Hungary. The West-East slope got steeper and also more determinant to inequality than the economic differentiation between the North and the South. According to the level of development and economic dynamism three major regions emerged: (i) dynamically developing North-West Hungary and greater Budapest, (ii) Northern and North-East Hungary, facing a deep recession of former heavy industries (including energy production) and a crisis in agriculture; and (iii) Southern Hungary, where slow and unbalanced modernisation has been taking place (*Beluszky* 2000).

Industry is the engine of economic development in the countryside. Despite the fact that the service sector has become dominant in the whole country with over a 50 per cent share in output and employment, there exists a strong correlation between the spatial share of industrial GDP and economic development of rural regions. The decreasing relative weight of Budapest in the country's industry – mainly in employment but also in industrial production and sales – fostered spatial equalisation (with the exception of exporting activity). As for the economy of the countryside, the spatial structure of industry has moved in the direction of more differentiation at the same time (*Figure 1 and 2*).

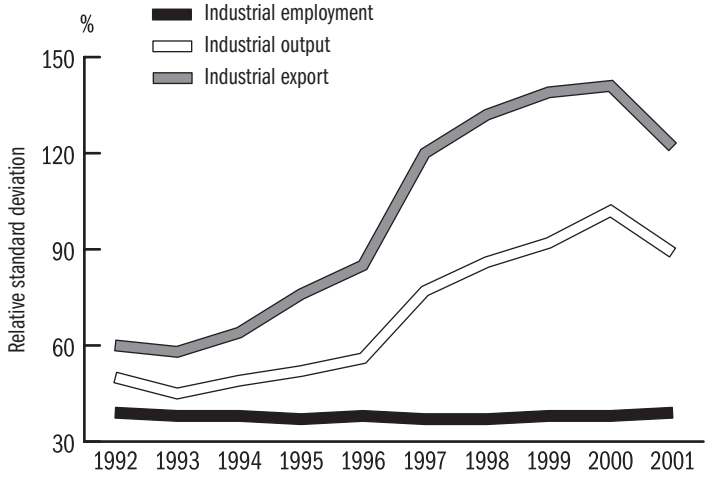
By the year 2000 regional differences in industry had significantly decreased in terms of employment, sales or exports, mainly as a result of an industrial decline in Budapest. As far as geographical features of production in the countryside are concerned, differentiation has also stalled due to a slowdown within the Northern Transdanubian area. There is no doubt that this process is undesirable both for national and regional development, since "the engine pulls with less power".

Figure 1: County level inequalities, shown by major indicators of Hungarian industry, headquarter level data (according to concentration index)



Source: *Statistical yearbooks of counties, HCSO, 1992–2001.*

Figure 2: County level inequalities as shown by major indicators of Hungarian industry, headquarter data (according to relative standard deviation)



Source: *Statistical yearbooks of counties, HCSO, 1992–2001.*

This chapter deals with two issues. First, we analyse how dynamic development and spatial differentiation of industry appeared at the firm level and what circumstances were motivating location decisions and spatial relationships among firms. Second, we discuss the development of new industrial areas as well as the concentration patterns of manufacturing.

New aspects of choosing location

The number of firms in industry has multiplied twentyfold since 1990. Privatisation and restructuring led to the disintegration of large enterprises. Some having changed profiles, reduced scales of production and altered the organisational structure thereby managing to adapt to the market economy. However, the majority of industrial firms of the '90s were actually newly established ones. Both our empirical results from analysing enterprises with more than one location and surveys of the industrial zones of Budapest suggest that approximately 20–25 per cent of the firms were able to survive the transition with greater or lesser changes. Accordingly, most of the currently active firms are new ones. Consequently, tens of thousands of industrial firms must have searched for a location in the '90s (*Barta* 2002).

Enterprises take various aspects into consideration when choosing a location. We grouped industrial firms according to the fashion of location choice. Primary factors yielding differentiation of these enterprise groups were size and ownership (foreign or domestic). Structural features were found to be less important. Accordingly, three groups of enterprises emerged:

- medium and large-sized foreign companies and their suppliers (foreign and domestic);
- large-sized domestic companies mainly with a network of small and medium-sized domestic suppliers;
- small and medium-sized companies – largely with domestic ownership.

In what follows we turn our attention to the first group since these enterprises had the most significant influence on altering the spatial structure of industry in the last decade.

There are two key aspects motivating foreign companies in choosing location: access to markets and production factors and favourable costs (*Quévit – Dicken*, 1994; and see chapters 2.1 and 2.4 in this volume). Foreign companies choose the *country* at first based on macroeconomic indicators, stability and business environment along with investment incentives (*Koltay*, 2003). Good access to markets is almost always a factor, the costs of production factors are mostly "country related" categories. Choosing a location *within the country* is in turn influenced by accessibility to production factors.

The list of regions attracting the most foreign direct investment in Hungary has hardly changed for the last decade. More than 80 per cent of FDI is concentrated in the Budapest agglomeration and in the Northern Transdanubia region. For foreign firms when choosing location the *geographical location and geopolitical position of the region* are both decisive factors. The areas close to the Western border and Budapest were favoured among for-

eign companies since this area has been part of an approximately 500km-wide zone along the EU-15 border that became attached to the Western European economic space. (This notion is supported by the geographical pattern of the contractual electronic firms of transnational companies presented on *Figure* 3.) In previous years, newly established foreign companies selected a location in this area even when signs of unsatisfied production factor (qualified labour) demand emerged. All of the four newly established car factories (Audi, Suzuki, Ford and Opel) settled in the North-Western part of the country, and three of these chose a location just 60–80 km away from the capital city. Also the majority of the supplier firms in the vehicle industry are situated in the North-Northwest of Hungary and the agglomeration around Budapest (*Figure* 4).

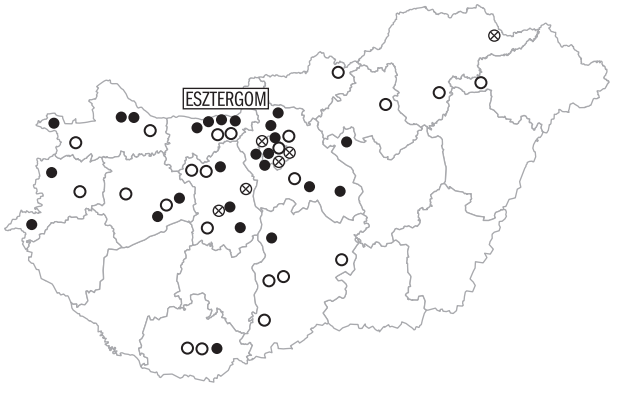
Figure 3: Contractual electronic manufacturing firms in Central and Eastern Europe, 2001

Source: *Kalotay*, 2003, table 3., pp. 46–48.

Improved accessibility of production centres and distribution hubs and a modernised transportation infrastructure will both lend the region an even more favourable position with its borders being pushed further away. According to some empirical studies, the incentive effects of motorways on the economy are perceptible in a 20–25 km zone adjacent to the actual motorway. Such an area would attract both new capital and a labour force and generate a multiplicative effect on economic development in the country

(*Bartha – Klauber*, 2000). This explains why Northern Transdanubia and Budapest being accessible via motorways, were so often chosen by foreign companies. It was also helped a lot by the fact that a new motorway route between these regions and Austria was speedily constructed

Figure 4: Shift in the supplier network of Suzuki between 1994 and 2000



Source: Collection of *Kovács, R.* and *Barta, Gy*.

Foreign companies employed the *younger and more qualified than average* labour and paid higher wages than state-owned companies (*Fazekas – Köllő*, 1998). This wage-difference can be partly explained by the age, gender and education composition of employees with higher productivity also being an important factor. The educational level of the population was higher in Budapest and Northern Transdanubia and consequently, this factor strengthened the spatial attractiveness of the area.

Further important determinants of location choice include *an already well developed local economy, an economic structure with an emphasis on manufacturing industry and traditions* and experience *in machinery production*. During the transition, Northern Transdanubia and Budapest were hurt less than other regions by the economic crisis and the recovery was also faster in this area. The local and the regional impact of *economic policy initiatives* are perhaps less important. The majority of customs-free zones were evidently concentrated in this region but regional concentration of firms was rather a result of individual corporate decisions. Surveys proved that the local corporate tax played no decisive role in attracting FDI or in creating jobs (*Keresztély – Gimesi*, 1999).

Agglomeration, networking, clusters in Hungarian industry

The long process of the evolution of industrial zones begins with the settlement of various companies in close proximity to each other (within a region). Agglomeration forces come into play, the local economy devel-

ops through new investment and jobs are created. This opens up the way for the formation of industrial cultures and the improvement of the living conditions of the region's population. The located companies are able to develop and integrate into the regional economy when the activities of economic agents become interrelated. These linkages then become stronger and become organised into *networks*. Geographic proximity is key to the evolution of networks. Networking can create clusters, complex systems of linkages among economic actors that provide various advantages of co-operation and competition for its participants. A continuous process can be captured here, starting with agglomeration forces and yielding at first networks and finally clusters. This process is not just long winding but its steps are interrelated and built on each other. Accordingly, no phase of this development process can be missed out. Clusters do not appear out of the blue. Networks and cluster initiatives have already occasionally emerged in the Hungarian economy but only in developed regions of the country. Elsewhere in Hungary, agglomeration forces have just appeared. There are several explanations for this.

During the socialist era, multi-locational companies dominated the economy, especially in industry. Company divisions were often concentrated in county-sized regions, and production sites were connected only to distant company headquarters, but not to each other. Division of labour or some sort of co-operation failed to evolve among plants of different companies. With the disintegration of large socialist (state-owned) companies, even these poor linkages within large firms disappeared.

Foreign companies entering Hungary after the political transformation found it hard to integrate into the Hungarian economy due primarily to significant differences in development and access to capital and productivity between foreign and domestic companies. As a result a dual economy evolved hampering the formation of economic districts.

Hungarian regional development policy provided no clear support for the evolution of industrial districts. On the one hand, the government's regional policy aims at reducing spatial inequality and thus, supports underdeveloped regions the most. On the other hand the development of economic zones is in contrast with the aims of spatial decentralisation and deconcentration. (This contradiction may at most be resolved by some sort of a concentrated decentralisation.) It is not by chance that before 1996 guidelines for special industrial zone construction were not put in force and the first programs for cluster-development were formulated at governmental level only in 2000.

The concentration of small and medium-sized companies in large cities

A large proportion of small and medium-sized companies meet public demand, providing services or work as a subcontractor for other firms. Cities, particularly bigger cities offer not only larger markets or a greater number of orders, but also conditions that are indispensable for operating enterprises (such as a large labour market, wide range of services, an abundance of and accessibility to information).

The measure of urban concentration of firms follows roughly the hierarchy of settlements. The enterprise-attracting ability of cities corresponds to the size and traditions of the city and regional specialities in the networks of settlements. As far as *firm density* (number of enterprises per capita) is concerned, Hungary is broken up into two parts along the Balassagyarmat-Békéscsaba line. Firm density is in connection with the economic development and dynamism of regions, as well as the specific structure of sectors. Since a large part of the small- and medium-sized companies are connected to real estate businesses, commerce, industry and construction, they have a strong presence in regions with a developed economy or tourism as well as in large cities.

Industrial clusters around larger companies

In Hungary the automotive industry offers the best example for agglomeration. There was no car manufacturing in Hungary before 1990, so it was multinational firms that established the first companies in this industry. The vehicle industry has become a crucial sector of the Hungarian economy for a decade. Approximately a hundred and fifty vehicle manufacturing firms have located in the small or large cities of Northern Transdanubia and the agglomeration area of Budapest. The most important centres are Győr, Budapest, Szentgotthárd and Esztergom but 40–45 settlements have also attracted companies operating in the vehicle industry.

Despite the multinational presence, supplier activity still stands at a rather low level. A supplier pyramid with four levels has been created with foreign car factories at the top. At the second level there are mainly foreign suppliers along with Hungarian integrator companies (Rába Rt., Imag-Ikarus etc.) and the third level is for the suppliers to the second level (mostly Hungarian medium and large companies: Bakony Művek Rt., MMG Automatikai Művek, Salgoglas Rt., etc.). We find small Hungarian companies at the bottom of the pyramid. Overall, the Hungarian supplier rate of foreign companies is remarkably low reaching just 10–20 per cent and in the case of multinational companies does not even exceed 10 per cent (*Kopasz*, 2001). The rate of domestic suppliers is hardly changing and in many cases, is even decreasing – by the emergence and settlement of foreign supplier networks.

The key exception is Suzuki, a Japanese car manufacturer that has created a wide supplier network. This is primarily due to the fact that Suzuki as a Hungarian car can only be exported to the EU if the Hungarian value added reaches the 50 per cent threshold with another 10 per cent being the supplier rate of the EU. To let the Hungarian suppliers attain this high rate, Suzuki provided notable help in transferring technology, acquiring and improving the machine stock and financing production. In recent years the number of suppliers has increased with the majority of the new suppliers coming from the agglomeration area of Budapest and the Northwestern part of the country (*Figure* 4).

Industrial parks, enterprise zones

In developed countries industrial parks were established *en masse* in the 1970s as a result of disintegration of Fordist multi-functional production structures in manufacturing. Masses of small- and medium-sized companies were searching for customers and an opportunity to become suppliers of large companies and to become active on the markets of large cities. Location choice was rather spontaneous but it gave rise to industrial parks in dynamic regions of the economy. New streams of urban development – the disintegration of urban functions in space – also assisted the evolution of industrial parks in suburban areas, where better conditions with lower prices were created for a modern economy.

The first industrial parks emerged in the first half of the 1990s in Hungary, as a result of the efforts of local governments and companies alike – for example in the cities of Győr and Székesfehérvár. At the governmental level, the plan for creating industrial parks appeared in 1996, yielding a steady rise in the number of industrial parks registered in Hungary (28 in 1997, 75 in 1998, 112 in 1999 and 145 in 2001). Nevertheless, a survey conducted in 2000 (*Laky*, 2000) reports that the number of industrial parks complying with the necessary conditions (at least 10 enterprises and 500 jobs created in the first five years) is only 20–25. Moreover, in most cases some companies were already operating on the actual location before creating the industrial park itself. Thus, the great and increasing number of industrial parks does not imply any accelerated spatial agglomeration of industry for the present. (Official figures should either be taken as tweaking statistical data or a desperate attempt by local governments to get access to all attainable state grants). At the moment numerous and evenly dispersed industrial parks in the country serve neither qualitative aim of economic development nor guidelines of regional development aiming at spatial equalisation. The plan for increasing the number of industrial parks at a rapid pace (250 industrial parks prior to 2010) or to build up networks among them is just too ambitious.

As for the plans set by enterprise zones, even less success can be found. In the second half of the 1990s, 11 zones were designated in Hungary – most of them in border regions or in areas that were lagging behind. Enterprise zones are designated areas created in order to develop the region with specific financial support schemes aimed at expanding production and services. For various reasons (underdeveloped economy, weak firm activity, low level of investment, as well as small and poorly organised state subsidies etc.) economic development has not accelerated in these regions: only two out of 11 such zones (the region of Záhony and the Zala Regional Zone) showed any results.

Cluster building

Clusters are spontaneous organisations with a bottom-up structure that were set up by agglomeration economies and co-operation among enterprises in geographical proximity. Spontaneous development created "cluster-embryos" at most, such as the one in Budapest on Óbuda, formerly "Shipyard" Island. (However, it seems that it was not able to fend off powerful investors.)

The encouragement of creating clusters by external devices lays within the remit of regional development policy. Indeed, the Pannon Automotive Industrial Cluster (PANAC) was established by the assistance of the Ministry of Economy in 2000 with the involvement of banks, large car manufacturers, a few suppliers and the West Transdanubian Regional Development Agency. PANAC was followed by other artificially created clusters in tourism, wood-work industry etc., but almost only in developed regions of the country. However, these clusters hardly presented any results: their organisation remained one-sided, the production co-operation hardly increasing over the past few years.

There are lots of unanswered questions in connection with the constructing of clusters. It is doubtful whether the Hungarian economy has achieved the phase of development that allows for cluster construction. Experts had also to question in the case of other countries if it is possible at all to substantially accelerate a bottom-up process by external supports.

New spatial structure of industry

Altering regional scales

Industry used to be fairly spread out in space, but regional differentiation has altered its structure. The three regions most developed industrially in the country – West and Central Transdanubia and the agglomeration area of Budapest – were producing two thirds of the industrial GDP in 2000. Regions of Southern Transdanubia, the Northern Great Plain and the Southern Great Plain contributed to industrial GDP by approximately 8

per cent each. This is barely exceeded by the output of the North Hungarian region, having suffered the greatest loss during transition, (*Table 1*).

Table 1: Regional division of industrial production

Region	1980 Adjusted national income	2000 Industrial GDP
West Transdanubia	9.8	17.4
Central Transdanubia	16.5	18.2
Central Hungary	30.6	29.4
South Transdanubia	7.4	7.1
North Hungary	17.9	10.3
North Great Plain	8.9	8.6
South Great Plain	9.2	8.7
Total	100.0	100.0

Source: *Regional Statistical Yearbook, 2000*. HCSO 2001, *Budapest; Regional Statistical Yearbook*. HCSO 1981, Budapest.

Regional division of industrial sectors

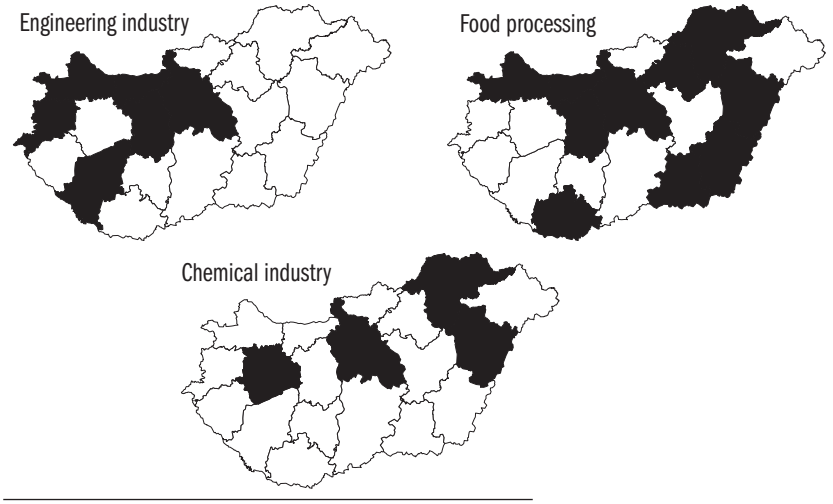
The sectoral structure of industry has radically changed over the last 10–12 years. The output in mining shrank to one third of its output a decade ago and production in textile and wearing apparel industries reached just two thirds of the 1990 level. Production in other sectors (the food industry, chemical industry, industry of non-metallic mineral products, metallurgy, electric energy industry) have also failed to reach their 1990 level. However, all these industries but mining have already passed through the worst period. In sharp contrast with traditional sectors, output in machinery equipment has risen more than fivefold since 1990. As for other branches, the wood, paper and printing industry managed to increase its share within industry (bar machinery) mainly due to the good performance of the printing industry.

The industrial structure of manufacturing is dominated by machinery (42 per cent), which, along with the food industry (15 per cent) and the chemical industry (14 per cent) provided almost three quarters of industrial production in 2001. As a result of differences in work intensity and productivity, shares of employment are somewhat different from shares of production. Accordingly, the above mentioned three sectors account for 59 per cent of employment. There are significant changes in the spatial location of industry, too.

Machinery, the chemical industry, the manufacture of metal products and the wood, paper and printing industries are highly concentrated in space. Sectors drawing on natural resources and raw materials in Hungary, such as food, textile and wearing apparel and non-metallic mineral industries are dispersed. The regional allocation of industrial sectors has altered over the years: machinery is now spread out more evenly in North

Transdanubia and the agglomeration area of Budapest as counties such as Komárom and Vas caught up with Budapest, Fejér and Győr-Moson-Sopron. Furthermore, Pest and Somogy joined the counties above as locations of machinery production. As opposed to this dispersion the spatial concentration of the food industry has been prevalent of late with 12 counties producing 84 per cent of the output compared with just 75 per cent three years ago. (*Figure 5*).

Figure 5: Regional structure of industrial sectors in 2001 (counties producing 83–88 per cent of production value)



Source: *Regional Statistical Yearbook, 2001*. HCSO

A majority of counties feature only a few dominant industries. A more diversified structure with considerable production in various sectors can only be found in Budapest and three counties: Pest, Győr-Moson-Sopron and Borsod-Abaúj-Zemplén. In various areas of the country, there is no notable industrial activity at all. Production districts are taking shape in some industrial sectors, such as machinery in Northern Transdanubia, the chemical industry in the agglomeration area of Budapest and Borsod-Abaúj-Zemplén and wood, paper and printing industries in the agglomeration area of Budapest.

The structure of Hungarian industry – compared with its former complexity – became even more one-sided. Machinery plays a dominant role in the new structure. This can be regarded as a positive change not just because of its progressive nature, but also because this structure better suits the circumstances of the country. On the one hand, machinery is already an industry complex in itself (the production of machines, equipment, the electronic industry, precision engineering and the vehicle industry form the

greatest part of the machinery industry in Hungary). On the other hand it contributes to the overall development of Hungarian industry by enhancing general productivity. Unfortunately, the spatial structure of industry moved to be less favourable. Not only did the spatial differentiation of development become strong, but industrial areas of various regions became impoverished and undiversified.

Industrial spaces, industrial concentrations and regional centres

Industrial zones and clusters as such have not yet evolved in Hungary and what we call industrial spaces are essentially spatial agglomerations of industry. These areas of concentrated activity include not only great city-centres but also smaller settlements in their area of agglomeration. Four spatial areas of industrial concentrations can be found – primarily on the basis of the scale of industrial concentrations – covering basically the whole Hungarian industry. These areas represent different types of industrial concentrations at the same time: the traditional (old-style) industrial cities, concentrations around large cities, the agglomeration of Budapest and the contiguous industrial region of Northern Transdanubia. Manufacturing companies, settled in cities belonging to these four types of structure, are responsible for two thirds of the manufacturing equity in Hungary. Furthermore, these firms are responsible for three quarters of the industrial exports (30 per cent from the agglomeration of Budapest, nearly 40 per cent from the cities of Northern Transdanubia; from another perspective, 60 per cent stems from the regional centres – including Budapest).

Traditional or *"survivor" industrial cities* include small and medium sized cities with an economy built on industrial monoculture that has still remained typical up to the present. The number of these cities is about two dozen including industrial towns that used to be the stronghold of communist industrialisation. Over the past few years, the number of such towns declined with the most important ones at the moment including Dunaújváros, Tiszaújváros, Kazincbarcika, Paks and Százhalombatta. Some of the towns have successfully pursued reforms after the political transformation mainly owing to their thriving industry (particularly in chemicals). Economic diversification of these cities is unfortunately not typical even today, but the reorganisation of some major companies, successful privatisation and investment mainly from foreign sources have strengthened the economic position of these cities. However, most of the traditional industrial cities had to face decline and atrophy (especially cities where key industries were mining and metallurgy).

Large cities are preferred areas of economy and industry. The industry of large cities incorporates many key elements of the economy: modern services, headquarters of big firms and often manufacturing production is lo-

cated in cities to make use of the labour pool, the proximity of business partners and a large consumer market. Moreover, it can be posited that the majority of small and medium-sized companies are concentrated in large cities. Two thirds of all firms are concentrated in county towns, of which more than 40 per cent may be found in Budapest alone. The largest cities play a role in concentrating enterprises in the region in the same way as Budapest does in the country. Debrecen has attracted nearly 70 per cent of firms in Hajdú-Bihar county, Szeged has two thirds of all those in Csongrád county, Pécs has 64 per cent of the firms of Baranya. The capability of attracting firms is somewhat weaker in Győr and Miskolc (since other important centres are operating in the respective regions, too). A strong relationship can be detected between size, competitiveness and the industrial and economic opportunities of cities. Large cities also attract most of the foreign direct investment, too. In 2000, investment into the 15 "most competitive" cities reached more than 70 per cent of all investment in the country (and this share is seen rising through time).

North Transdanubia. In comparison with other Hungarian regions, the economy developed dynamically in the four counties of North Transdanubia during the early nineties. Several key regional characteristic features of economic development emerged that are completely missing or not present at the same level or quality elsewhere. Among the favourable circumstances of economic development, a beneficial geopolitical, geographical position (namely the direct and strong economic linkage with the agglomeration of Budapest and with the Central European region), developed infrastructure and qualified labour pool related to manufacturing traditions should be emphasized. It should also be mentioned that this region has continuously benefited from central and local government incentives.

Foreign capital has been a decisive factor in investment since 1989. Investment was concentrated in manufacturing, more specifically, in machinery. Green-field investments brought in modern industries (vehicle industry and partly the electronic industry) that proved to be a driver for industry as a whole.

The economic evolution of the last 12 years has created new advantages in the region and a new economic structure has emerged. Recent tendencies imply that an industrial district is taking shape in the region covering ever more settlements. Note that 21–22 cities of the region already belong to the top 50 cities of the country in terms of the value of exports, and of the top five cities – Győr, Székesfehérvár, Szentgotthárd, Szombathely and Esztergom are responsible for more than 40 per cent of the county's exports. It makes the formation of industrial districts more difficult that local connections among companies are poor (first of all between large foreign

companies and domestically owned small and medium-sized companies) and the local diffusion of innovation is rather slow.

In the *agglomeration area of Budapest,* a complex set of developments are characterising industrial transformation. Although robust deindustrialisation is taking place in the capital, it is still the largest industrial concentration of the country with employment in industry reaching 100 thousand. Among the three key sectors – chemical industry, machinery and the food industry – machinery has been developing the most. Also the decisive role of Budapest is becoming stronger in the economy and industry. An effective division of labour is emerging between the agglomeration area of Budapest and the region of Northern Transdanubia. Multinational industrial companies located in North Transdanubia are consumers of the modern services of Budapest. The region of North Transdanubia and the agglomeration area of Budapest are transforming more and more into one continuous area that is part of a dynamically developing international region (a strip of some 500km) connected to the Western European economic space.

Regional centres of industry. In the last 10–12 years the competitiveness of regions and cities was measured mostly by the ability to attract capital from external sources. Successful regional strategies these days focus on attracting foreign capital, international tourism or gaining state sources. The ability to attract investment is well represented by the *concentration of medium and large-size companies in a settlement*. According to this, the key centres are:

- Budapest (in a leading position).
- Győr (having emerged as winner from a group of five, so called "counter-pole" after the political transformation).
- The group of county seats, along with Budaörs and Dunaújváros.
- Some medium sized cities in the agglomeration of Budapest: Budaörs, Gödöllő and Vác.
- Cities located in a 60–80 km neighbourhood around Budapest: Cegléd, Esztergom, Gyöngyös, Jászberény, Tata, Tatabánya.
- Old and new industrial cities apart from Dunaújváros: Tiszaújváros, Salgótarján, Ajka, Kazincbarcika, Orosháza, Esztergom, Mosonmagyaróvár.

The concentration of the headquarters of large companies in large cities functioning as regional-centres is strengthening these settlements. Budapest, Győr, Székesfehérvár, Szeged and Debrecen play such a role. One third of the large industrial companies (from the Top 100) have headquarters in Budapest, another third in the North Transdanubian region, followed by the Great Plain region with only a 20 per cent share. In Northern Hungary, which used to be a leading centre of industry in the eighties, there is no such outstanding centre at the moment.

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2.4 Spatial concentration of domestic and foreign investment enterprises in Hungary*

Károly Fazekas

Introduction

Large scale dispersion, polarisation and rank stability of regions in terms of their labour market performance is not a unique feature of Hungary or other transitional economies. A series of empirical studies revealed that the variation in unemployment or employment rates between regions within countries was considerably greater than disparities between countries and there was a tendency towards polarisation in the '90s. (*Taylor and Bradley* 1997, *Padoa Schioppa Kostoris* 1999, *Overman and Puga* 1999, 2002) Dispersion and polarisation are driven by changes in the spatial distribution of the labour force (demographic trends, migration patterns, participation decisions) or changes in the spatial distribution of employment.[11] Theoretical considerations of the *New Economic Geography* (*Fujita – Krugman – Venables*, 1999) and empirical studies (*Overman and Puga* 1999, *FKPS* 2002, *Suedekum* 2004) revealed that the polarisation of local labour markets (LLM) is mainly the result of employment changes as a consequence of agglomeration forces in economies (see also Chapter 2.1 on this).

Because of data constraints at the level of local labour markets most of the empirical studies on the spatial pattern of job creation deal with the NUTS-2 or NUTS-3 level of regions. One of the rare exceptions is the paper of *Peri and Cunat* (2001). They investigated the geographical determinants of job creation at the level of LLM in Italy between 1981–1996. They found that local agglomeration economies, in particular input-output linkages, social characteristics and the development of the local infrastructure were the most important determinants of the employment growth across Italian local labour markets.

Empirical evidence on the regional evolution of CEE labour markets shows similar scenarios. Increasing regional differences and polarisation are mainly determined by the changing spatial distribution of jobs on the labour market.[12] One of the main reasons for the dramatic change in the spatial distribution of firms and jobs in CEE countries lies, of course, in the different spatial allocation preferences of firms operating in a socialist planned economy and in a market economy. It is well known that full employment and scarcity of labour are the main features of the socialist regimes. (*Kornai* 1980) In the case of Hungary labour demand was evenly distributed across skill structures and across local labour markets. Increasing scarcity of labour had encouraged firms to establish affiliates even in the less developed regions where labour (although less educated) was available. In the first three years after the collapse of the socialist economy approxi-

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11 *Elhorst* (2003) provides an integrated overview of theoretical and empirical explanations used in applied literature on regional unemployment differentials.

12 As in other CEE countries internal migration flows have remained at a very low level in Hungary (*Burda and Profit* 1996, *Fidrmuc* 2001, *Rutkowski* 2001, *Kertesi and Köllő* 2001, *Cseres–Gergely* 2004) Using aggregate in and out migration data by settlements, *Kertesi* (2000) has proved that migration behaviour reacts to economic incentives. Regions with high unemployment rates have suffered substantial migration losses while those with a low level of unemployment had migration gains. The magnitude of this effect, however, is modest and likely to remain so in the near future. According to Kertesi's calculation even migration of a considerably higher level than the current figures would not lead to a sufficient narrowing of the regional unemployment rate differentials in the near future.

mately 1.5 million jobs (more than 30 per cent of the total) disappeared in Hungary. The high intensity of job destruction was then accompanied by dynamic job creation in the following years of recovery. (*Kőrösi* 2003) Research results show invariably that while the intensity of job destruction portrays an equal regional distribution, the intensity of job creation follows an uneven spatial pattern. (*Nemes-Nagy* 2000, 2001)

An important factor behind the changing location preferences of firms is the massive inflow of foreign direct investment and the fast increase of foreign firms' employment during the 90's. The sudden collapse of the socialist system offered a great opportunity for the CEE countries to attract a huge amount of FDI in a short period of time. These countries had a number of industrial regions where relatively cheap and highly qualified labour was available. From the host countries' point of view, foreign investments are assumed to play a crucial role in economic restructuring (*Barrell and Holland*, 2000, 2001). Foreign capital can decisively promote the economic restructuring of local economies through the provision of capital, modern technologies and work organisation practices. It is also a means for integration into the global economy and could provide positive spillovers of know-how for domestic firms in the region (*Schoors and van der Tol* 2001, *Sgard* 2001, *Günther* 2002, *Konings* 2000).

Table 1: Characteristics of foreign owned enterprises (FEs) in the corporate sector (All enterprises = 100%)

	FEs total	100% foreign ownership	Majority foreign ownership	Majority domestic ownership
Shares of FEs in the corporate sector				
Number of enterprises	8.1	5.4	1.6	1.2
Paid in capital	52.8	23.5	21.6	7.6
Value added	43.3	22.6	15.2	5.5
Net sales	46.8	25.9	14.7	6.2
Employees	25.0	13.9	8.2	2.9
Exports	83.0	n.a.	n.a.	n.a.
Average of FEs compared to the average of the corporate sector				
Value added/employees	173.4	163.2	185.2	188.3
Net sales/employees	187.5	187.1	179.8	211.0
Gross wages/employees	157.2	155.9	159.5	157.3

Note: Financial sector excluded.
Source: *HCSO* (2004).

Hungary has been quite successful in attracting FDI for the last ten years and several studies confirmed that FDI was the leading factor in the economic success of the recent years. (*Nemes-Nagy* 2000, 2001, Mickiewicz 2000) In 2002, 8.1 per cent of all Hungarian firms were foreign-owned en-

terprises (FE), together employing 25 per cent of the corporate sector. FEs were responsible for 46.8 per cent of net sales, 43.3 per cent of the value added and 83 per cent of net exports in the corporate sector (*HCSO* 2004). A large inflow of foreign FDI had a great impact on the labour market. During the years of post-transition economic recovery (1993–2002), corporate sector employment increased by 22 per cent, while more than two thirds of net job creation took place within the group of foreign enterprises.

The Core-Periphery concept used by the *New Economic Geography* models suggests that, in the presence of increasing returns and in the absence of congestion, local externalities and insufficient labour mobility, a stronger economic integration may widen regional gaps in terms of employment rates. Increasing flows of FDI are a crucial element of this process. Hence the allocation preferences of the foreign firms differ from those of the domestic enterprises (*Krugman*, 1991 a,b,c,; *Krugman and Venables* 1990). A massive increase of FDI in the world economy had a substantial impact on regional differences of the host countries and contributed to the regional polarisation process of recent years. The success of regions to attract FDI depends upon the competitive advantages of regions and is created and sustained by highly localised processes which are reinforced by the location capacity to attract resources from outside. Backward areas, not being attractive locations for foreign investors will suffer an increasing marginalisation. "The geographical polarisation of (local and foreign) productive activities, once it has occurred, tends to be stable and self-sustaining, thus making inversion somehow improbable and strengthening the coexistence of regional peripheries and centres within national borders." (*Iammarino – Santangelo* 2000).

Hungary together with nine other accession countries became a member of the European Union on the 1st of May 2004. We expect a further integration of accession countries to the enlarged EU economy and a further increase of FDI towards CEE regions. How would this process affect regional disparities of these countries? Which regions will be the winners and the losers in the years to come? Would these countries achieve a more balanced regional landscape within the enlarged European Union using the available community resources of regional development policy or should we expect a further widening of regional differences? Would the losers of the transition also become the losers of the accession or is there a real chance to stop the further deterioration of backward regions? These are crucial aspects of the possible impacts of EU enlargement and policy makers should find appropriate responses to mitigate the polarisation effects of increasing integration.

To find answers to these questions we will go, in the second part of this chapter, in some depth into the Hungarian empirical evidence. We offer

an analysis of the difference between the spatial distribution of foreign and domestic firms' employment in the last ten years. The impact of spatial concentration of foreign and domestic corporate employment in local labour markets will be measured and the most important explanatory factors of spatial concentration will be identified. The final part covers conclusions and a few policy relevant messages.

Spatial distribution of foreign and domestic firms' employment in Hungary

In the following part of the paper we will investigate the spatial distribution of corporate sector employment at foreign and domestic firms and will analyse the impact of the increasing share of foreign firms' employment on the regional differences and polarisation of local labour markets in Hungary.

Data

The micro-regional distribution of the corporate sector will be analysed using the IE-FDI Micro-regional Database of the IE–HAS. The source of this data is the firm level Balance-sheet Corporate Database of the HCSO.[13] This covers all incorporated firms and practically all firms employing more than five persons. In the IE-FDI Micro-regional Database a set of balance sheet data of all foreign and domestic enterprises[14] was *separately* aggregated at NUTS-4 level regions. Data covers all years between 1993 and 2002. We will use NUTS-4 region level labour market data and a set of NUTS-4 region level background variables. Labour market data is aggregated from three settlement level databases: (a) the Unemployment Register Database of the National Employment Office, (b) the TSTAR Database of the HCSO and the IE-HAS, (c) the Census Database of the HCSO.

In the existing HCSO-FDI Regional Database firms are classified into regions according to the location of the headquarters of the firms. This method, however, overestimates the spatial concentration of firms because premises located in different regions are taken into account as if they were located in the headquarters' region (*Hamar* 1999). Since the balance sheets of the firms contain the settlement code and the number of employees of each establishment of enterprises, this bias can be reduced by the re-distribution of firms' data between micro-regions in proportion to the branch's share in the total number of employees of the given firms.[15] Variables used in the following analysis are described in the Appendix.

Absolute spatial concentration of working age population, foreign and domestic firms' employment

Studies on spatial distribution of FDI (*Hamar* 1991, *Fazekas* 2001) revealed that FDI inflows were highly concentrated in certain regions so it

13 The Balance–sheet Corporate Database does not provide relevant data on the spatial distribution of employment in the financial sector, therefore this sector was excluded from the micro–regional data base.

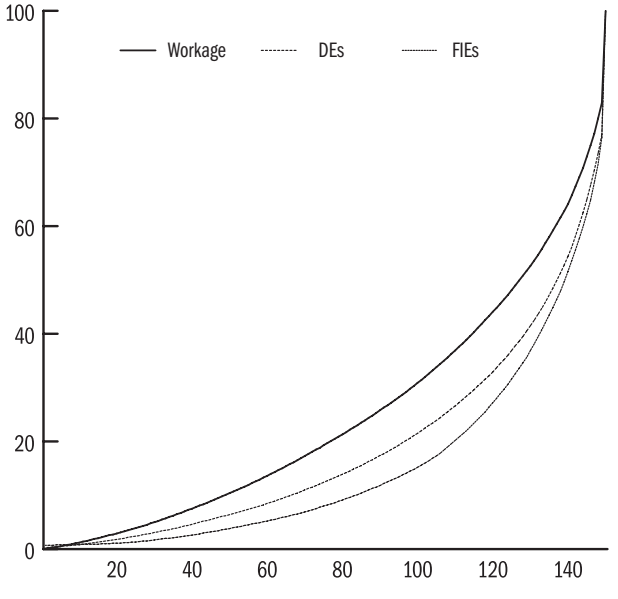
14 Classification of foreign and domestic enterprises follows international standards: firms with more than 10 per cent foreign share are regarded as foreign owned enterprises (FEs') The average share of foreign capital in FEs was 82.7 per cent in 2000.

15 We could not carry out this correction in the case of the financial sector hence firms operating in the financial sector were excluded from the micro–regional database.

comes as no surprise that the concentration of FEs' jobs is much higher than the concentration of working age population and higher than the concentration of DEs' employees (see Figure 1.). Nevertheless the difference between the concentration of jobs at FEs and DEs is not particularly high. The Gini coefficients of the working age population, DEs' employees and FEs' employees were 0.50, 0.63 and 0.70 in 2002. 17.1 per cent of the working age population, 23.0 per cent of the domestic firms' employment and 23.5 per cent of the foreign firms' employment were concentrated in one region: in the capital of the country. The top quartile of the micro-regions (37 regions) having the highest shares covered 61.1 per cent of the working age population. 73.3 per cent of jobs at DEs and 78.3 per cent of jobs at FEs in 2002.

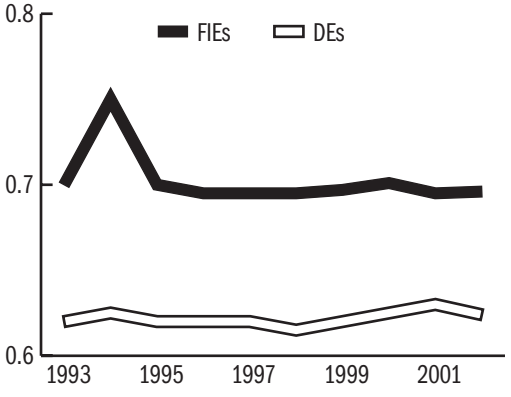
The time path of Gini coefficients shows that the difference between the degree of absolute spatial concentration of jobs at FEs and DEs has not changed and neither has the degree of concentration decreased over recent years (Figure 2.). However the difference between the shares of the top and bottom quartiles in the case of DEs' employment somewhat decreased over the years. The share of the top quartiles increased from 70.4 per cent to 73.3 per cent while the share of the bottom quartiles decreased from 4.4 per cent to 3.8 per cent between 1993 and 2002.

Figure 1: Spatial concentration of working age population, FEs' and DEs' emloyment in Hungary in 2000 (Lorenz curves)



Note: Financial sector excluded.
Source: *IE-FDI Database*.

Figure 2: Time path of spatial concentration of FEs' and DEs' employment (1993–2002) (Gini coefficients)



Note: Financial sector excluded
Source: *IE-FDI Database*.

Relative spatial concentration of FEs' and DEs' jobs

It is obvious that corporate jobs are concentrated in regions where a relatively large pool of working age population is available. Using relative concentration indices we could measure the difference between the spatial distribution of FEs' or DEs' jobs and the distribution of a benchmark variable (such as the working age population) by the following way:

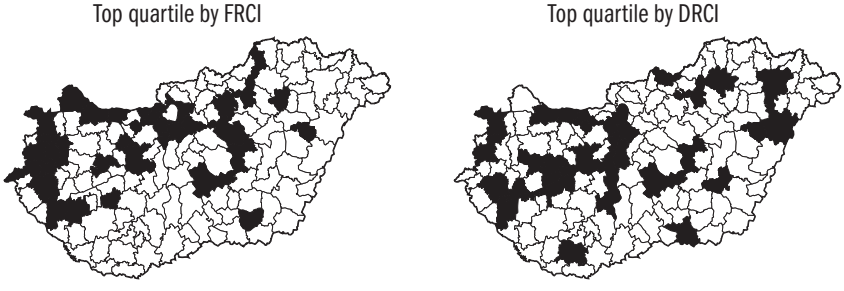
$$FRCI_i = (FL_i / \Sigma_i FL_i) / (WAPOP_i / \Sigma_i WAPOP_i)\ 0 < FRCI < \infty \quad (1)$$

$$DRCI_i = (DL_i / \Sigma_i DL_i) / (WAPOP_i / \Sigma_i WAPOP_i)\ 0 < DRCI < \infty \quad (2)$$

Where:
FL: Number of FEs' employees
DL: Number of DEs' employees
WAPOP: working age population
(i) = region

The indexes compare the share of FEs' and DEs' jobs located in micro-region *i* with the share of working age population located in region *i* in the year *t*. If $FRCI_i$ or $DRCI_i = 1$ in a micro-region it means that the share of FEs' or DEs' jobs located in the region matches that of the share of the working age population. When the regional FL or DL share is greater than the region's WAPOP share, the concentration of foreign jobs is greater than the concentration of the working age population. Conversely when $FRCI_i < 1$ or $DRCI_i < 1$ it means that the region's FL share or DL share is less than its share of working age population. The trend of FRCI or DRCI over time gives us a picture of the changing distribution of foreign or domestic firms' jobs at the level of micro-regions.

Figure 3: Top quartiles of micro-regions according to the relative concentration indexes of FEs' and DEs' jobs in 2002



FRCI = relative concentration index of FEs' jobs. DRCI = relative concentration index if DEs' jobs.
Note: Financial sector excluded.
Source: *IE-FDI Data Base*.

The correlation coefficient between the FEs' and DEs' concentration indices was 0.43 in 2002. It indicates that besides the degree of concentration there are certain differences between the spatial distribution of FEs' and DEs' employment. Figure 3 shows top quartiles of micro-regions according to their relative concentration indices in 2000. One can see that the relative concentration of FEs' jobs is the highest in most of the micro-regions along the Austrian border but also there are several regions of the top quarter in the eastern part of the country as well. The relative concentration of DEs' jobs does not show a clear east-west division.

Determinants of relative concentration of foreign and domestic firms

We can give a more detailed picture of the determinants of the spatial concentration of FEs' and DEs' jobs by estimating the *relative concentration* of jobs by regressions using selected explanatory variables. In the case of Hungary, a series of empirical studies revealed that regional differences in the unemployment rates of micro-regions have been determined by three main factors: the industrial past of the regions, the proximity to the western portals and the education level of the local labour force (*Fazekas* 2000, *Nemes-Nagy* 2004). Some papers (*Hamar* 1999) revealed that regions along the Austrian border attracted exceptionally high FDI inflows from Austria. Using the following four variables[16] as proxies of these factors we calculated repeated cross section regression estimation for the 1993–2000 period: EDU *(average number of completed school years in the local population, age 7+)* as a proxy of the education level of the local labour force, INDUSTRY *(average ratio of employees in industry in the working age population in 1990*) as a proxy of the industrial heritage of the region, ABORDER (a dummy variable to identify micro-regions along the Austrian border) as a proxy of special social and economic network existing between Austrian and Hun-

16 Variables used in the equations are described in Table A2 in the Appendix.

garian regions along the border, DISTANCE *(distance of the region's centre from the most important crossing point at the Austrian border*) as a proxy of the proximity of the region to the western portals.

This approach produces estimates of the changing explanatory power of each variable over the 10 years by the following way:

$$FRCI_{it} = \alpha_1 + \alpha_2 EDU_{it} + \alpha_2 INDUSTRY_{i,90} + \alpha_3 DISTANCE_i + \alpha_4 ABORDER_i + u \quad (3)$$

$$DRCI_{it} = \beta_1 + \beta_2 EDU_{it} + \beta_2 INDUSTRY_{i,90} + \beta_3 DISTANCE_i + \beta_4 ABORDER_i + z \quad (4)$$

Where:

FRCI = relative concentration index of FEs' jobs

DRCI = relative concentration index of DEs' jobs

EDU = average number of completed classes in the local population, age 7+

INDUSTRY = average ratio of employees in industry in 1990

DISTANCE = distance of the region's centre from the Austrian border on road (km)

ABORDER = dummy variable. Austrian border regions = 1, other regions = 0

α_k, β_k = regression coefficients

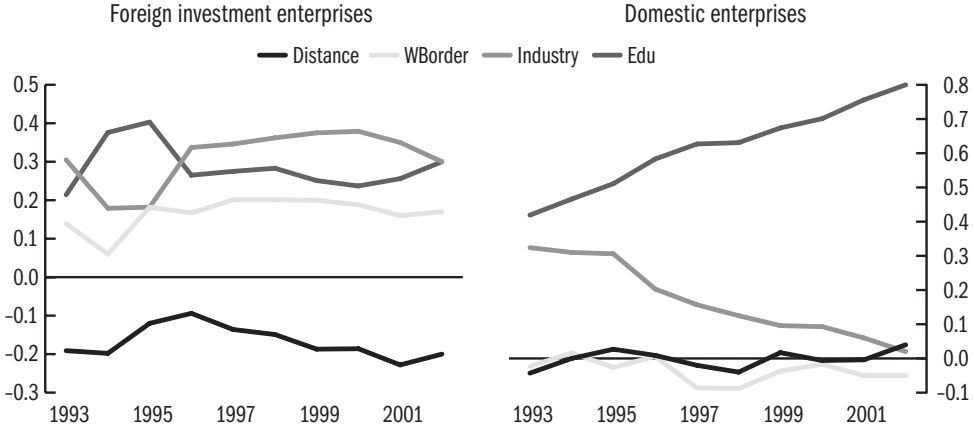
u, z = error terms

t, = years of observation (t = 1993–2002)

i = micro-regions (i = 1–150)

The objective of the multiple regression estimation was to discover whether explanatory variables are significant and to estimate the direction and the relative importance of each explanatory variable over recent years. We expect significant positive impact of EDU, INDUSTRY and ABORDER variables and significant negative impact of DISTANCE variable on the relative concentration of FEs' employment. We expect significant positive impact of EDU and INDUSTRY variables and do not expect significant impact of DISTANCE and ABORDER variables on the relative concentration of DEs' employment. The results of the estimations are summarised in Table A1 in the Appendix. Adjusted R^{2}-s are between 0.38 and 0.51 in the case of foreign firms and between 0.42 and 0.65 in the case of domestic enterprises. Figure 4. shows the time path of the standardised correlation coefficients in both groups. Our results correspond to most empirical studies on regional distribution of FDI in CEE countries. One can see that:

Figure 4: Time path of standardised coefficients of linear regression estimations of relative concentration indexes (1993–2002)



• EDUCATION had significant explanatory power over the years. Both FEs' and DEs' jobs are concentrated in regions with an educated local population.

• In the case of domestic firms, DISTANCE and ABORDER variables had no significant effects. The explanatory power of EDUCATION increased while the explanatory power of INDUSTRY decreased over the period and it had no significant effect in the latter years. This tendency corresponds to the changing sector composition (increasing share of service sector and decreasing share of industry) in the group of domestic firms.

• In the case of foreign firms, all four variables had significant effects on the relative concentration. FEs' jobs are concentrated in industrial regions close to the Western border. The BORDER dummy as well as the EDU variable had significant positive effect on the FEs' jobs concentration. Apart from the turbulent first period of transition, there were no major changes in the explanatory power of variables during recent years.

According to our evaluation, one of the most important messages of these results is that the education level of the local population is an important determinant of the spatial distribution of both FEs' and DEs' employment. Note that the effect of the EDU variable does capture the effects of a number of externalities offered by urbanised regions. Regions with a relatively highly educated population have a high share of the service sector, developed infrastructure, high geographical density of firms, high density of NGOs etc. These variables have no significant effect in addition to the EDU variable and when we replaced the EDU variable with any of them the explanatory power of the estimation decreased.

Impact of spatial concentration of foreign and domestic firms on labour market differences

Table 2. indicates that the spatial concentration of corporate sector employment in the developed urban centres has substantially increased labour market differences during recent years. Allocation preferences of foreign firms had a further important positive impact on these processes. Corporate employment rose by 404 thousand (22.2 per cent) or 6.6 per cent of the working age population in Hungary between 1993 and 2002. More than two thirds of net job creation was carried out by foreign firms. The number of FEs' employees increased by 91.1 per cent while the number of DEs' employees increased by 8.8 per cent.

Corporate employment expanded by 31 per cent in high employment regions and decreased by 4.6 per cent in low employment regions. These changes contributed to a 11.2 percentage points rise in employment rates in high employment regions and a 0.9 percentage point decline in low employment ones.

The vast majority (67 per cent) of the net increase happened within the foreign enterprise sector and 64 per cent of the increase of FEs' jobs was concentrated in the high employment regions. The number of FEs' jobs rose by 106 per cent in high employment regions and increased by 79.2 per cent in low employment ones. These changes contributed to a 7.1 percentage point rise in employment rates in high employment regions and a 1.6 percentage point gain in low employment ones.

The number of DEs' jobs increased by 13.8 per cent in high employment regions and decreased by 14.6 per cent in low employment ones. These changes increased the employment rate by 4.1 percentage point in high employment regions and decreased the employment rate by 2.5 percentage point in low employment ones.

Table 2: Changes of corporate employment in the low and in the high employment regions between 1993 and 2002

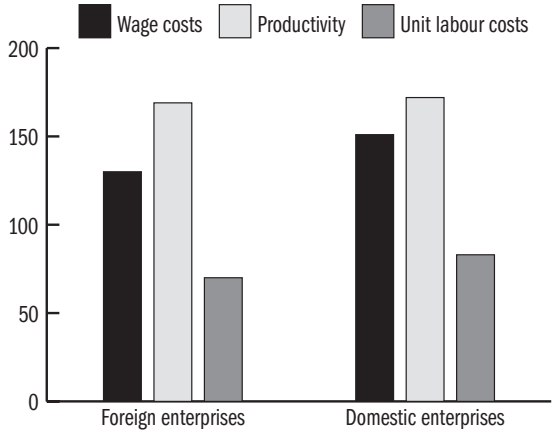
Quartiles of micro-regions according to the average of employment rates in 2000	Changes in the number of employees 1993 = 100%			Changes in the number of employees as a percentage of the working age population		
	DEs	FEs	Total	DEs	FEs	Total
Low employment regions						
Top quartile	–14.6	+79.2	–4.6	–2.5	+1.6	–0.9
High employment regions						
Bottom quartile	+13.8	+106.0	+30.9	+4.1	+7.1	+11.2
Country total	+8.8	+91.1	+22.2	+2.2	+4.4	+6.6

Note: Financial sector excluded.
Source: *IE-FDI Database*.

Why do not corporate jobs flow towards less developed regions in Hungary? – Regional differences in wages, productivity and unit labour costs of foreign and domestic firms

Despite the considerable efforts taken by regional policy to attract investment to low employment regions, the increasing scarcity of skilled labour in high employment regions[17] and the marked wage differences between high and low unemployment regions,[18] spatial concentration of FEs' and DEs' employment has not decreased over recent years, and corporate jobs have not moved towards low employment regions. On the contrary, of late, low employment regions have lost, while high employment regions have gained, corporate (mostly FEs') jobs.

Figure 5: Wage costs and productivity of firms settled in high employment regions compared to firms settled in low employment regions in manufacturing in 2002



Note: Firms settled in low employment regions = 100%.
Source: *IE-FDI micro-region data base*.

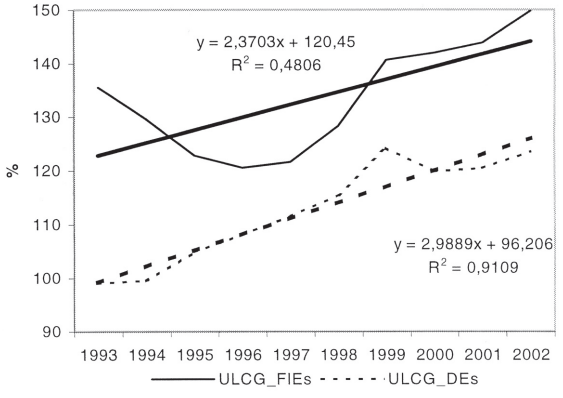
It is not difficult to understand the reluctance of firms to move towards less developed, low employment regions if we compare the regional differences of productivity and the unit labour costs of foreign and domestic firms. Figure 5 shows regional differences in wages, productivity and unit labour costs between firms in manufacturing operating in high and low employment regions. One can see that there are substantial regional differences in both groups. Wage costs are higher in high employment regions than in low employment ones. However, as a result of high productivity, the unit labour cost of firms operating in high employment regions is less than 80 per cent of those settled in low employment regions. Besides region-specific factors (proximity, density of firms, externalities offered by urban agglomerations etc) the regional productivity gap has been influenced by a

17 Regional unemployment/vacancy statistics shows increasing scarcity of (skilled) labour in the most developed regions and an increasing stock of job seekers in the depressed regions.

18 Empirical studies on regional wage differences revealed that due to the increasing regional differences in unemployment and vacancy rates, a regional wage curve was born in Hungary. The elasticity of wage with respect to the unemployment rate was found to be more or less the same as in established market economies. (*Köllő* 2002).

number of firm-specific factors, such as sector composition, technologies and the labour/capital ratio. Unfortunately, we do not have sufficient data to separate firm-specific and region-specific effects. Nevertheless, the time paths of regional gaps in the case of FEs and DEs reveal a striking tendency. Figure 6–7 shows that the regional gaps of productivity and unit labour costs between firms settled in high and low employment regions have substantially increased in both groups over the last ten years.

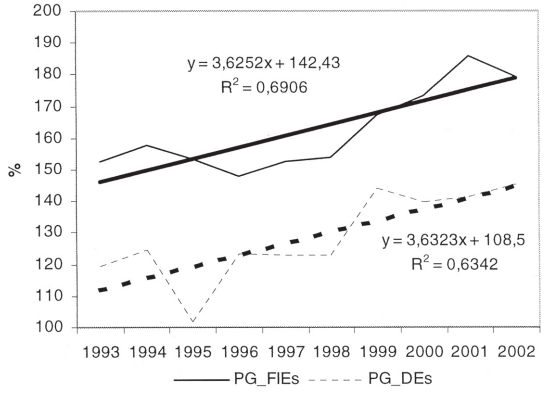
Figure 6: Time path of the unit labour cost gap between firms in manufacturing settled in low and high employment regions (1993–2002)



ULCG (Unit labour cost gap) = (Average unit labour costs of firms settled in low employment regions) / (average unit labour costs of firms settled in high employment regions) *100

Unit labour costs = net sales / total wage costs

Figure 7: Time path of the productivity gap between firms in manufacturing settled in low and high employment regions (1993–2002)



Productivity gap = (average productivity firms settled in high employment regions) / (average productivity of firms settled in low employment regions) *100

Productivity = net sales/employees

Factors behind the increasing wage, productivity and labour costs gap require a careful analysis which is beyond the scope of this paper. Nevertheless, we are convinced that an increasing return to agglomeration is an important element of these effects. Regional spillover effects between firms could be an important element of agglomeration effects. A number of empirical studies indicate that regional productivity differences are reinforced by regional spillover effects between foreign and domestic enterprises. (*Moretti* 2002) The higher the density of foreign firms in the high employment regions, the stronger the spillover effect towards domestic (and foreign) firms. As a consequence, productivity advantages are also abundant in these regions. According to empirical evidence from CEE countries and especially from Hungary, the increasing density of FEs has a significant positive effect on the productivity of domestic firms in the region (*Campos* 2001, *Sgard* 2001, *Schoors and van der Tol* 2002). This could be one of the explanations for the increasing regional productivity gap among firms.

Conclusions and policy implications

In the first part of the paper we described the polarisation and the increasing core-periphery division of local labour markets in Hungary during transition. The driving force of this process was the fast integration of the country into the world economy and a massive inflow of foreign direct investment into certain regions of the country. Foreign firms were responsible for the bulk of net job creation in recent years and the vast majority of net job creation within the foreign firm sector was concentrated in high employment regions.

Foreign employment is concentrated in industrial regions with a favourable geographical location, and a high level of urbanisation. Employment of domestic firms was also highly concentrated in urbanised regions. Both foreign and domestic firms exhibit stable spatial concentration and pattern of distribution. A large and increasing productivity gap between winner and loser regions is one of the explanations of this stability. Both foreign and domestic firms located in high employment regions are much more productive than firms located in low employment regions. Besides firm- and region specific factors, regional spillover effects between foreign and domestic firms could explain this tendency. Supply side alleviating mechanisms (migration, commuting) are too weak to stop or to decrease further polarisation of local labour markets.

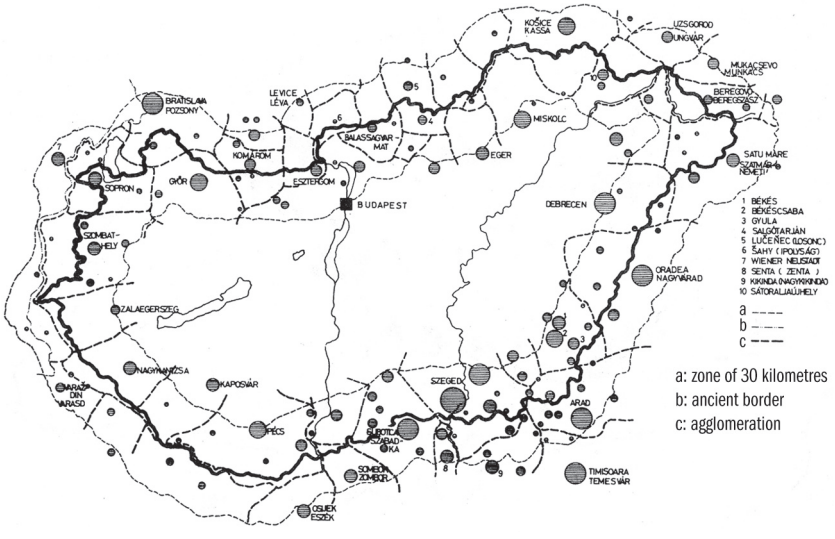
What can we expect in the future and what should be done to stop further deterioration of backward regions? The majority of studies on the impact of the EU accession forecast an increasing attractiveness of accession countries in terms of FDI inflows. Are there relevant policy options to avoid

the situation where further increase of FDI mimics the established pattern thus yielding ever rising regional differences and polarisation?

The second part of the paper demonstrated that the education level of the local population has a crucial impact on the competitiveness of local economies. Thus, one of the most important tasks is to raise education levels even in the remote rural territories of the country. It is a long term and costly program for central and local governments and requires a large scale development of the educational infrastructure. Analyses of the explanatory factors of the spatial concentration of FEs' jobs show that in addition to the education/urbanisation level and industrial past, the geographical location (i.e. distance from the EU borders) has a crucial impact on the attractiveness of regions. Distance could be decreased by the development of transport infrastructure and some urbanised South-Transdanubian, and East-Hungarian regions could be connected to the most developed Central-Hungarian and West-Transdanubian agglomerations. The most challenging questions for the policy makers: What can be done in the case of remote rural regions along the North-East, East, and Southern borders? How will the EU accession affect their position in the years to come?

If we take into consideration the spatial consequences of globalisation and agglomeration, there is no real possibility to stop the further deterioration of these regions. Nevertheless, let me finish this paper with a more optimistic picture. Figure 8. shows areas of influence of major cities in cross-border regions in Hungary. We can see that the present state borders deprive some remote rural regions from their historical urban centres.

Figure 8: Areas of influence of major cities in cross-border regions



Source: *Kovács* (1990).

Some of those cities like Kosice, Satu Mare, Oradea, Arad have a great potential to develop following the accession of their countries. Disappearing borders following the joining of the European Union offer a possibility for some remote Hungarian peripheral regions to access the developing local labour markets of urbanised regions located outside the existing border. On the other hand, in some developed border regions there are cities on the Hungarian side of the border (such as Pécs, Debrecen, Győr) which could have positive effects on backward rural regions situated in neighbouring accession countries.

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Appendix

Table A1: Results from the regression estimation

Dependant Variable = FRCI	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
A. Foreign firms										
DISTANCE	–0.217	–0.198	–0.120	–0.094	–0.136	–0.149	–0.187	–0.186	–0.228	–0.206
	–2.749	–2.499	–4.320	–1.213	–1.876	–2.141	–2.707	–2.715	–3.232	–2.909
	0.007	0.014	0.000	0.227	0.063	0.034	0.008	0.007	0.002	0.004
ABORDER	0.118	0.060	0.182	0.167	0.201	0.201	0.200	0.188	0.160	0.172
	1.613	0.806	2.591	2.297	2.949	3.071	3.066	2.822	2.408	2.566
	0.109	0.422	0.011	0.023	0.004	0.003	0.003	0.005	0.017	0.011
INDUSTRY	0.295	0.179	0.182	0.337	0.346	0.362	0.375	0.379	0.350	0.307
	3.844	2.339	2.506	4.509	4.955	5.409	5.646	5.597	5.186	4.518
	0.000	0.021	0.013	0.000	0.000	0.000	0.000	0.000	0.000	0.000
EDU	0.232	0.376	0.403	0.265	0.275	0.283	0.51	0.237	0.256	0.301
	2.753	4.485	5.078	3.261	3.632	3.921	3.517	3.269	3.538	4.144
	0.007	0.000	0.000	0.001	0.000	0.000	0.001	0.001	0.001	0.000
Adjusted R^2	0.377	0.377	0.428	0.390	0.465	0.504	0.510	0.486	0.489	0.484
F	23.240	23.394	28.879	24.774	33.423	38.837	39.778	36.279	36.698	35.878
Sig.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Number of observations	149	149	150	150	150	150	150	150	150	150
B. Domestic firms										
DISTANCE	–0.043	0.000	0.027	0.009	–0.020	–0.040	0.017	–0.006	–0.004	0.042
	–0.558	0.995	0.710	0.905	0.782	0.581	0.813	0.931	0.954	0.480
	0.578	0.006	0.373	0.119	–0.278	–.553	0.237	–0.086	–0.058	0.708
ABORDER	–0.023	0.016	–0.026	0.006	–0.086	–0.088	–0.037	–0.017	–0.050	–0.040
	–0.326	0.233	–0.392	0.087	–1.290	–1.302	0.561	–0.275	–0.837	–0.711
	0.745	0.816	0.695	0.931	0.199	0.195	0.576	0.783	0.404	0.478
INDUSTRY	0.324	0.310	0.306	0.203	0.157	0.125	0.096	0.093	0.060	0.018
	0.393	0.000	4.389	2.941	2.293	1.810	1.423	1.452	0.985	0.315
	0.000	0.708	0.000	0.004	0.023	0.072	0.157	0.149	0.326	0.753
EDU	0.419	0.466	0.511	0.583	0.627	0.631	0.674	0.701	0.756	0.819
	5.148	5.912	6.667	7.754	8.450	8.478	9.260	10.254	11.686	13.400
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Adjusted R^2	0.418	0.457	0.476	0.483	0.485	0.474	0.492	0.547	0.593	0.645
F	27.760	32.180	34.830	35.600	36.140	34.530	36.830	45.600	54.930	65.880
Sig.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Number of observations	150	150	150	150	150	150	150	150	150	150

Note: Coefficient cells consist of coefficients, t values and significance.

Table A2: Variables used in the analysis

Label	Content	Source
DISTANCE*(i)*	Average distance of the region's centre from the Austrian border on public road measured in km. *(i = 1–150)*	ANDROUTE Database
ABORDER*(i)*	Dummy variable. *(i = 1–150) (Austrian border regions = 1, other regions = 0)*	
INDUSTRY*(t,i)*	Average ratio of employees in industry in the working age population in year *t*, in the micro–region *i. (t = 90; i = 1–150)*	HCSO T–star
EDU*(t,i)*	Average number of completed classes in the local population, age 7+ in year *t,* in the micro–region *i. (t = 1990, 2000; i = 1–150)*	HCSO Census
FL*(t,i)*	Number of FEs employees in the micro–region in year *t,* in the micro–region *i. (t = 1993–2002; i = 1–150)*	IE FDI Database
DL*(t,i)*	Number of DEs' employees in the micro–region in year *t*, in the micro–region *i (t = 1993–2002; i = 1–150)*	IE FDI Database
WAPOP*(t,i)*	Working age (age 18–59) population of the micro–region in year *t* in the micro–region *i. (t = 1993–2002; i = 1–150)*	IE FDI Database
FWAGECOSTS*(t,i)*	Total wage costs of FEs settled in the micro–region in year *t. (t = 1993–2002; i = 1–150)*	IE FDI Database
DWAGECOSTS*(t,i)*	Total wage costs of DEs settled in the micro–region in year *t. (t = 1993–2002; i = 1–150)*	IE FDI Database
FSALES*(t,i)*	Total net sales of FEs settled in the micro–region in year *t (t = 1993–2002; i = 1–150)*	IE FDI Database
DSALES*(t,i)*	Total net sales of DEs settled in the micro–region in year *t (t = 1993–2002; i = 1–150)*	IE FDI Database