County to county migration and labour market conditions in Hungary between 1994 and 2002

*Zsombor Cseres-Gergely**

In this paper I use county to county migration data to estimate the effect of labour market conditions on these flows. A gravity model is estimated on Hungarian NUTS 2 regions for the period between 1994 and 2002. Such results are not available for Hungary so far. Estimated parameters show significant and expected effects of local amenities, distances and labour market conditions. Although the magnitude of the estimated parameters is not small, they are not sizeable enough to compensate for the overall low level of migration.

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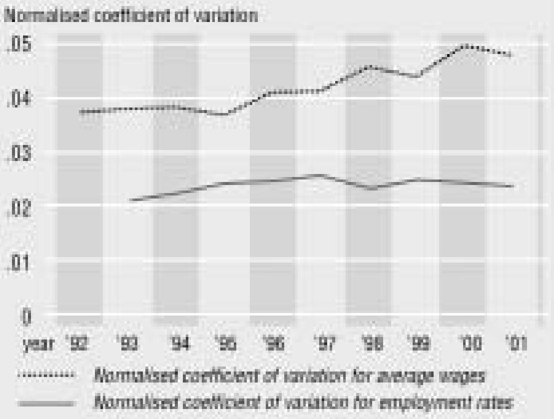
* For this paper only the author is responsible.

1 Introduction

Hungary, along with other Central and Eastern European countries, performed well around the beginning of the new millennium in terms of economic growth. Behind the increase of average performance however, there is a substantial amount of dispersion in both output and opportunities. In 2002 the best county[1] in terms of GDP produced 4 times the output of the poorest one (Győr and Nógrád, respectively, not counting Budapest and Pest county among the best, which are far ahead).[2] Labour market opportunities show less pronounced, but quite substantial heterogeneity. The lowest employment rate of the population between 15 and retirement age[3] is 45 percent (Szabolcs), whereas the highest is 66 percent (Zala). Average earnings vary even more, although this variation is again smaller if we exclude Budapest from the comparison, but there is still 50 percent difference between average wages in the poorest Szabolcs or Békés and the top performer Fejér or Győr (again excluding Budapest and Pest county). Although differences in wages shrink substantially if we control for compositional effects, the same is not true for employment opportunities (see Nagy 2004 and Köllő 2004 on this matter). Because average wages and employment opportunities are correlated in space, the question arose over and over the past years: what will be the mechanism, if any, that equilibrates these differences?

Regional differences are only partly increasing over time. Figure 1 shows the normalised coefficient of variation of average wages and employment rates at the county-level. After a moderate increase from 1993, differences in employment rates are stagnant from 1997 on. Differences in average wages on the other hand, were increasing steadily from around 1995, following the overall growth of the economy.

Figure 1
Evolution of labour market inequality in Hungary after 1990



Source:
Own calculations from the Wage Survey, and the Labour Force Survey

If prices of the same good are not the same in different, but interconnected markets, we can expect that such a difference will vanish over some time as a result of goods or factors being transported to and sold in places where their price is high. Regional differences should be no exception – in space, this arbitrage can happen through the relocation of capital and labour. Although there is a slight sign of change in this trend recently, Barta (2004) for example shows that it is the most western and richest county of Hungary that attracted most foreign direct investment (FDI) in the 1990s, a core factor in both regional and country-level economic performance. Eastern parts of the country, where many low wage and low employment regions are located, seem to be left behind in this respect. This can possibly be attributed to spatial differences in the inherited industrial structure and knowledge that proved to be valuable after the economic transformation, amplified by favourable spillover effects, as recent evidence by Békés (2004) shows. Regardless of the reason, location choices of foreign firms show that FDI and capital in general has not only been favouring already advanced regions, but it is not too mobile either when it comes to within-country relocation. If firms are reluctant to initiate an equilibrating process by using workforce from depressed regions, it is migration of the population that can work towards diminishing regional differences.

1.1 Mobility in Hungary

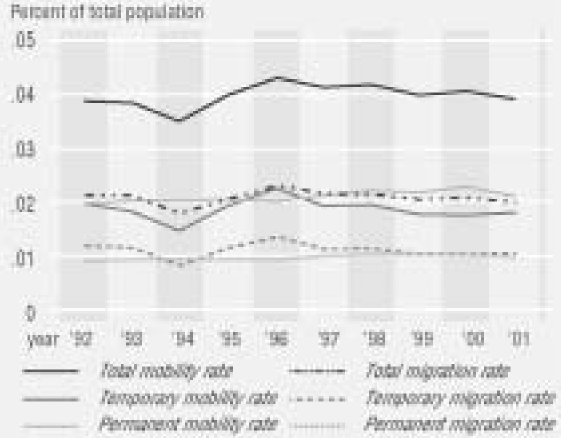
The Hungarian society is not a mobile one. It is around 4 percent of the population that changes residence during a year such that the registered address is in a new municipality. This includes those moving their permanent address and also those moving only their temporary one. Thinking about regional differences and migration, it is probably the former type we would like to consider, as it is permanent migrants

[1] Counties are the NUTS 2 regions in Hungary, a regional unit one level below what is called a (NUTS 1) “region” in the EU. There are 20 counties, and Budapest, the capital is one of them.

[2] This grows to a 30-fold difference if we include Budapest and Pest county. This procedure however can be misleading. There are firms who have separate firms for their plants and acitivities, but many of them have a headquarter in Budapest acting as a profit centre.

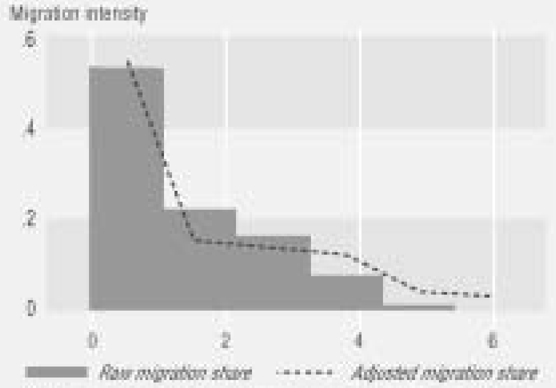
[3] Although the earliest retirement age is increasing from 1997 on, the effective one did not change much from 55 (females) and 60 (males) years of age, due to several legally provided early retirement opportunities.

Figure 2
Evolution of labour market inequality in Hungary after 1990



Source: Own calculations from various issues of the Demographic Yearbook, Hungarian Statistical Office; see the main text for the definition of the various concepts.

Figure 3
Migration intensities by proximity in Hungary between 1992 and 2002



Source: Own calculations from various issues of the Demographic Yearbook, Hungarian Statistical Office; Using own county-proximity indicators

who commit to bind their life to a given region. Temporary movers might also have motives that ultimately lead to diminishing regional differences, but being a very heterogeneous population, they need consideration that available data does not make possible.[4] Looking at only permanent movers, the mobility rate halves to around 2 percent. But again, if we are interested in regional inequalities, probably only those migrants are relevant, who cross the boundaries of the chosen regional units and not those who move from a core city to the surrounding green belt.

Partly because of substantial reasons, partly because of data availability, I am looking at county-level differences and migration. The substantial reason for using counties (or rather: any unit above the settlement-level) is that relocation to suburbs and the formation of suburban agglomerations is a dominant feature of the Hungarian mobility pattern. Although such processes can have economic and indeed labour market related aspects (such as sorting by skill, see Brueckner/Thisse/Zenou 2002, for example), this is not something we are interested here. If however we consider only those permanent movers, who cross the boundaries of counties (who will be called migrants hereafter), we obtain a migration rate of 1 percent. This figure is rather low, no matter what comparison we consider, and is almost constant over time (see Figure 2 for a comparison).

We can look at the low mobility figures from a different, a spatial point of view. I have already noted that one great drop in the mobility rate occurs as we restrict attention to those crossing county borders. To explore that idea further, one can look at how much of the intensity of mobility is changing with the distance spanned. Locations are different, however. People at central locations have no chance to cross the longest distances, but have more possibilities to go to shorter ways, and those in remote areas have a greater selection of distances, but with a smaller set for each. Because of this, the measured intensities are shaped by the choice set as well. To filter out this effect, we can divide the observed migration proportions by the proportion of *routes* to a given distance, thereby reducing the dominance of potentially more frequent routes and get the pure effect of choice. Figure 3 depicts both the raw and adjusted (and normalised) intensities for the period between 1992 and 2002. As we have already seen, around 50 percent of all moves happen within a county and yet again 50 percent of the remaining moves happen between adjacent counties. Reaching developed areas from underdeveloped ones often requires crossing at least one full county, but mostly more – only a very small proportion of migration reaches that far.

1.2 Previous evidence

Literature on Hungarian migration is quite sparse, and studies framed in an economic context are hard to find. On the one hand, we have a handful of quite

[4] Cseres-Gergely (2004) notes that seasonal fluctuations in the number of such people indicates that a large share of them can be students. Despite of such concerns, I attempted to estimate the model presented later on temporary migrants. This, as opposed to the case of permanent ones, produced very different and unexpected results.

accurate descriptions of migration from the demographers' point of view – these mostly appeared in a volume edited by Illés and Tóth (1998). Such studies point out a number of interesting features of mobility and migration, such as its relation to suburban development, the demise of the migration of low skilled workers, or the phenomenon of migrant-commuters. They do not however offer conclusions about labour market effects.

Among the few that do elaborate on economic effects, we find first the study of Kertesi (2000), who – looking at commuting in the same paper – models gross and net migration flows out and into settlements between 1990 and 1994. Including proxies for labour market characteristics, such as the number of companies, local average income, unemployment rate and commuting possibilities, Kertesi estimates a simultaneous equation system of in- and outmigration. Push and pull forces are connected to economic motives; density of enterprises and tax paid per taxpayer being important pull, whereas unemployment, share of agricultural employment, different types of commuting behaviour and the proportion of gipsy population are the most important push factors. Although it is not clear from a theoretical point of view, why the specific variables enter the equations and why in the proposed configuration, the results are appealing and are in line with evidence from other sources. Nevertheless it is not clear, whether results from the early 1990s are valid today.

A second study is due to Fidrmuc (2002), who looks at gross out- and immigration flows in several then acceding countries, including Hungary, and also in some EU member countries as a benchmark. Running linear regressions with out-, in- and net-migration rates of counties as the dependent variable on county-level data for the period between 1994 and 1998, three main findings emerge. Firstly, it is only net migration that seems to respond to wages and unemployment rates in the expected way, i.e. such that higher wages encourages, while higher unemployment discourages in- and net migration to a region. Results for Hungary and the Czech Republic are comparable to responsiveness obtained from Italy, but still not very significant in economic terms. Secondly, it seems that the effect of wages is nonlinear, high wage regions receiving disproportionately high share of migrants. Thirdly, it seems that Budapest (and also Pest county) behaves in a peculiar way that is not comparable to other counties.

In a third paper, Cseres-Gergely (2004) attempts to quantify the effect of wages and unemployment on migration using individual-level data. Based on individual-level data from the 1996 Microcensus of the Hungarian Statistics Office (HCSO), Cseres-Gergely estimates a probit model for individual migration decision in which the local average wage and unemployment rate captures the "push" effect of local labour markets. Although the responses to these variables are found to be significant, their economic relevance is not substantial. Because the individual data registered moves of different ranges, it was crucial for this result to hold to exclude those moving to the neighbouring settlements and commuting back to their previous place of living – usually a larger town. Apart from being limited to 1996 and the preceding periods, this study is limited by the fact that it is not clear what is the underlying population "at risk" of migration and what is the positive outcome we observe. Because the exact date of the move between 1990 and 1996 is not known, the population identified as movers include only once those who moved many times, but those who moved to one place and subsequently returned, do not count as movers. Also only wages and unemployment rates averaged over the 6 year period could be used, which possibly dampened the real effects quite substantially.

1.3 Aim of the paper

Stylised facts on migration are rather discouraging about the relevance of labour mobility in terms of its potential effect on regional differences. Nevertheless, even in such a low rate of mobility, it is not clear what role labour market conditions and economic factors can play. Evidence so far is mixed and is based on non-current data.

Can we hope that the usual labour market motives, wages and employment possibilities have the expected effect on mobility flows? How substantial is the adverse effect of distance on migration? Is the role house markets play in migration clear-cut? My aim here is to try to clarify these to a greater extent than it is available to date. Because of the very limited nature of the data at hand, I shall possibly not be able to get a comprehensive understanding of either of these phenomena, neither to model migration fully as such. What I hope is to improve our understanding compared to existing evidence on the role of labour market motivations. After a brief description of the data used and a theoretical motivation, I estimate a gravity-type model to explore the above questions.

2 Theoretical motivation and data

In the empirical section, I shall be using the well-known gravity model, the standard workhorse of migration research that has its roots deep in the history of the field. Originally based on an analogy with physics and Newton's idea of gravitational force, it was following the work of Lowry (1966) that gravity models were extended with economic variables to represent push and pull effects. The central relationship is

$$m_{ij} = g\,\frac{P_i^{\beta'}P_j^{\beta''}}{d_{ij}^{\gamma}}$$

with m_{ij} being the flow from region i to region j, p_i and p_j being the respective "masses" and d_{ij} the distance between region i and region j. Although Newton's theory restricted $\beta'=\beta''=1$, we do have no reason to suppose so in a migration context. To obtain an equation that is estimable using standard techniques, this relation is transformed into a linear form by taking logs:

$$1\mathrm{n}m_{ij} = \alpha + \beta' 1\mathrm{n}P_i + \beta'' 1\mathrm{n}P_j - \gamma 1\mathrm{n}d_{ij}.$$

This is the relationship that Lowry extended by adding economic variables as the generalisations of P_i and P_j. Although venerable, the model in today's world of very detailed micro-level data is considered to be outdated by many. Nevertheless, it is still used in cases when such data are not available – and this is one of such cases. Having access only to aggregate migration flows, the gravity model seems to be a natural candidate.

2.1 Theoretical motivation

In order to rid of the analogy from physics, the gravity model can be supported by a microeconomic model – if one accepts the assumptions that come with it. Although the end result is almost identical to the original model, one might hope that a formal exposition helps empirical investigation. In a study with similar motivation to mine, Fidrmuc and Huber (2003) neatly collect the pieces to characterise such a model. Their elaboration is in turn based on that of Fields (1979), with some useful verbosity. Here I only follow the most important points in their reasoning to expose the idea.

The suggested chain of reasoning starts with a variant of the random utility model of McFadden (1973)[5], where a decision-maker n living in place i is supposed to choose a place of living j among 1..J possible alternatives, based upon the expected utility that arises from living in a given place over some period of time. The utility derived from a move like that (in expectation, over a planning horizon) can be written as $U_{ij}^n(Y_j,A_j,C_{i,j},\mu_j^n)$, where Y_j denotes income in j, A_j denotes amenities in j, C_{ij} is moving costs from i to j, and μ_{jn} is an individual random draw from a preference/cost distribution. As the individual chooses the location that yields the highest utility, the P_{ij} probability of moving to region j from i is

$$P_{ij} = \Pr[\, U_{ij} = \max(U_{i1},U_{i2},...,U_{iJ})].$$

McFadden's result is that if U_{ij} is linear in the logarithms of the arguments and the logarithm of the original stochastic disturbance has an independent and identical Weibull distribution across alternatives, then the probability of moving from one place to the other is given by

$$P_{ij} = \frac{\exp(U_{ij})}{\sum_{k=1}^{J}\exp(U_{ik})} = \frac{\exp(\alpha_1 1\mathrm{n}A_j + \alpha_2 1\mathrm{n}Y_j + \alpha_3 1\mathrm{n}C_{ij})}{\sum_{k=\mathrm{j}}^{J}\exp(\alpha_1 1\mathrm{n}A_k + \alpha_2 1\mathrm{n}Y_k + \alpha_3 1\mathrm{n}C_{ik})}$$

This form of the migration probability gives an easy formula for the probability of moving from i to j, relative to that of staying in i, a linear function of the differences of local characteristics

$$1\mathrm{n}\left(\frac{P_{ij}}{P_{ii}}\right) = \alpha_1(1\mathrm{n}A_i - 1\mathrm{n}A_j) + \alpha_2(1\mathrm{n}Y_i - 1\mathrm{n}Y_j) + \alpha_3 1\mathrm{n}C_{ij}$$

If we do not wish to model the determinants of the number of stayers, we can make use of the fact that P_{ij} is consistently estimated by the population ratio M_{ij}/N_i, cancel denominators on the left hand side and collect M_{ii} to the right. Relaxing the symmetry of the effect of sending and receiving regions and supposing a more general impact of the population remaining in the sending region, an equation arises which is a good starting point for estimation

$$1\mathrm{n}M_{ij} = \beta_0 1\mathrm{n}M_{ij} + \beta_1 1\mathrm{n}A_i + \gamma_1 1\mathrm{n}A_j + \beta_2 1\mathrm{n}Y_i + \gamma_2 1\mathrm{n}Y_j + \beta_3 1\mathrm{n}C_{ij}.$$

This equation is almost identical to the gravity formulation, except for here we have the number of stayers on the right hand side, whereas the gravity equation has the population for both the sending and the receiving region. A_k and Y_k are just the generalisations of attraction forces associated with the destinations, and C_{ij} encompasses all the costs of migration, including that captured by distance. By estimating the probability with observable quantities, the individual characteristics are aggregated as well: they

[5] Fields (1979) credits the application of the McFadden model to the migration problem to T. Paul Schultz (1977): "A Conditional Logit Model of Internal Migration: Venezuelan Lifetime Migration within Educational Strata" Economic Growth Center, Yale University, Discussion Paper No. 226, Sept. I could not, unfortunately, gain access to this material.

correspond to individual values in the sending and receiving regions.

Although we have just seen a nice microeconomic foundation to the gravity model, there is a very important assumption underlying the derivation, namely the independence of the individual utility component from all other components. Individual deviations from and the values of the representative (mean) characteristics of both sending and receiving regions in particular are assumed to be uncorrelated. This implies that migrants select themselves to better destinations based upon their fitness in the sending region. Such an assumption may or may not be valid, but we have to understand that it is built into the aggregation process. While this problem can be tackled with individual data, an aggregate analysis has to put up with the assumption only.

Another property of the model results from the so called Independence of Irrelevant Alternatives assumption of the individual model: characteristics of regions other than i and j do not affect flows between them. This is a similar assumption that is often made (and found wrong) in consumption analysis about zero cross-price effects. While it is theoretically possible and desirable to relax such an assumption, it is not clear how to deal with it in the current framework.[6]

2.2 Data

To estimate the proposed model, I use data on county to county migration flows. There are several reasons for this. Firstly, there is no available individual-level survey data that could be used to estimate migration responses reliably. Secondly using counties (as opposed to smaller units), it is almost certain that one does not have to worry about mobility that is actually connected to suburban relocation. Thirdly, available surveys on wages and employment are not designed to be representative at the level of micro-regions, the next possible smaller regional unit, therefore the estimate of the incentive variables can be precise in this case. Fourthly, although data on flows between NUTS 3 micro-regions are collected by the respective authority, such data are not disclosed to the public due to confidentiality reasons.

There are 20 counties (NUTS 2 regions) in Hungary, geographic units with comparable area and with an average population of around 500 thousand inhabitants. One exception from the rule is Budapest, which is a city with a population of 2 million and concentrating an atypically high level of economic activity as well. Data for the counties comes from several sources. The dependent variable is (the log of) the number of permanent migrants from county *i* to county *j* in year *t*. Data on these flows comes from respective issues of the Demographic Yearbook of the Hungarian Statistics Office (HCSO). The TSTAR database of the HCSO and the IE-HAS, a yearly panel of 1990 to 2002 provides various data on settlements, which can be aggregated to the level of counties. The Wage Survey of the National Labour Centre provides yearly payroll wage data for firms with more than 11 employees between 1994 and 2002. The Labour Force Survey of the Central Statistics Office, available for 4 quarters a year between 1993 and 2002, provides employment data for at least 80 thousand individuals each quarter. Yearly data on per square meter flat prices come from a database of the HCSO specialised on the flat market, available on CD-ROM.

Finally, I created proximity data myself. Since in the case of large regional units, one can pick a continuous distance measure only in a very arbitrary way, I created a discrete proximity measure. This takes on the value 1, if two counties are adjacent (i.e. there is 1 border to cross to go from one to the other), 2 if there is one county “in between” (i.e. there are 2 borders to cross), and so forth. If there is more than one route from county *i* to county *j*, the shortest is chosen. The minimum proximity (maximum distance) is 6.

The above data are assembled into a 3-way panel, spanning a total of 9 years and 400 county to county flows, a total of 3600 observations. This means that every explanatory variable enters twice: once for the sending, secondly for the receiving region. Because moves within a region are not used for estimation purposes and data are missing here and there, we end up with 3040 observations. Descriptive statistics for all of the variables are provided in the Appendix.

In the spirit of the model[7] every variable enter in logs, and hence this qualifier is omitted in what follows. Using logs has the unfortunate feature that it excludes the case of zero migration from one region to the other. To treat this problem, often a Poisson regression is estimated on the level of migration flows, which is more plausibly thought of as count data in

[6] One could clearly continue the enumeration of difficulties: migration of families, not individuals; various migration motives that are only indirectly labour-market related, etc. These are issues that can be tackled either purely theoretically, or empirically using a specialised individual-level dataset, neither of which is an option here.

[7] Schultz (1977) argues that it is especially appropriate to take logs of the right hand side variables in the present case. Because it is most probably expected income which a migrant takes into account when deciding upon a move, having average wages and (un)employment rate in a log-linear formulation allows for a flexible modelling of the multiplicative interaction.

case of small regional units. In our case however there is no need to go beyond the linear regression framework. Because of the size of the regions and their distance from each other, there is very little chance of observing zero migration between regions (none such case in the actual data). Also because of this, treating the data as count has little relevance.

The explanatory variables can be divided into four categories: gravity variables (population sizes and distance), labour market related-, housing market related-, and finally "other" indicators, mostly referring to (dis)amenities in the given county.

I proxy local labour market conditions using wages and employment rates. Average wages (deflated to 1992 prices using the consumer price index), the unconditional expectations for the individual migrants, are calculated from the Wage Survey as a simple weighted average. Instead of unemployment, I use employment rates calculated from the yearly pooled samples of the LFS. Because unemployed and inactive persons has a very similar chance of obtaining a job in Hungary, neither the registered, nor the ILO-conform unemployment rate represents the true stance of the labour market (see Micklewright /Nagy 1999).

Based on the evidence and methods presented in Köllő (2004) and Nagy (2004), I have calculated an additional set of proxies of labour market conditions using the individual data of the Wage Survey and the Labour Force Survey, with composition al effects removed. In the case of wages, I ran a very simple Mincerian wage regression with the log of gross monthly wages on the right hand side, schooling (below lower-secondary, upper-secondary, and higher education), potential experience (inferred from schooling) and potential experience squared, micro-region level local unemployment rate, gender-, industry- and county-dummies on the left hand side. The reference group was males working in agriculture with upper-secondary education. The parameters on county dummies became the "cleaned" representation of wages. In the case of employment, I used a logit model with schooling, age groups (16-25, 26-36, 37-50, 51-60), indicators for family status, gender and counties on the left-hand side.

Although the causality is not understood in great detail, earlier work highlighted the fact that the state of the real estate market, most notably the flat market can have a great effect on migration and mobility as such. Kertesi (2000) argues that it is vacancy chains that are responsible for preventing mobility. Hegedűs (2004) stresses that changing flats is a risky business: the potential loss incurred in a less fortunate swap of flats can be prohibitively high for those in less favourable economic conditions. To proxy the effects of the property market, I include the number of flats built and demolished in an area.

Also because living costs are possibly different in different regions, one would like to include a regional prices index in a migration analysis. This is unfortunately not possible, as such a measure does not exist. Instead of that, I use per square meter flat prices to proxy living expenses. Because of the regionally uniform structure of retail trade (with malls and suburban shopping centres emerging throughout the county), and the uniform pricing of utilities, flat prices are possibly one of the most important element of living expenses.

Local amenities are represented by various factors characterising public goods, security of the locale and its desirability: the per capita number of general practitioners, paediatricians, equivalised number of tourists visiting the county representing "goods", the number of criminal offences and suicides "bads". These as always, are supposed to be characteristics that affect the desirability of a region, hence affecting the utility the potential migrant is able to derive from moving to a specific place.

3 Empirical results

The theoretical motivation presented in the previous section yielded an equation that is estimable using simple linear regression techniques. Before proceeding with estimation, we have to specify the stochastic structure of the problem. Because of the availability of panel data, this can be a fairly general form:

$$1\mathrm{n}M_{ijt} = \beta_0 1\mathrm{n}M_{ijt} + \beta_1 1\mathrm{n}A_{it} + \gamma_1 1\mathrm{n}A_{jt} + \beta_2 1\mathrm{n}Y_{it} + \gamma_2 1\mathrm{n}Y_{jt} + \beta_3 1\mathrm{n}C_{ijt} + g_t + f_{ij} + e_{ijt},$$

where – in addition to the already discussed variables – we have a time fixed-effect g_t and a county or county-pair ("route") specific effect f_{ij}, potentially correlated with the included regressors. Theory does not advise us which one to use among the latter two, although Mátyás (1997) suggests the county-specific ones. Although it captures a greater amount of specific effects, the drawback of using the route-specific effects is that the effect of proximity (as well as other time-invariant variables) can not be identified.

3.1 Parameter estimates from different specifications

The first column of Table 1 presents a model estimate including the number of stayers, average earnings

Table 1

Parameter estimates of a gravity-type model on a panel of Hungarian counties 1994–2001; model 1 estimated with county fixed effects for sending and receiving counties, all others with flow ("bilateral") fixed effects; all continuous variables are in logs

	1	2	2C	2TE	3	3a
Number of stayers	0.953*	0.625**	0.602**	0.988**	0.467	0.853**
	(0.377)	(0.218)	(0.221)	(0.238)	(0.313)	(0.303)
Average earnings – i	−0.251	−0.239**	−0.177+	0.111	−0.022	−0.024
	(0.157)	(0.085)	(0.107)	(0.120)	(0.117)	(0.112)
Average earnings – j	0.319*	0.316**	0.116	0.682**	0.088	0.229*
	(0.156)	(0.085)	(0.107)	(0.120)	(0.118)	(0.113)
Employment rate – i	0.184	0.177	−0.123**	−0.094	−0.433*	−0.181
	(0.244)	(0.133)	(0.042)	(0.157)	(0.212)	(0.202)
Employment rate – j	0.592*	0.582**	0.106*	0.315*	0.036	0.049
	(0.244)	(0.133)	(0.042)	(0.157)	(0.212)	(0.202)
Proximity=2	−1.326**					
	(0.020)					
Proximity=3	−1.697**					
	(0.020)					
Proximity=4	−1.914**					
	(0.025)					
Proximity=5	−2.145**					
	(0.036)					
Proximity=6	−2.344**					
	(0.062)					
Property price (per sq. m.) - i					0.093**	
					(0.033)	
Property price (per sq. m.) - j					−0.037	
					(0.033)	
No. of flats constructed - i					−0.011	
					(0.023)	
No. of flats constructed - j					0.089**	
					(0.023)	
Constant	−3.375	−3.808	−2.620	−16.004**	−3.030	−8.572*
	(5.334)	(2.786)	(2.884)	(3.516)	(4.036)	(3.870)
Observations	3420	3420	3240	3420	2280	2280
R-squared	0.90	0.02	0.01	0.05	0.03	0.01
Number of i to j pairs		380	380	380	380	380

Notes:
Standard errors in parentheses
*+ significant at 10% level; * significant at 5% level; ** significant at 1% level*
Note that R^2 in model (1) takes the effect of the dummies explicitly into account

and employment rates in the sending (i) and the receiving (j) counties, as well as the proximity measures, along with county-effects. The results are in line with what we expect when interpreting wages and employment possibilities as push and pull effects.

The parameter on the number of stayers is almost unity. Although neither labour market variable shows significant effect in the sending region, they both have a positive coefficient in the receiving region, attracting the inflow of migrants. Proximity has a similarly expected effect. Although the difference in marginal effects is more or less constant for the included indicators (2 and up), there is a great jump from the first neighbour to the second – just as raw data suggests.

The second column presents almost the same specification, the difference being that instead of county-specific effects, I use route-specific ("bilateral") ones and proximity measures are of course absent.[8] The results are fairly similar to what we obtained previously, with the exception that the parameter on wages in the sending region has a significant and negative coefficient, as expected.

Note that time effects were not included either in this, or in the previous specification. The reason for that is the variation in the right-hand side variables comes partly from the time dimension and the time effects absorb that to a great extent. The third column, labelled 2TE shows the second set of estimates using time effects as well. This results in a drop of significance of wage in the sending region, an increase in the effect of receiving region wages, and a decrease in its employment rate. Because my preference is to capture the effect of labour market variables and because the results do not seem to change substantially, I prefer to drop time effects.

As already mentioned, Köllő (2004) and Nagy (2004) show that regional differences on the NUTS 1 level change if we filter out composition effects. To check how such a treatment affects estimation results, I re-estimated model 2 using the adjusted wage and employment rate variables (see the previous section for a description of the process). Results under heading 2C show a diminished effect, with a slightly changed pattern of significance. Employment rates in both sending and receiving regions are significant, while wages in the receiving region ceased to be so.

Just as the theoretical discussion suggests, I wanted to include variables to capture the effect of amenities present in both the sending and the receiving location, such as the (per capita) number of doctors, crimes, suicides, visitor-nights. Unfortunately neither of these variables proved to have a significant effect on the flows, which is again a result of their relative stability over time. Also because of this, we can hope that the included fixed effects capture their effects well enough – indeed, a Hausman test against either the OLS or the random-effects alternative favour fixed effects. Results are not shown for this specification.

Even if the effect of amenities is stable over time, there is an important factor influencing mobility, namely cost of living. This, as already mentioned, manifests itself to a great extent in housing costs. Housing however plays a double role in the migration decision. High property prices increase the cost of rental, but given that most Hungarian households are owner-occupiers, this is not a significant factor. Property is more relevant when looked upon as an asset the household. Hegedűs (2004) shows that it is to a great extent the risk associated with selling the old and purchasing the new property, thereby a potential loss of a great part of their most important asset is what discourages people from moving house. If nevertheless the decision on moving is made, income from selling house is one of the most important assets the household can draw upon to finance the move to either jumpstart a new life in a more promising, or in a less expensive location. Housing markets have another important effect on migration. As in many countries, migration in and outflow is highly correlated in Hungary. Both Kertesi (2000) and Hegedűs (2004) note this feature and attribute it to vacancy chain-effects. Because of the limited availability of housing, it is to a great extent moving households that free up space for those looking for available property.

To control for these effects, the specification shown in Table 1 under heading 3 includes per square meter housing prices as well as flats constructed for both sending and receiving counties. Because property prices are available only from 1997 on, column 3a shows results from specification 2 constrained to this period. Two of new variables have significant effects, property prices in the sending and construction in the

[8] Because a Hausman test rules out simple OLS and random-effect GLS estimation, it is only the different fixed effect estimators I consider. In case of the fixed effect estimators however, one might raise the objection that if we believe that the equilibrating effect of migration works through the labour market, we should not use those, since the regressors' strict exogeneity might be violated through simultaneous determination of migration, wages and employment chances. Although this is a theoretically sound critique, I believe it can safely be ignored in the current case where the level of migration is extremely low. Since only a tiny fraction of a population leaves through a given route (or at all, for that matter), its impact on the local labour market is probably negligible.

receiving region. The latter has a positive parameter, which is in line with the vacancy-chain effect and scarcity of flats. The positive effect of property prices in the sending region also point towards the expected direction.

While adding the new variables allow identifying property-market effects, they also render formerly significant labour-market effects insignificant. This is partly a result of their initially low variation and slightly different behaviour in the period starting in 1997 (see column 3a), but also that of the correlation between wages and property prices. It is interesting to note that it is the second specification where employment rate in the sending region has a significant effect, comparable in absolute size to that of employment in the receiving region, when significant.

3.2 Sensitivity of the results and discussion

There are a number of ways the stability of the estimates can be checked. One obvious but unfortunately infeasible one is to include additional regressors to measure unobserved effects. As there are not many spatial units, such attempts failed.

Unfortunately the relative scarcity of the data appears in other ways, too. When using panel data, one might want to check whether the poolability restriction implicit in panel estimation holds true. Although even setting the breakpoint in the middle of the time period left what appears to be an insufficient number of observations (significance of most parameters drop considerably), there is a clear pattern emerging. Until around 1998, it is only employment in the receiving region that has an effect on migration. Wages seem to gain importance only after that – a factor that can be connected to the start of economic growth. Poolability is thus strictly speaking seems to be violated but not to an extent that would affect qualitative conclusions.

Poolability might be a question not only in time, but also in terms of other attributes, such as space or economic performance. Because Budapest and Pest county are very special in many ways (exceptional economic performance and the only unit of observation where suburban mobility might be relevant), I repeated the estimation leaving out flows from or to any or both of these counties, or flows between them. In all of these experiments the (qualitative) results were unchanged. Another sensible division is to consider sending counties to the west and to the east to the river Danube. Because the east is traditionally more agricultural oriented and is in a generally worse economic condition, one might think that motives work in a different way here and there. The results are surprisingly similar to that what we experienced when cutting the sample half in time. It is only employment in the receiving region that seems to matter in the west, but almost all of the factors play an important part in the east.

One might also argue that wages have different meaning if agents have full access to credit markets and when they do not – indeed, such a finding is a cornerstone in the Andrienko and Guriev (2003) study. To check the possibility of such an effect, I separated the counties in terms of their per capita GDP into two groups. Moving the divisor line to separate the best 13 from the others to the best 7 from the others, one can observe a shift from the effect of employment possibilities (especially in the receiving region) to the effect of wages in both places.

Yet another doubt might be raised due to the arbitrariness of the labour market variables. Why do we think that it is wages and employment rate that represent the chances of a potential employee most faithfully? Why not use for example local GDP, or income tax per taxpayer instead of wages, or unemployment rate instead of employment rate? Checking for their validity, I used all of them, replacing the original variables. The qualitative results again did not change much, although some variables were “stronger” then others. This is especially true for unemployment, which seemed to dominate wages, rendering them insignificant. This can be attributed to the more direct connection between the pressure of unemployment on wages (the wage curve) than that coming from the number of inactive people, which is an important contributor to the employment rate.

All of the above results suggest that although the pooled model gives a sensible description of the overall migration, it would be useful to differentiate impacts on the basis of time-periods and wealth of the regions. Such an attempt however failed for two possible reasons. One of these is that if we differentiate in both respects, too great degrees of freedom are used and impacts are not significant any more. The second possibility is that also the stochastic structure of the respective groups is different and not differentiating this have adverse effects on the estimates.

Although we have seen a number of sensible and significant effects in the above results, one might ask whether the estimated parameters imply a sizeable, not only statistically significant effect on migration. Looking at the problem from a labour market perspective, one has to consider that the intensity of migration itself is rather low in Hungary and that its extent declines rapidly with distance. If the destination is not in an adjacent county, there is a more than 1 percent penalty on migration. Because of this, its equilibrating effect can be high only if we observe great changes as a response to incentives.

The estimates suggest that differences between average earnings have to increase by 3 percent to raise migration flow by 1 percent in a given direction. Looking at the evolution of wages, such change is entirely plausible. Average wages in Budapest were by around 48 percent higher in 1992 than in Nógrád, one of the poorest counties. This difference grew to 80 percent in a decade. Although the original difference was great enough, it also widened over time. This comparison is biased however, because Budapest, Pest county, and some other counties in the Western-Transdanubia experienced the greatest economic growth, so their advantage in wages is overwhelming. However, there are differences even among the less well to do counties: Hajdú, for example, one of the most eastern counties, has a steady 3–4 percent advantage in average wages over Békés, its southern neighbour – enough to generate some difference.

Another perspective is provided by results from other studies relating to CEE countries. Although differences in regional units and other methodological differences render a comparison imperfect, we can use results from Fidrmuc (2002) and Andrienko and Guriev (2003) for a tentative attempt. These show that the measured impact of economic incentives is not too small: parameters measured there rarely exceed unity, and are mostly close to what is obtained here. One has to keep in mind however, that they include many more regressors, whose effect is nevertheless not always significant.

Then why is so migration low? Clearly, there are numerous factors that are not included in the analysis and these have positive as well as negative impact on migration. Secondly, although differences in employment possibilities have higher impact than wages, their geographic variability is also smaller. Thirdly, here we measured the extent to which labour market factors increase or decrease migration relative to an "autonomous" base level. Because this level is rather small, it remains small unless we multiply it by an enormous number – an impact not observed in real data.

4 Conclusions

In this paper we looked at county to county migration in Hungary. Although regional differences in labour market indicators seem to increase rather than diminish over time, migration rate is small and stable. Previous studies of Hungarian migration either focus on earlier periods, such as the first half of the 1990s, or use data in which imperfect measurement does not allow the clear interpretation of results. In the current paper I used aggregate data to estimate the effect of economic incentives on migration flows. Using counties as the unit of analysis has various drawbacks, but also makes it possible to exclude the effect of relocation to suburban green-belts, a dominant feature of Hungarian mobility that would generate perverse labour maket effects, with "good" regions appearing to deter, "bad" ones appearing to encourage in-migration.

To measure the extent of labour market incentives, I estimated a gravity model in log-linear form, relating place to place migration flows to several "push" and "pull" effects, wages and employment/unemployment being the most important. Although low variation in the regressors prevented the inclusion of several potentially important factors, there are several robust results emerging. According to these both wage differentials and differences in employment rates encourage migration between counties. Although there is no sign of evidence running against this in the earlier 1990s, the relationship seems to stabilise chiefly from 1998 on.

The property market is also found to have an important effect on migration. People move away from counties where property prices are high, possibly because of higher living expenses or because by moving to a cheaper neighbourhood, they can obtain a stream of income from the profit realised in swapping flats. Construction of property was found to have a positive effect on inflow of migrants, which is in line with previous evidence on vacancy-chain effects.

Even though labour market incentives were found to have a significant effect on migration, the estimated model has a fairly weak explanatory power. There are so many factors affecting (or not affecting) migration in Hungary, that such incentives alone are very unlikely generate a stream of migrants that would possibly able to reduce regional inequalities.

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Appendix

Descriptive statistics of the variables included in the analysis

Variable (in log)	Obs	Mean	Std. Dev.	Min	Max
Migration	4940	4.60	1.22	0	10.088
Stayers	4940	12.98	.492	12.01	14.52
Average wage	3800	9.94	.154	9.69	10.52
Employment rate	3800	–.605	.103	–.899	–.417
Flat price (per square meter)	2280	2.97	.347	2.202	3.791
Flats constructed	4940	6.93	.689	5.193	8.85