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REGIONAL LABOUR MARKET DYNAMICS, HOUSING AND MIGRATION***

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Abstract: The aim of this study is to explore the dynamics of regional labour markets in terms of migration flows. In particular, the study explores the impact of labour markets and housing markets on migration. The internal and the external re-organisations of regional labour markets are shown to be related. An increase in internal turnover within establishments in regional labour markets is found to increase net-migration. This effect arises mainly from a reduction in out-migration. Housing markets constitute binding constraints for migration flows through housing prices and the share of owner-occupancy housing. The results imply that an increase in regional housing prices and a large share of owner-occupancy housing discourages net-migration to a region by reducing in-migration. The out-migration rate remains largely unaffected by housing markets.

Key words: Dynamics of regional labour markets, housing, migration flows, panel data

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Tiivistelmä: Tutkimuksessa arvioidaan alueellisten työmarkkinoiden toimivuuteen vaikuttavia tekijöitä. Erityisinä mielenkiinnon kohteina ovat alueellisten työmarkkinoiden ja asuntomarkkinoiden yhteydet alueiden väliseen muuttoliikkeeseen. Työmarkkinoiden sisäisen ja ulkoisen uudelleenjärjestäytymisen osoitetaan olevan kiinteässä yhteydessä toisiinsa. Alueen sisäisten työmarkkinoiden dynamiikan kasvu vähentää nettomuuttoa. Vaikutus syntyy pääasiassa poismuuton kautta. Asuntomarkkinat puolestaan rajoittavat muuttoliikettä asuntojen hinnan ja omistusasumisen kautta. Tulosten perusteella asuntomarkkinat alentavat alueiden nettomuuttoa pienentämällä tulomuuttoa. Poismuutto ei ole riippuvainen asuntomarkkinoista.

Asiasanat: Alueellisten työmarkkinoiden toimivuus, asuntomarkkinat, muuttovirrat, paneelidata

Contents

1. Introduction

Migration has been at the centre of regional economics for decades and it seems to be gaining ever more importance. Most of the developed countries are entering into the era of a declining labour force as the baby boom generation approaches retirement age. Provided that the working-age population is spatially mobile, migration contributes to a more efficient resource allocation of increasingly scarce labour resources across regions. This improves the matching process of regional labour markets, which in turn reduces frictional unemployment and improves the competitiveness of the economy as a whole and the receiving regional economies in particular.

This study investigates migration in Finland, using both net flow and gross flow data on inter-regional migration between NUTS-4 regions that correspond to 85 travel-to-work areas. The time period under examination covers the years from 1988 to 1997. Finnish regions have similar labour market institutions with collective bargaining, similar legislation and similar education systems. This homogenous institutional setting is, however, connected to wide and persistent regional disparities, see Pehkonen & Tervo (1998). This implies that there are also other economic factors, not connected to the differences in institutional settings that affect regional economies and migration.

The investigation of gross flows offers the opportunity to get a better picture of the interactions between different markets and migration. It is a well-documented fact that in- and out-migration are strongly and positively correlated; for discussion of this compositional effect see e.g. Westerlund (1998) and Tervo (2001). Given this stylized feature one is tempted to think that the same factors hinge behind both migration flows. The estimation results of this study, however, strongly reject this view. It is shown that different variables can have a similar impact on net-migration, having totally different gross-migration effects. Accordingly, the policy recommendations differ according to whether a region is losing or gaining population through the process of migration.

The current study is by no means the first to examine both the net-migration and gross-migration flows. Ever since Lowry's (1966) results implied that the behaviour of in-migrants is different from that of out-migrants, gross flows have been examined separately in a number of empirical studies.[1] This study differs from most of these previous studies by the following overlapping means. First, we are able to examine the impact of labour and housing markets on migration flows of the working-age population. The advantage of focusing on the working-age population has been recognised before, see e.g. Pissarides & McMaster

[1] For a recent empirical study, see Day & Winer (2001).

(1990), but the available migration data has usually not been detailed enough for this.

Second, we employ the measures of the internal reorganisation of regional labour markets, together with the conventional labour market variables, in exploring the possible connection between the internal and the external reallocation of labour resources. In particular, we investigate the connection between the internal, plant-level mobility of jobs and workers (Davis and Haltiwanger, 1999) with the spatial mobility of the working age population. It is hypothesised that internal reorganisation within plants in a region reduces the out-migration of the working-age population, since the opportunities to get a job arise in dynamic labour markets. In this case we would observe a positive correlation between the inter-regional adjustment of labour markets and net-migration. A panel of the Finnish regions is highly suitable for scrutinizing this issue. During the investigation period the internal turbulence of regional labour markets has been at a high level owing to the severe economic downturn at the beginning of the 1990s that led to the export-led recovery at the end of the decade.

Third, the role of housing markets in the adjustment of regional labour markets has been strongly stressed, for example in Oswald (1996), but this issue has rarely been examined in terms of gross-migration flows. By focusing on gross-migration, this study is able to provide a more detailed answer to the question on how binding the constraints produced by housing markets actually are. This issue is especially interesting in the Finnish context since regional differences in housing costs form almost entirely the regional differences in the cost of living, in which case one would expect to capture ‘pure’ housing effects via the parameter estimates of housing variables. Despite this, housing markets in Finland have remained unexplored, owing to the limited number of Finnish migration studies, see Pekkala & Ritsilä (2000).

In addition, there are still relatively unexplored methodological issues in the literature on migration. One potential difficulty in modelling migration flows is that many of the independent variables cannot be convincingly argued to be truly exogenous. This places some doubts on the results produced by conventional panel data estimation methods. To examine the robustness of the results, we experiment with various GMM estimation models that allow us to instrument potentially endogenous variables with their lagged levels in the dynamic setting, see Arellano & Bond (1991). Although this modelling framework is subject to criticism and proper instruments for potentially endogenous variables are superior to lagged values, we believe that the framework offers the second best solution for testing and dealing with the endogeneity problems, especially since our data set does not offer persuasive instruments for all potentially endogenous variables in the data set. We believe that the question of whether the results of GMM estimations differ from the results of conventional fixed effects models is interesting in its own right.

The rest of the study is organised as follows. The second section provides theoretical underpinnings for empirical models. The third section introduces the data and briefly discusses the evolution of migration flows in Finland. In the next section the empirical model is introduced. The fifth section presents the empirical estimates of the effects that regional labour markets and housing markets have on different migration flows. This section also reports other interesting findings. Conclusions close the study.

2. Theoretical considerations

The underlying motivation for the following empirical part of the study can be derived from the optimising behaviour of individuals. Following Shaw (1986), the probability of migrating to region i, $P(M_i)$ exceeds zero if and only if the difference between the individual's discounted utility streams in location i, $U_i(t)$, exceed the discounted utility streams in the current location o, $U_o(t)$ i.e.

(1) $$0 < P(M_i) \leq 1 \text{, if and only if}$$

(2) $$U_i(t) = \int_{t=0}^{n} Q_i(t)e^{-rt}dt - C > \int_{t=0}^{n} Q_o(t)e^{-rt}dt = U_o(t),$$

where Q refers to the overall (existing or expected) quality of life, r is the discount factor and C refers to the fixed costs of migration. Accordingly, migration can take place if the discounted gross gain from moving exceeds the cost of moving. At the regional level out-migration is an increasing function of the discounted gross gains, whereas in-migration is a declining function of the same gain. Net-migration is then the difference between in- and out-migration and the factors that affect these flows. In particular, it should be noted that the equations above do not necessarily restrict the determinants of utility terms to be the same between gross migration flows. Accordingly, different variables can have similar net-migration effects, having totally different gross-migration effects. This means that the focus on the net migration rates may provide an incomplete picture of the adjustment of regional labour markets.

In this study, we express $P(M_i)_t$ as a function of lagged migration, c(M), labour market characteristics, f(x), housing market variables, h(z), local public sector variables, g(y) and other factors, s(w), that may affect the migration flows:

(3) $$\begin{aligned} P(M_i)_t = {} & c(M)_{t-n} + f(\text{INCOME, UNT, DGDP, EJR, CF})_{t-n} \\ & + h(\text{ACCOPRIC, OWNHOME})_{t-n} \\ & + g(\text{DEBTS, TAXINC, GRANTS})_{t-n} \\ & + s(\text{AGED, UNSK, CRIME, AGRI, ELEC, SERV, PUBL})_{t-n}. \end{aligned}$$

Lagged migration is included to capture the stylized feature that migration flows tend to be persistent in the sense that the rate of net migration is usually positive for the same regions for quite some time. In other words, lagged migration aims to capture the potential state dependence in migration flows. Migration has traditionally been seen as a main device in equilibrating the regional system of labour markets, see e.g. Mueller (1982) and Ghatak et. al. (1996). This equilibrating effect largely depends on regional earnings (INCOME) and regional unemployment (UNT). In neo-classical models of migration individuals are expected to move from high unemployment regions to low unemployment ones (Harris & Todaro, 1970). According to this view, the process equilibrates unemployment and income differences across regions. Unemployment may also serve as an indicator for job opportunities influencing the expected income in a region, see e.g. Pissarides & McMaster, (1990), or, as in the context of hiring function, unemployment may influence the mobility through the activity of the unemployed in job search outside the home region, Jackman and Savouri, (1992). In a similar fashion to UNT, the growth rate of regional GDP (DGDP) may serve as one determinant of overall job opportunities in a region.

Along with the traditional labour market factors that have been related to migration flows, measures of gross job and worker flows are included among the labour market characteristics, viz. the excess job reallocation rate (EJR) and the churning rate (CF), see Davis & Haltiwanger (1999). EJR is an index of simultaneous gross job creation and destruction. If this measure is positive, the magnitude of gross job reallocation in a region exceeds the change in net employment. In other words, EJR is an indicator of the underlying heterogeneity of labour-demand adjustment at the plant-level of the regions. CF, on the other hand, is called the excess worker turnover rate since it compares worker flows with job flows; the larger the magnitude of CF is the larger are the worker flows (hirings and separations of workers) compared with job flows (creation and destruction of jobs). What is more, these variables summarise the job creation/destruction and the hirings/separations in the population of establishments and, thus, provide a more detailed picture of the process of the internal reorganisation of regional labour markets than conventional job turnover variables that are based on aggregate data.

These two factors complement the unemployment rate in examining the effect of labour markets on migration. As Fields (1976) argued, the unemployment rate is an imperfect indicator of regional labour market opportunities. Individuals living in regions with high internal labour market dynamics may have better prospects of finding a job than those living in regions with relatively sluggish labour markets. Similarly, it is possible that individuals move to regions where internal labour markets are dynamic, regardless of high unemployment. By including these variables in the model, it is possible to assess whether the internal dynamics of labour markets provides an explanation for several findings according to which regional labour markets have only a limited influence on migration; for discussion on this issue, see e.g. Westerlund (1998).

There are many ways through which gross and job worker flows may influence migration flows. Contini and Revelli (1997) argue that the movements of jobs and workers are connected to each other via a vacancy chain. The hiring and separation of workers launch a sequence of adjustments at the plant level in a region. This adjustment cannot be totally captured by employing a measure of net employment change. Lazear (1998) argues that young and fast-growing firms are characterized by a great deal of simultaneous hiring and separation of workers (i.e. churning). These are often the same firms that attract migrants from other regions. Finally, Acemoglu (2002) points out that churning is associated with the adaptation of new vintages of technology. This implies that the regions that experience a great deal of churning may be the same regions that stimulate large flows of in-migration, because technological progress at the plant level of the regions provides employment opportunities for recent migrants that have not yet established their labour market positions.

Housing markets have been allowed to affect migration flows through housing prices (ACCOPRIC) and the share owner-occupied houses (OWNHOUSE). Housing has a special role in the evolution of the regional accumulation of resources and in the adjustment of regional labour markets. Individuals need to live relatively close to their working place and housing costs form almost entirely the regional differences in the cost of living in Finland. In particular, it has to be noted that changes in housing prices may have different effects on in-migration and on out-migration. At the receiving end, an increase in housing prices may slow down in-migration since higher accommodation prices may constrain some households who prefer to move; see Cameron & Muellerbaeur (1998). In original locations an increase in housing prices may have two opposite effects; see Böheim & Taylor (2000). On the one hand individuals may cash in on their property and move elsewhere and, on the other hand, the appreciating value of the asset may reduce the propensity to migrate. During the economic downturns, the impact of decreasing housing prices may have a completely different effect on the mobility of individuals. This may generate capital losses to households and, by this means, reduce the propensity to migrate; see e.g. Henley (1998).

Owner occupation (OWNHOME) has recently been connected to higher unemployment both at the regional level (Oswald, 1996) and at the country level (Layard & Nickell, 1999). One explanation for these findings is that owner occupation forms an obstacle to mobility by locking people to regions. If this is the case, higher owner occupation is connected to smaller out-migration flows and to the sluggish adjustment of regional labour markets, which in turn is shown as high regional unemployment. It is interesting to see whether this hypothesis passes the empirical test put forward in later sections.

Public policy, and its impact on the allocative efficiency of the economy in terms of labour mobility, has been under examination in several studies; see e.g. Shaw (1986), Westerlund (1998), Day & Winer (2001) and Fishback et. al. (2001). The controversies about the significance of public policy still exist. For instance, in the Canadian context Shaw (1986) concludes that the fiscal structure that subsidises residence in contracting regions has crowded out the influence of traditional market-based variables on migration. In a recent study Day & Winer (2001) conclude that the impact of public policies have a small impact on the volume of migration. Even though the exact magnitude of the impact of public policies is somewhat uncertain, they have been found to affect migration flows. Thus, their presence is also justified in this study owing to the presence of the large-scale local public sector in a Nordic welfare state.

Since labour market institutions and legislation are similar across Finnish regions, the differences in public policies arise mainly from income transfers to regions. There are three types of fiscal factors controlling for regional differences in the financial situation, viz. long-term debts (LDEBT), received taxes (TAXINC) and state grants (GRANT). The last two variables are directly connected to public policies. Equality among individuals, in terms of schooling, social welfare and health care has been the main argument for state grants (Moisio, 2002). As a result of this, the state grants have been the highest in contracting regions. During the 1990s the state grant system underwent several reforms that almost halved the total sum of state grants paid to regions. This decline has been partially compensated for through the tax system by giving regions a larger share of company taxes. The potential effect of changes in the tax system on migration flows are captured by the TAXINC variable. Finally, LDEBT completes the set of fiscal variables.

When it comes to other determinants of migration flows, differences in the demographic factors of regions influence the potential to generate mobility. It is a common finding in individual-level studies that the young and the highly educated have a higher propensity to move; see e.g. Ghatak et. al. (1996). The proportion of individuals aged 55 or over from the population (AGED) and the proportion of unskilled individuals (basic schooling) from the working age population (UNSK) are included in the model to control for these effects.

Many of the factors above can be placed in the context of push and pull factors that have gained a lot of attention in new economic geography models of economic agglomeration; see e.g. Krugman (1992). Many of these effects have been discussed in regional science before, e.g. in the gravity models; see Mueller (1982). In this study the number of serious crimes per 1000 inhabitants (CRIME) is included as an additional push factor to examine whether regional differences in crime have any effect on migration flows. Finally, industry shares of total production (AGRI, ELEC, SERV, PUBL) are among the factors that explain migration flows. These serve as additional control variables to take account of the economic boom in electronics and the economic downturn in agriculture that are likely to affect the inter-regional mobility of workers across the Finnish regions during the 1990s. Table 1 shows the exact definitions of the variables.

Table 1. The description of the applied variables

Variable	Definition/measurement
The measures of migration flows	
In-migration	Gross inward migration of the prime-aged individuals (15-59) at time t divided by the prime-aged population at time t-1 in region i, %
Out-migration	Gross outward migration of the prime-aged individuals (15-59) at time t divided by the prime-aged population at time t-1 in region i, %
Net-migration	In-migration – Out-migration in region i, %
Labour market variables	
INCOME	Income subject to state taxation in region i / income receivers in region i
UNT	The unemployment rate in region i
DGDP	Change in regional GDP in region i, %
EJR	Excess job reallocation rate = (job creation rate + job destruction rate) - | job creation rate - job destruction rate | in region i
CF	Churning rate = (hiring rate + separation rate) - (job creation rate + job destruction rate) in region i
Housing markets	
ACCOPRIC	Average price of houses in region i, 10 000 FIM
OWNHOME	The share of owner-occupied houses from total area in region i, %
Municipal variables	
DEBTS	Long-term debts in region i / population in region i, 10 000 FIM
TAXINC	Tax revenues of municipalities in region i / population in region i, 100 000 FIM
GRANTS	State grants in region i / population in region i, 100 000 FIM
Other control variables	
AGED	The number of individuals aged 55 + in region i / population in region i
UNSK	The number of individuals with basic education in region i / population aged 15 + in region i
CRIME	The number of serious crime offences in region i / 1000 inhabitants in region i
AGRI	Value added by agriculture in region i / regional GDP in region i, %
ELEC	Value added by electronics in region i / regional GDP in region i, %
SERV	Value added by private services in region i / regional GDP in region i, %
PUBL	Value added by public sector in region i / regional GDP in region i, %

3. The data

The study exploits the regional division in which Finnish regions are divided into 85 sub-regions that correspond to the travel-to-work areas (the NUTS4-level of the EU). Since the borders of these regions closely follow the commuting districts, the data provides excellent opportunities for the examination of the dynamics of regional labour markets. The yearly observations cover the period from 1988 to 1997.

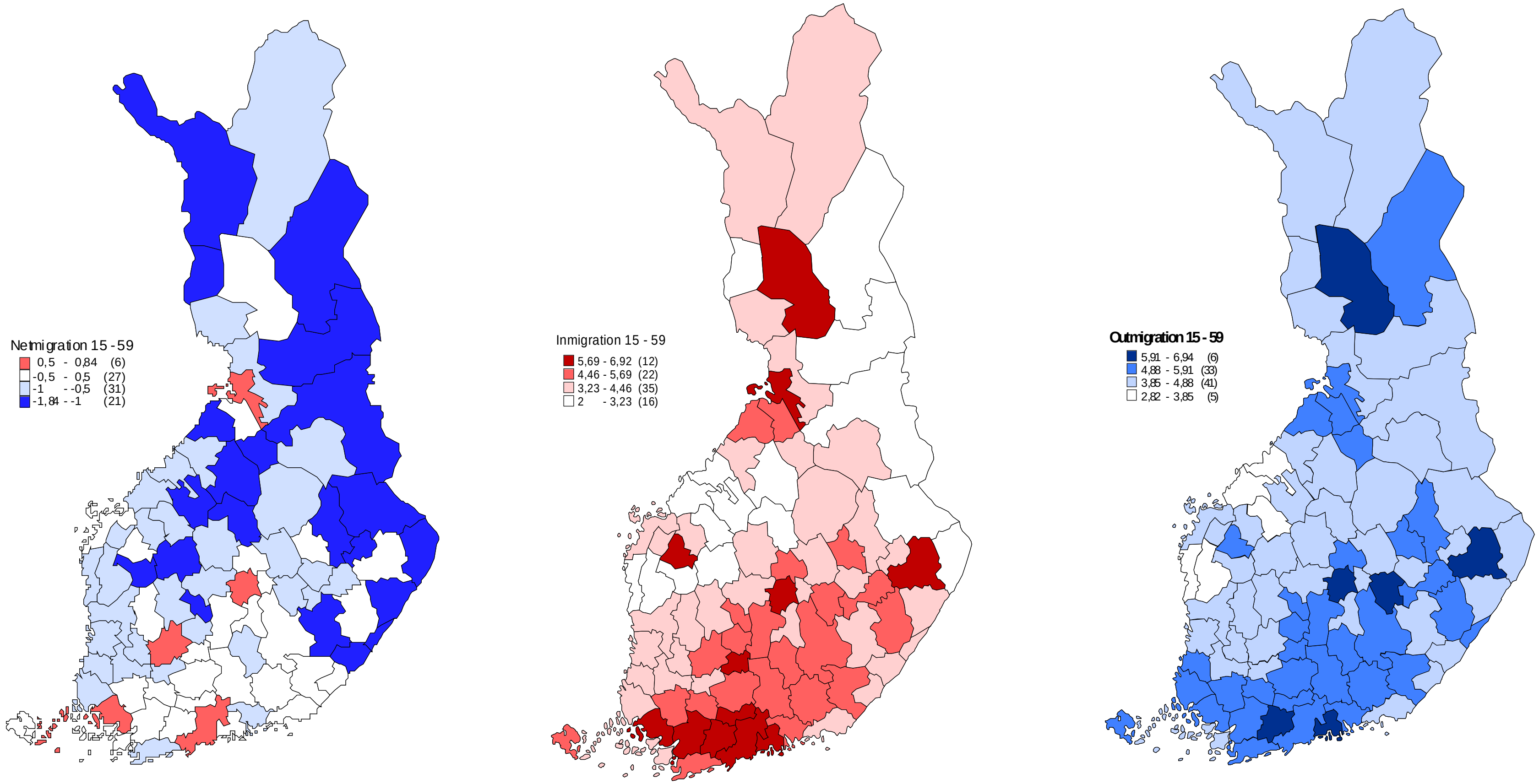
The new measures of the internal re-organisation of regional labour markets are constructed from the longitudinal data on employers and employees; for description of the data set see Böckerman and Maliranta (2001). Job and worker flows that are calculated from this data set measure the number of jobs created/destroyed within establishments and workers moving in and out of establishments (i.e. hiring and separation of workers). Annual job and worker flows are then aggregated to the regional level. Unlike most of the studies on job and worker flows, the measurement of job and worker flows includes all major sectors of the economy, which is essential when examining the relation between the internal and external adjustment of labour markets.

Other variables that describe the evolution of migration flows and the regional economy are collected from various data sources maintained by Statistics Finland. To concentrate on labour market-induced migration, the migration flows correspond to the working-age population aged 15-59. Unfortunately, the data contain information neither on the destination of out-migrants nor the origin of in-migrants. It is hoped that the travel-to-work division of the data is detailed enough to compensate for potential shortcomings caused by the lack of the total migration matrix across regions.

Figure 1 reports the distribution of migration rates across regions. The first striking observation is that during the last decade migration has been concentrating; the net-migration rate is clearly positive only in six travel-to-work areas out of 85. This is in stark contrast with previous experience when the expansion of the public sector resulted in positive net-migration rates in tens of travel-to-work areas. The situation is most severe in eastern and northern Finland where migration has resulted in a reduction of over one per cent in the working age population each year.

Examination of the in- and out-migration rates reveals a strong positive correlation between the two flows with the correlation coefficient of 0.88. In-migration and out-migration rates tend to be especially high in southern Finland and in the university regions of eastern and northern Finland. Figure 1 also reveals that the poor net-migration record in eastern and northern Finland is not caused by specially large out-migration flows. The problem mainly arises from small in-migration rates. These observations point out that there are considerable differences in migration patterns across regions. Examination of the factors behind these patterns is the broad issue of interest in this study.

Figure 1. The net-migration (left) in-migration (middle) and out-migration (right) rates in the Finnish regions (the average from 1988 to 1997)



4. Empirical specifications

Motivation for the dynamic specification of explanatory variables is given in the Treyz et. al. (1993) study in which it is argued that migration may respond to lagged economic variables owing to the time required to collect and act upon the available information. Lagged dependent variables, on the other hand, are employed as catching up potential state dependence in migration flows. To examine this kind of dynamic process of migration flows we specify the following dynamic model:

$$Y_{it} = \sum_{k=l}^{P} \alpha_p Y_{i,t-k} + \sum_{k=l}^{P} \beta_p X_{i,t-k} + \eta_i + \delta_t + \varepsilon_{it} \, . \tag{4}$$

where Y stands for the selected measure of the migration flow and **X** is a vector of explanatory variables. The impacts of these variables are allowed to influence migration flows from lags l to p. The unobserved regional effect, η_i, is taken to be constant over time and specific to each region i. The individual effects are allowed to correlate with the explanatory variables. Any time-specific effects that are not included in the model are accounted by the regional-invariant time effects, δ_t. Finally, the remaining disturbances, e_{it}, are assumed to be independently and identically distributed over i and t.

The model set up in equation (4) can be consistently estimated by employing the Arellano-Bond (1991) GMM method for the first differenced equation. Although differencing eliminates the individual effects, it induces a negative correlation between the lagged dependent variable, ΔY_{it-1}, and the disturbance term $\Delta\varepsilon_{it}$. The Arellano-Bond method overcomes this problem by employing linear orthogonality conditions, $E(Y_{i,t-s}\,\Delta\varepsilon_{it}) = 0$ for t = 3, … , T and $2 \le s \le t-1$ and p = 1, as instruments for the lagged dependent variable. In addition, all leads and lags of strictly exogenous explanatory variables can be employed as instruments for all equations in first differences.

If the assumption that the explanatory variables are strictly exogenous with respect to ε_{it} does not hold, some of the explanatory variables are correlated with the disturbance term as $E(X_{it}\,\varepsilon_{is}) \neq 0$ if $s \le t$. In this case the valid instrument set for period t consists of lagged values of dependent variable $Y_{i,t-s}$, $s \ge 2$ and of the lagged values of endogenous variables $X_{i,t-s}$ $s \ge 2$. Accordingly, the set of valid instruments becomes larger as t increases. Monte Carlo experiments show that the use of a full set of moment conditions in the later cross-sections may result in over-fitting biases in the estimates; see Arellano and Honore (2000). For this reason, it is advisable to remove the least informative instruments from the instrument set.

Dependent variables at time t are based on the migration flows between the last weeks of periods t-1 and t. These are related to a set of strongly exogenous variables and to a set of endogenously determined variables. Strongly exogenous variables are allowed to influence migration flows from periods t-1 and t-2. In the case of endogenous variables, the effects are allowed to arise from the current period, t, and from the period t-1. In what follows, different specifications of both instrument sets and various sets of endogenously modelled explanatory variables are reported. In the most general model several variables describing labour markets, housing markets and the financial situation of municipalities are modelled as endogenous.

Optimally all potentially endogenous variables are instrumented with proper instruments. Unfortunately, our data set does not contain economic instruments that could be argued to be truly independent of migration flows. Consequently, we opted for the second best and employed the lagged levels of potentially endogenous variables as instruments. According to the Sargan test for the validity of instruments, see Arellano & Bond (1991), our endogenous specifications improve the statistical properties of the estimated models. This gives us some confidence that the estimation framework helps to ease potential endogeneity problems.

5. The results

The estimation results are reported in Table 2. The first column (FES) corresponds to the conventional static fixed effects model. The second column (FED) reports the results of the dynamic fixed effects model. The results shown in the next two columns refer to the GMM models. In the GMM1 model only the lagged dependent variables are instrumented. The GMM2 specification applies to the endogenous specification in which EJR, CF, UNT and ACCOPRIC are treated as endogenously determined. To alleviate potential endogeneity problems, all the effects of dynamic specifications are allowed to arise from the time periods t-1 and t-2. Contemporaneous effects are allowed only if some of the explanatory variables are treated as endogenous. For consistency the number of instruments as well as the number of lagged dependent variables has been fixed in all dynamic specifications.[2]

There are few observations worth making when one compares the results of different specifications. First, the results of the static model are in line with other results when one examines the net-migration rate, excluding the unexpected negative sign of the DGDP variable. However, the results of the static fixed effects model differ drastically from the results of dynamic specification in the gross migration equations. This implies that the lack of dynamic adjustment may bias the results in gross migration estimations, which in turn may give rise to unaccurate policy recommendations.

Second, the results of dynamic specifications are well in line with each other. This is a promising result, given that these three specifications share different assumptions concerning the data generating process. There are some implications of endogeneity problems as implied by the SARGAN test statistics for the validity of instruments in the GMM1 specifications, especially since the GMM2 specifications all pass the implemented tests. Encouragingly, however, the qualitative results remain almost the same between the exogenous and endogenous specifications. This finding implies that the potential bias resulting from specifying endogenous variables as strictly exogenous does not seem to be particularly severe when one is modelling migration flows, at least in our case. This is an important observation since it gives additional confidence to previous studies that have largely relied on the assumption of strict exogeneity.

[2] The results are sensitive to neither the number of lagged dependent variables nor the exact number of instruments. These unreported results are available from the authors on request.

Table 2. The results of different specifications

Dependent	Net-migration				In-migration				Out-migration			
	FES	FED	GMM1	GMM2	FES	FED	GMM1	GMM2	FES	FED	GMM1	GMM2
Dependent $_{t-1}$	n/a	0.211***	-0.191**	0.056	n/a	0.240***	-0.122	-0.093	n/a	0.238***	0.268	0.441***
$_{t-2}$	n/a	-0.134***	-0.212***	-0.082	n/a	-0.035	-0.128*	-0.072	n/a	0.032	0.072	0.108
Labour market variables												
EJR $_{t-1}$	-0.001	0.003	0.003	0.033***	0.002	0.002	0.002	0.007	0.004	0.000	-0.005	-0.008
$_{t-2}$	n/a	-0.002	0.001	-0.007	n/a	-0.001	0.001	-0.001	n/a	0.001	-0.003	0.003
CF $_{t-1}$	0.016***	0.002	0.002	0.062***	0.019***	0.002	0.002	0.020*	0.003	0.000	0.002	-0.035***
$_{t-2}$	n/a	0.017***	0.015**	-0.008	n/a	0.007	0.008	0.004	n/a	-0.008*	-0.009*	0.005
UNT $_{t-1}$	-0.027**	-0.027*	-0.018	-0.076**	-0.026**	0.013	-0.007	-0.034	0.001	0.041***	0.015	0.113***
$_{t-2}$	n/a	-0.041**	-0.037	-0.054	n/a	0.001	-0.008	-0.052	n/a	0.040***	0.025	0.010
INCOME $_{t-1}$	0.022**	0.039***	0.034**	0.018	0.005	0.033**	0.040***	0.015	-0.017*	-0.004	-0.005	-0.005
$_{t-2}$	n/a	0.018	0.014	0.055***	n/a	0.008	0.024	0.032*	n/a	-0.014	-0.014	-0.030**
DGDP $_{t-1}$	-0.007**	0.009**	0.013***	0.016*	-0.004	0.010**	0.009**	0.009*	0.002	0.002	-0.004	-0.008
$_{t-2}$	n/a	0.001	0.004	0.005	n/a	0.009**	0.011***	0.010***	n/a	0.007**	0.004	0.004
Housing markets												
ACCOPRIC $_{t-1}$	-0.003	0.020	-0.014	-0.066	-0.043*	0.040	-0.018	-0.119**	-0.040*	0.024	0.037	-0.034
$_{t-2}$	n/a	-0.110***	-0.107***	-0.037	n/a	-0.081**	-0.135***	-0.069	n/a	0.035	0.012	0.056
OWNHOME $_{t-1}$	-0.129***	-0.082***	-0.084***	-0.065*	-0.144***	-0.056**	-0.053**	-0.064***	-0.015	0.014	0.003	0.006
$_{t-2}$	n/a	0.015	0.003	0.007	n/a	0.006	0.012	-0.013	n/a	-0.020	-0.030	-0.025
Municipal variables												
DEBTS $_{t-1}$	-0.011	0.000	-0.013	0.013	-0.005	-0.018	-0.017	-0.019	0.006	-0.023	-0.034	-0.048
$_{t-2}$	n/a	0.064**	0.047	0.045	n/a	0.001	-0.021	-0.001	n/a	-0.064**	-0.062*	-0.047
TAXINC $_{t-1}$	-0.497	0.616	0.096	-0.033	0.212	0.674	0.083	0.046	0.709*	0.062	-0.042	0.009
$_{t-2}$	n/a	-0.625	0.001	-0.104	n/a	0.162	0.063	0.023	n/a	0.656	0.065	0.119*
GRANTS $_{t-1}$	0.161	-0.605	-0.135	-0.217**	-0.228	-0.693	-0.106	-0.161	-0.389	-0.015	0.023	0.073
$_{t-2}$	n/a	1.352**	0.129*	0.151	n/a	1.429**	0.100*	0.141*	n/a	-0.148	-0.048	-0.009

Table 2. Continues

	Net-migration				In-migration				Out-migration			
	FES	FED	GMM1	GMM2	FES	FED	GMM1	GMM2	FES	FED	GMM1	GMM2
Other control variables												
AGED $_{t-1}$	0.256***	0.219	-0.024	-0.120	0.161***	0.163	0.149	0.102	-0.095**	-0.200	-0.004	0.059
$_{t-2}$	n/a	-0.062	0.340*	0.390	n/a	-0.043	-0.058	0.091	n/a	0.195	-0.078	-0.137
UNSK $_{t-1}$	-0.241***	0.244**	0.309	0.638***	-0.239***	-0.062	0.135	0.188	0.002	-0.331***	-0.462***	-0.561***
$_{t-2}$	n/a	-0.030	-0.086	-0.378*	n/a	0.035	0.159	0.060	n/a	0.048	0.216	0.370
CRIME $_{t-1}$	-0.035**	-0.019	-0.015	-0.028	-0.008	-0.019	0.002	-0.001	0.027*	0.000	-0.005	0.009
$_{t-2}$	n/a	-0.026	-0.026*	-0.039	n/a	-0.005	-0.003	-0.008	n/a	0.016	0.009	0.022
AGRI $_{t-1}$	-0.011	-0.002	0.002	0.009	0.003	-0.007	-0.008	0.007	0.014	-0.002	-0.011	-0.009
$_{t-2}$	n/a	-0.013	-0.022*	-0.021	n/a	0.016	0.011	0.005	n/a	0.027**	0.034***	0.022*
ELEC $_{t-1}$	0.027***	0.038**	0.032	0.004	0.029***	0.050***	0.036**	0.032	0.002	0.012	0.001	0.028
$_{t-2}$	n/a	-0.012	0.019	0.048	n/a	-0.005	0.024	0.027	n/a	0.011	0.004	-0.022
SERV $_{t-1}$	-0.012	-0.009	-0.002	0.001	-0.033***	0.002	-0.011	-0.001	-0.022**	0.011	0.003	0.006
$_{t-2}$	n/a	-0.006	-0.016	-0.026	n/a	-0.029**	-0.017	-0.022	n/a	-0.025*	-0.013	-0.001
PUBL $_{t-1}$	0.001	0.030	0.033	0.039	-0.001	0.029	0.037**	0.035	-0.002	-0.003	-0.001	-0.008
$_{t-2}$	n/a	0.010	0.030	0.002	n/a	0.029	0.029*	0.021	n/a	0.018	-0.005	0.013
Test statistics												
WALD	n/a	n/a	0.00	0.00	n/a	n/a	0.00	0.00	n/a	n/a	0.00	0.00
SARGAN	n/a	n/a	0.00	0.56	n/a	n/a	0.02	0.51	n/a	n/a	0.50	0.82
AR(2)	n/a	n/a	0.07	0.22	n/a	n/a	0.89	0.50	n/a	n/a	0.75	0.44
R^2	0.47	0.54	n/a	n/a	0.65	0.74	n/a	n/a	0.80	0.86	n/a	n/a
ρ	0.86	0.93	n/a	n/a	0.87	0.90	n/a	n/a	0.86	0.92	n/a	n/a

Notes: *** (**,*) = significant at the 1 (5, 10) per cent level of significance. n/a indicates that no figure is available. The results correspond to the 1-step estimates. The WALD test is a test for the joint significance of the explanatory variables. SARGAN reports the test statistic for over-identifying restrictions and AR(2) for the second order autocorrelation of the residuals. These test statistics are reported as p-values. ρ reports the estimated correlation coefficient between time periods. In the GMM2 specification the variables modelled as endogenous are allowed to influence migration flows from periods t and t-1.

The results show the strong relation between local labour markets and labour mobility. The overall picture is consistent with several migration theories ranging from neo-classical theories to the theory based on a hiring function. The results indicate that individuals are pushed from high unemployment regions (UNT) to rapidly growing regions (DGDP) with high income. As a new finding, the results confirm that the external and internal re-organization of labour markets is related. Large worker flows at the establishment level (CF) are found to lower the net-migration rate by reducing out-migration from a region. This finding is consistent with the view put forward in Fields (1976), according to which the unemployment rate alone does not necessarily give a complete picture of the job prospects in regional labour markets.

When it comes to housing markets, they seem to form the main mechanism that slows down regional mobility. An increase in regional housing prices reduces net-migration by discouraging in-migration. Interestingly, there is no evidence that housing prices influence out-migration. This contrasts with the locking-in view that links the crash of housing markets at the end of the 1990s with a slow regional adjustment process. One potential explanation for this finding is that the two opposite effects discussed in Böheim & Taylor (2000), i.e. the cashing-in effect and the appreciating value effect, cancel each other out.

The other determinant of housing markets, viz. owner-occupancy, has a downward impact on net-migration. Interestingly, this effect is found to arise completely through lower in-migration rates. There is no statistically significant connection between out-migration and the rate of owner-occupancy. This observation gives support to the results in Oswald (1996) that connected a large owner-occupancy sector to high regional unemployment through the weaker adjustment process of regional labour markets. However, this study offers a completely different explanation for the observed positive correlation between owner-occupancy housing and unemployment. Our results suggest that this follows from the lack of rental housing in potential in-migration regions, not from the unwillingness of the unemployed who own their houses to move.

Turning next to the local public sector, we find that the results indicate that the public sector has a rather minor role in the determination of migration flows across travel-to-work areas. There are some indications that larger debts are connected to lower out-migration and higher municipal taxes to higher out-migration. However, since these results are not unilateral across different specifications they have to be considered with caution. One explanation for the relatively minor impact of local fiscal variables is offered by the Tiebout hypothesis (1956). The hypothesis states that individuals will sort themselves across local communities according to their public good preferences. One of its central assumptions is perfect mobility without any costs. Since moving costs increase with distance, the local public sector can be more important in determining the migration flows within the travel-to-work areas. The migration flows between travel-to-work areas are mainly driven by the opportunities in labour and housing markets.

In addition to the factors above, the empirical models control for regional differences in various other factors such as in demographics and in the industry-structure. These results are well in line with a priori expectations. The share of unskilled individuals to the working age population (UNSK) has a statistically significant, downward impact on out-migration. The finding is not surprising, given that it is well-reported that the highly educated are more mobile than individuals with low education.

Another factor shaping the migration flows is the industry-structure of a region. Finland recovered from an exceptionally deep recession of the early 1990s via an export-led recovery. This was, to a large extent, driven by the electronics sector, in which both production and employment improved quickly. A boom in electronics is reflected in the results as an increase in both in- and net-migration. Unlike the electronics sector, the agricultural sector has been steadily declining during the 1990s. This has induced an increase in out-migration from regions where the share of agriculture is high, other things being equal.

To get a sharper picture of the relative significance of different labour market and housing market variables, Table 3 reports the long-run effects of standard deviation changes in variables[3]. By this means, it is possible to combine the information included in the parameter estimates with the actual distribution of variables across regions and in time.

[3] The long-run effects of the model $Y_{it} = \alpha_1 Y_{it-1} + \alpha_2 Y_{it-2} + \beta_1 X_{it-1} + \beta_2 X_{it-2} + \ldots$ are calculated as $\left(\frac{\beta_1}{1-\alpha_1-\alpha_2}\right)\times$ (a standard deviation in X_{t-1}) + $\left(\frac{\beta_2}{1-\alpha_1-\alpha_2}\right)\times$ (a standard deviation in X_{t-2}).

Table 3. The long-run impact of a standard deviation change in labour and housing market variables on migration flows in dynamic models

	Net-migration			In-migration			Out-migration		
	FED	GMM1	GMM2	FED	GMM1	GMM2	FED	GMM1	GMM2
Labour markets									
EJR	0.01	0.02	0.20***	0.01	0.02	0.04	0.01	-0.10	-0.09
CF	0.13***	0.07**	0.31***	0.07	0.05	0.12*	-0.07*	-0.07*	-0.39***
UNT	-0.58**	-0.31	-0.99**	0.14	-0.10	-0.58	0.88***	0.48	2.11***
INCOME	0.63***	0.35**	0.71***	0.53**	0.52***	0.41*	-0.25	-0.29	-0.78**
DGDP	0.07**	0.08***	0.13*	0.15**	0.10***	0.10***	0.08**	0.00	-0.06
Housing markets									
ACCOPRIC	-0.08***	-0.07***	-0.08	-0.04**	-0.10***	-0.13**	0.06	0.06	0.04
OWNHOME	-0.31***	-0.25***	-0.24**	-0.27**	-0.14**	-0.28***	-0.03	-0.17	-0.17

Notes: *** (**,*) implies that at least one of the parameter estimates reported in Table 2 is significant at the 1 (5, 10) per cent level of significance. For the calculation of the effects, please see Footnote 3.

The long-run estimates show that an increase in the dynamics of internal labour markets merely slows down the out-migration in high unemployment regions. The long-run effect of a standard deviation change in the churning rate (CF) varies between –0.07 and –0.39, whereas the corresponding figure for the unemployment rate varies between 0.88 and 2.11[4]. Accordingly, a rise of eight percentage points in the regional unemployment rate results in an increase in the out-migration rate of some 1-2 percentage points, other things being equal. This finding is consistent with several previous findings which state that the unemployed are more mobile than the employed; see e.g. Herzog et. al. (1993).

The long-run effects of other local labour markets variables, viz. INCOME and DGDP, are fairly robust to variations in the specification of a model. These two factors form the pulling element of labour markets, individuals moving to high

[4] The long-run effects of CF and UNT on out-migration are larger in specifications in which these variables are modelled as endogenous (GMM2). Even though this is an important topic in its own right, the question of whether this is an artefact caused by the estimation method or the actual underestimation due to false assumption of exogeneity had to be left for future study. There are three reasons for this. First, the conclusions concerning the statistical significance of parameter estimates and the relative importance of the internal dynamics of labour markets and the unemployment rate are robust to variations in specification. Second, the other long-run effects are relatively robust to changes in specification. Third, we do not have any convincing instruments in our data set.

income and rapid growth regions. Interestingly, the results imply that regional differences in income have a larger impact on in-migration than regional growth differences, even after controlling for observed differences in job opportunities and in the industry structure. The long-run impact of a one-standard deviation change in INCOME on the in-migration rate is found to be around 0.50, the corresponding figure for DGDP centring around 0.10. Since these two factors do not have any significant impact on out-migration, the relative differences remain in the net-migration rate equation.

Housing markets were found to reduce in-migration to regions with high housing prices and a large share of owner-occupancy housing. The long-run effects of regional variation in these variables are estimated to be around –0.10 and –0.20, respectively. The finding that owner-occupancy has a larger impact on in-migration than housing prices may mean one of two things. The structural explanation focuses on the lack of the rental sector in rapidly growing regions that force some of the potential migrants to abandon their migration plans. Provided that this mainly affects the low income households, the finding that owner-occupancy reduces in-migration offers an additional explanation for selective mobility reported in the Finnish context in Ritsilä (2002). The lack of rental housing results in selective in-migration, in which case highly educated, skilled individuals are observed to move to growth centres.

An alternative explanation for this negative dependence is connected to the regional division employed in the study. It may be that individuals who move for work-related reasons are not able to choose between job opportunities in different travel-to-work areas. This together with large regional differences in housing prices, means that the lack of rental housing creates a more severe constraint for mobility than housing prices. The latter is likely to play a much larger role in determining short-distance migration within travel-to-work areas.

When it comes to the long-run impacts of other variables (not reported in Table 3), these results imply that the main determinant of migration flows is the share of unskilled individuals to the working-age population (UNSK). The estimated impact of UNSK is identical across different specifications, a one-standard deviation change (around six percentage points) causing a reduction of two percentage points in the out-migration rate. The corresponding increase in the net-migration rate is estimated to be over one percentage point. Accordingly, the influence of UNSK on the mobility of the working-age population is as large as that of regional unemployment, in absolute terms.

All in all, the results imply that migration equilibrates regional labour markets. People are pulled to regions with a high income and rapid economic growth from regions where job opportunities are scant. This adjustment process is, however, slowed down by a large share of prime-age individuals with only basic education living in departing regions. Another constraint for regional adjustment is created by housing markets. High housing prices and a large share of owner-occupancy in potential destination regions discourage mobility. The industry-structure of a region either enhances or slows down mobility, public policies having little significance in this adjustment process.

6. Conclusions

The aim of this study was to explore the impact of local labour markets and housing markets on the mobility of the working-age population. The analyses were carried out by means of an examination of both net migration flows and gross migration flows between Finnish travel-to-work areas during the period of 1988-1997. As a new feature the study incorporated the internal restructuring of local labour markets into migration studies. In addition, the robustness of the results was scrutinized by various empirical specifications that rely on different assumptions about the adjustment process and the exogeneity of the explanatory variables.

The results connect regional unemployment and the internal restructuring of local labour markets to the out-migration rate. High unemployment increases the mobility of the working-age population out from a region. Out-migration is alleviated if internal labour markets are dynamic, i.e. job and worker flows at the plant level are frequent. The internal restructuring of labour markets cannot, however, totally offset the pushing effect of high unemployment. Despite this, the importance of internal labour market restructuring in explaining the observed migration flows calls for further studies – both theoretical and empirical.

The in-migration rates are mainly influenced by the income level of a region, its economic growth and housing markets. The first two factors tend to increase in-migration, whereas housing prices and the lack of rented housing tend to reduce in-migration into a region. The results imply that the share of owner-occupancy housing affects only the in-migration rate and has no significant effect on out-migration. There are no signs that owner-occupied housing locks in the unemployed into high unemployment regions, at least in the Finnish context. This finding leads to a policy conclusion according to which an expansion in the rental housing sector is likely to improve the matching process of regional labour markets. This, in turn, reduces large and persistent regional disparities in unemployment and, hence, structural unemployment.

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Appendix 1. *Descriptive statistics from 1989 to 1997*

	Mean	s.d.	Min	Max
The measures of migration flows				
In-migration	4.33	1.28	1.61	8.54
Out-migration	4.89	1.02	2.04	8.47
Net-migration	-0.56	0.76	-2.69	3.17
Labour market variables				
INCOME	71.09	10.76	42.55	116.57
UNT	15.83	7.73	0.80	34.05
DGDP	1.08	6.48	-22.31	32.87
EJR	25.16	7.88	8.63	84.35
CF	20.61	5.84	7.27	51.58
Municipal variables				
DEBTS	4.99	1.55	0.95	12.02
TAXINC	0.08	0.01	0.05	0.16
GRANTS	0.08	0.02	0.02	0.14
Housing markets				
ACCOPRIC	4.53	0.78	3.61	10.73
OWNHOME	67.51	4.39	53.00	77.00
Other control variables				
AGED	26.66	3.77	17.45	39.34
UNSK	51.86	5.26	35.42	65.60
CRIME	4.39	1.97	1.04	12.26
AGRI	15.18	9.29	0.34	41.98
ELEC	3.11	3.65	0.00	47.85
SERV	32.31	7.32	17.66	63.51
PUBL	20.24	5.54	8.11	40.13

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