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Worker Turnover, Structural Change and Inter-Regional Migration: Some Finnish Evidence*

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Abstract

We study the effects of regional labour market conditions on inter-regional migration using province-level panel data on bilateral migration flows and disaggregated labour market flows. Our results indicate that hires from unemployment and job separations leading to unemployment have sizeable effects on migration. The effects of hires from and separations to other labour market statuses, while also significant, appear smaller. Further, our results suggest that inter-industry and inter-firm shifts in employment are immaterial for migration. Taken together, inter-regional migration is largely dependent on unemployment and the employment possibilities available for the unemployed in regions.

Keywords: Inter-regional migration, job flows, worker flows, worker turnover, unemployment, GMM estimation

JEL codes: J61, J63

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1 Introduction

Inter-regional migration and its determinants has been the subject of numerous empirical studies during the last decades. Regardless of whether micro-level or macro-level data is used, measures related to labour markets are routinely included as explanatory variables in migration models. Despite the improved availability of more detailed regional-level labour market data and various theoretical arguments suggesting otherwise, the majority of studies use the regional unemployment rate as the key labour market variable. Arguing that also other aspects of local labour markets may be of relevance to potential migrants, some authors have used additional variables to explain migratory behaviour. Recent examples of this include Gallin (2004), who includes the future conditions of the labour market, Carlsen, Johansen, and Røed (2006), who include measures of labour market tightness and, with Finnish data, Hämäläinen and Böckerman (2004) who include excess job turnover and churning variables. Exceptions of this kind are still rare, so that the overall picture remains unclear. However, it can be concluded that the additional aspects considered in the aforementioned studies are of importance.

This paper aims at further contributing to the literature by considering some new variables to characterise local labour markets and to explain inter-regional migration flows. Using disaggregated job and worker flow data, we construct measures closely related to those local labour market phenomena which, according to theoretical ideas and evidence from micro-level studies, have potential to influence migration decisions. More specifically, we explore the roles of worker turnover disaggregated by associated labour market transition of the worker, structural change in employment, or job reallocation across industries and establishments, and 'churning' as determinants of migration. By using Finnish province-level panel data on bilateral migration flows we are able to simultaneously identify the effects of source and destination regions' characteristics on migration between the two regions. Our key explanatory variables come from a linked

employer-employee data with a sufficient degree of disaggregation. To add to the reliability of our results, we address potential endogeneity of the labour market variables by using GMM estimation technique. The results give a clear picture of what are the salient labour market determinants of migration.

The standard theoretical framework in the majority of earlier empirical studies is the so-called human capital approach of migration. It suggests that a potential migrant moves to the region where local labour market possibilities offer the highest return on her human capital. As in the theoretical model, the rate of unemployment in a region is used as the proxy variable for the probability of getting a job in that region in empirical models. This kind of approach has some shortcomings both in terms of its realism and its fit to the actual data, as has been argued by many authors before. Firstly, the theoretical view rules out the possibility of inter-regional job search. Secondly, the share of unemployed in the labour force may not satisfyingly characterise the relevant aspects of the labour market possibilities, which could be one reason for the failure of some of these studies to find any effect for the unemployment rate. When the possibility of inter-regional search is taken into account and the tools of job search theory are used, it seems natural to view most inter-regional moves as outcomes of successful inter-regional search activity by the migrants; see Jackman and Savouri (1992). Within this framework, labour market dynamics, hires and job separations, becomes a more relevant characteristic of the local labour market than the static level of unemployment alone. Since data on these phenomena is increasingly available, it feels natural to apply it to empirical investigation of the determinants of migration.

Our results show that variation across regions in neither the level of unemployment nor the aggregate net change in employment alone is able to satisfactorily explain inter-regional migratory flows. Rather, hires and job separations in regions have sizeable effects on migration. Hiring by local employers hinders out-migration and increases in-migration whereas job separations increase out-migration and decrease in-migration.

The effects of these labour market flows are found to be strongly heterogeneous with respect to the source labour market status of the hired workers and destination status of the separated workers. Specifically, our results reveal that a hire from or a separation into unemployment has, in general, larger effect on migration than a hire from or a separation into employment or outside the labour force. These novel results are both in line with previous micro-level evidence on individual migration propensities and in accordance with theoretical ideas of the labour market and mobility. We also find that simultaneous hiring and separation by the employers has a negative effect on in-migration, possibly reflecting increased competition for jobs. Even though there occurs a lot of changes in the structure of employment, i.e. employment shifts between industries and plants within regions, we do not find evidence that this would matter for inter-regional migratory behaviour.

The paper is organised as follows. In Section 2, we briefly discuss the background and sketch the theoretical underpinnings of the paper. Section 3 describes the data and defines the variables. In Section 4, we introduce the methodological strategy. Section 5 presents the empirical results and discussion and Section 6 concludes.

2 Background and Theory

The theoretical treatment of migration dates back to the human capital framework by Sjaastad (1962). A similar line of thinking is adopted in the classic two-region model of migration by Harris and Todaro (1970). The central feature of the framework is that by moving or staying individuals maximise the expected return on their human capital. The expected return in a region depends on local labour market opportunities, consisting of the probability to be employed and the wage level. The human capital approach has since then been widely used in theoretical and empirical studies relating local labour markets and migration. Following the example of the theoretical

Harris-Todaro model, most empirical studies use unemployment rate as the variable characterising local labour market conditions. In some papers, also the net growth of employment has been used. However, as already Fields (1976, 1979) has pointed out, these variables are not necessarily sufficient to capture the features of the labour market that are relevant to individuals who make migration decisions. This means that they fail to correctly measure the labour market opportunities for potential migrants, which could explain the mixed empirical results on the effect of unemployment in the literature. Further, the theoretical job search framework of migration and empirical results supporting it by Jackman and Savouri (1992) underscores the importance of additional variables.

In assessing which aspects of local labour markets could be of importance for migration, possible empirical characterisations of local labour markets and relevant labour theories can be consulted with. Recently, empirical studies of job and worker flows have been able to characterise labour markets in a more elaborate way than has been possible with pre-existing datasets. These studies suggest that the level of unemployment and the net changes in employment hide behind them a considerable amount of dynamics in the market; for recent documenting, see Davis, Faberman and Haltiwanger (2006). Generally speaking, there occurs a lot of simultaneous creation and destruction of jobs, or hiring and separation of workers. This is not reflected in the net figures. Yet, incidence of simultaneous hiring and separation is likely to reflect changes in the conditions of or competition in the labour market. This is particularly true if hires take place in different industries or firms than simultaneously occurring separations. In this case, the structure of employment changes. Following Dunne, Roberts and Samuelson (1989), several authors have used data on industry-level job flows to quantify structural change. On the other hand, many recent studies of labour market flows have focused on the fact that aggregate figures of hires and separations of workers may represent various kinds of labour market transitions. The source of hired and the destination of

separated workers may be employment, unemployment or other labour market states. Yashiv (2008) surveys studies of U.S. labour market dynamics. The author makes a clear distinction between different kinds of flows and reports that the flows differ in the way they behave over the business cycle. To the extent that the aforementioned labour market dynamics reflect the employment possibilities, or changes in them, for potential in-migrants or out-migrants, it is worthwhile to include measures of them in an empirical analysis of migratory flows.

In addition to simply postulating that the aforementioned measurable phenomena in labour markets are linked to inter-regional migration, some theoretical views to back up this claim can be found. For this, we take the job search theory as our starting point. We share the view of Jackman and Savouri (1992) and consider the migrations of workers as outcomes of successful inter-regional job search[1]. Within this framework, it is clear that every open vacancy in a region can be applied to by workers from the same region or from the other regions. Therefore, every hire in a region may involve an inter-regional match between a worker and a job. Also separation of workers from their jobs in a region are likely to affect inter-regional matching. Our intuition is that job separations matter predominantly by changing the competitive situation in the labour markets. Those workers who quit or were laid-off are probably different from other workers with respect to their job search behaviour. For example, workers who lose their jobs and begin searching for new employment may increase the competition for jobs in the region which, in turn, narrows the relative labour market possibilities of other job seekers. Noticing that all hires and separations matter and that these two flows of workers are different in nature has some implications for the characterisation of regions' labour markets in a model of migration. Although the magnitude of the effects of the flows is eventually an empirical question, it is clear that these effects may

[1]For our empirical strategy, this perspective is useful and natural but not imperative. Assuming the contrary, that the workers move first to search for a job in another region, would not imply changes in our method or the qualitative conclusions based on the results.

not be properly captured by using the net change in employment as the measure of labour market dynamics.

In theoretical job search literature, search behaviour and job finding probabilities are seen to be distinct for individuals in different labour market states. Clearly, the distinction can arise from differences in factors such as search costs, reservation wage and employers' perceptions of the applicants. The differences in search behaviour are likely to translate into differences in migration probabilities. Indeed, studies using micro-level data have shown that workers with different labour market statuses (and other characteristics as well) differ in their propensity to migrate; for recent micro evidence from Finland, see Nivalainen (2004). Most importantly, personal unemployment increases the propensity to migrate. This finding is in line with a result of some migration studies using regional-level data, namely that regions with high unemployment experience greater out-migration; see e.g. Jackman and Savouri (1992). This result is still more commonly interpreted differently, so that high unemployment rate indicates poor labour market possibilities and thus increases out-migration. Whereas the unemployment rate may correctly capture some of the salient differences in individual migration propensities, we maintain, as has been discussed earlier, that its ability to measure labour market possibilities is likely to be limited. Therefore, characterisation of the labour market possibilities by more accurate indicators is needed. More specifically, theory and micro-econometric evidence encourages to, in some sensible way, separate between employment possibilities primarily available for the unemployed and those presumably available for the workers in other labour market statuses.

We have already discussed the importance of the whole array of hires as employment possibilities to job seekers from other regions. This line of thinking suggests that simultaneous hiring and separation activities may be of relevance to potential migrants. To the extent that breaking worker-job matches and the new ones created are not similar in the required skills and other requirements for the workers, in-migrants from

outside the region may be better suited to the newly created jobs. Mismatch between job seekers and job opportunities may occur for example in the case of structural change where employment shifts to other industries or firms. Thus it is possible that structural change has some implications for inter-regional migration. This is a question we will also address in our analysis by using disaggregated worker flow data.

Molho (2001) and Burda and Profit (1996), among others, have studied inter-regional job search, matching and resulting labour mobility theoretically. Although it is not possible to derive the aforementioned hypotheses from these theoretical models, an empirical analysis of inter-regional migration can benefit from some of the views presented in these papers. The models highlight that the labour market conditions of both source region and potential destination regions affect migration through inter-regional search behaviour. Therefore, we believe that the possibility to simultaneously include variables concerning migration flows' source region and destination region in the empirical model will add accuracy to our results.

3 Data and Empirical Specification

To model inter-regional mobility we use data on gross bilateral migration flows of people in economically active age (15-74) between 19 Finnish provinces in the years 1988-1996[2,3]. This data provided by Statistics Finland covers all registered moves i.e. every change in the registered place of living of Finnish inhabitants. Since, according to the law, every Finnish inhabitant is obliged to have a registered address and inhabitants are only eligible for the public services in their home municipality, the data is of high accuracy and likely to capture virtually all the residential moves. Altogether, the data consists of 342 units of observation which are the province pairs. In the analysis, we are able to use a total of 2736 observations.

[2]For descriptive statistics of the variables in the data, see the Appendix.

[3]Due to the special character of the region and due to lack of some data we exclude the autonomous island of Åland from the analysis.

The key set of explanatory variables is obtained from a linked employer-employee data[4]. The data includes province-level gross rates of job creation and destruction as defined in Davis, Haltiwanger and Schuh (1996) and worker flows into and from employment. Worker flows into and out of employment are further disaggregated in an important way. For both flows we can separate between the flows from and into unemployment and the flows from and to other labour market states. Carlsen *et al.* (2006) provide some evidence on the effects of flows from unemployment to employment. They measure 'local labour market tightness' by the rate at which local unemployed workers aged 25-59 years exit from unemployment. The authors argue that this variable can be interpreted as the rate of transitions from unemployment to employment and find that it has a statistically significant positive effect on in-migration to Norwegian counties. With our data, we are able to directly, and thus more accurately, measure transitions from unemployment to employment at the plants of a given province. Further, as is appropriate, hires from other provinces are counted in.

In addition to the aforementioned use of the data on labour market flows, we use it to identify the potential effects of structural changes in the local labour markets on migration. For this, we exploit another dimension of disaggregation in the data. Both job and worker flows are disaggregated by industry. Thus, the data can be used to quantify the degree of employment shifting between industries and between plants within industries. The combination of job and worker flows also allows us to calculate a variable reflecting excess worker turnover (churning).

The empirical migration equation to be estimated is

$$\log\left(\frac{M_{ijt}}{Pop_{ijt}}\right) = \alpha_{ij} + x'_{ijt}\beta + \epsilon_{ijt}, \tag{1}$$

[4]We would like to thank Petri Böckerman for making this data available. For description of the data, see Böckerman and Maliranta (2001). An earlier paper utilising variables from the same employer-employee data to study migration flows in a similar setting is Hämäläinen and Böckerman (2004).

where M is the number of migrants aged 15-74 years, Pop is the total population aged 15-74 years and x' is a vector of explanatory variables. The indices i, j and t stand for source province, destination province and year, respectively. Parameters of the model are α, the fixed effect of a particular pair of provinces, β, the coefficient vector and ϵ is the error term.

The elements of vector x' that are of interest in this paper are the variables characterising local labour markets of source and destination provinces. In addition to the conventional labour market variables such as the unemployment rate, the wage rate and net change in number of jobs and unemployment rate, we calculate variables that describe the dynamics of the labour markets in two aforementioned separate dimensions. In the following detailed introduction of our variables, we leave out the indices to simplify the expressions. All the variables are calculated for each of the provinces and for every year.

Our flow data covers business sector establishments, excluding farming, public sector and social and personal services. Using employment figures together with job flow and worker flow rates we are able to calculate measures for disaggregated numbers of hires and separations in this sector of economy. Specifically, we use the following disaggregated variables in our baseline specifications: Hires from unemployment (HU)[5], hires from other sources i.e. from employment and outside the labour force ($HOTH$), separations into unemployment (SU), separations into other destinations ($SOTH$) and industry-specific hires and separations (H_k and S_k, where k denotes the industry). Since our hire and separation variables exclude some industries, we also control for the net change in employment in these ($NETO$). The flows, as well as most other variables (those representing absolute numbers) are scaled with population aged 15-74 years in the province.

To further assess the effects of provinces' labour markets, we include several other

[5]The definitions of variables can be found in the Appendix.

variables in our model. As in the majority of earlier studies, unemployment rate (U) and wage level (in 1 000 euro) ($WAGE$) are included. Wage level is calculated as the total wage income divided by the number of wage earners in the province. We control for the industrial composition of jobs in provinces and the differences in industrial composition between the source region and the destination region. For this, we include the shares of jobs in agricultural (JOB_{pri}), industrial (JOB_{ind}) and construction (JOB_{constr}) sectors in the source and destination region. Industrial dissimilarities between the two regions are captured by an index parallel to the 'comparability index' in Jackman and Savouri (1992). More specifically, the dissimilarity index (DIS) is calculated as the sum of squared differences (between the source and the destination) in the shares of 14 industries.

To sufficiently control for other factors possibly affecting migration, we include an extensive set of province-level variables. For the source province, we control for demographic characteristics of the population. These controls include the number of population aged 15-74 years with different education levels (5 categories), the number of inhabitants in different age groups (6 categories), the number of children, the number of elderly people (above 74 years) and the number of retired people aged 15-74 years, all divided by the total aged 15-74 years. For both source and destination province, we control for the share of owner-occupied housing, the number of newly enrolled university students (divided by population aged 15-74 years), the share of population living in municipalities classified as urban areas and the share of population living in municipalities classified as densely populated areas. Also average house prices and rents (per square metre) are included for both provinces to account for differences in living costs. To account for the possible substitutive role of commuting in migration decision, we include the ratio of the number of employed inhabitants to the number of jobs which measures the net inter-regional commuting of workers. In all regressions,

we also include year dummies[6].

4 The Estimation Method

In some recent studies of inter-regional migratory flows, it has been noted that not only labour market conditions affect migration, but reverse may also be true; see e.g. Hämäläinen and Böckerman (2004) and Furceri (2006). Theoretically, this may occur, for example, if a positive exogenous in-migration shock increases labour supply in the region. This could lead to an increase in the number of jobs, a reduction or an increase in the unemployment rate and a change in the wage rate. For this reason, possible endogeneity of regressors needs to be taken into account in the statistical analysis. Further complication arises from the possible dynamic nature of migration. In some earlier studies, past migration flows are found significant in explaining the subsequent flows. In a fixed effects panel setting, including the lagged dependent variable is likely to bias the estimates. We try to solve these problems by utilising the panel nature of our data and using the dynamic panel data GMM method by Arellano and Bond (1991) in estimating equation (1)[7]. In the method, equation is first differenced and then estimated using the generalised method of moments. Arellano and Bond (1991) have shown that in a panel context two or more periods lagged values of the endogenous regressors and the dependent variable can be used as the instruments. Regressors that are predetermined rather than endogenous need to be lagged one period. To keep the instrument matrix reasonable in size, our instrumenting strategy is to use only the two period lagged values of endogenous regressors and only one period lagged values of predetermined regressors[8]. We further restrict our set of instruments to include only the twice lagged dependent variable and the lagged labour market variables (i.e.

[6]For the sake of brevity, the results concerning these additional controls are not reported in the tables but briefly commented in text whenever noteworthy.

[7]All models are estimated by Stata xtabond2 module created by David Roodman (2003).

[8]E.g. Windmeijer (2005) considers restricting the number of instruments as an advantageous strategy.

the hiring and separation variables (lagged twice), net change in employment in other industries (lagged twice) and the unemployment rate (lagged once)). This leads the number of instruments in our models to range from 68 to 124, which we consider sufficiently large but not excessive. It should be noted that all the variables included in the instrument matrix serve as instruments for all the regressors. Instead of relying only on lagged regressors as instruments, we have added some 'genuine' instruments. These are investments divided by GDP and exports divided by turnover in the firms located in the province. These variables are one-period lagged and included for both the source and the destination region. We believe that these instruments are valid in the sense that they are likely to affect the labour market events in a region but are not linked to out-migration or in-migration directly.

Using the described method to estimate an equation in first differences has been shown to have some potential weaknesses. Arellano and Bover (1995) and Blundell and Bond (1998) have suggested that a problem of weak instruments may be present, especially if the time series of regressors are highly persistent. To correct for this, the authors propose an alternative method (system GMM) where additional moment conditions are introduced. In the case of our data, we believe that weakness of instruments is not a major concern with the difference GMM method since the variables of interest, in particular the flow variables, are not very persistent over time. Moreover, according to simple correlation coefficients, twice lagged level variables have better predictive power for first differenced variables than twice lagged differences have for level regressors. Therefore, we find the difference GMM method as suitable, and preferable, for our aims. In particular, we use the two-step GMM estimator since it, with an appropriate finite sample corrected variance estimate, has been found to be superior to the one-step estimator; see Windmeijer (2005).

5 Results

The key findings of the analysis are reported in Table 1, where we present three alternative specifications for the migration equation. Specification (a) includes the total hiring and total separation variables. In specifications (b) and (c), these variables are decomposed by labour market status of workers and by industry, respectively.

The impression from the results in column (a) is that there is something wrong with the model specification. None of the coefficients shown in the column is statistically significant. The probable explanation for this is found by looking at the results from specification (b), where worker flows are disaggregated by source and destination labour market statuses. We can see that the effects of flows differ markedly in size depending on the source and destination labour market status. Thus, in specification (a), there are incorrect restrictions on the coefficients. We believe that this is the primary reason for the insignificance of the coefficients in that specification. In (b), most coefficients are of expected sign and many of them are significantly different from zero. For the source region, hires from unemployment by employers (HU) has a sizeable and statistically significant negative coefficient. In contrast, the coefficient of hires from other sources ($HOTH$) is statistically insignificant. Therefore, hiring hinders out-migration in so far as unemployed workers are hired. We do not find statistically significant effects for worker separations on out-migration but the signs of the coefficients are as expected. Further, we are able to identify the result commonly found in earlier literature, that more out-migration occurs when the rate of unemployment is higher. Also, net change in employment in other sectors hinders migration[9].

The results concerning the destination region from specification (b) underline different features of the labour market than the ones which were of importance in the source region. Most importantly, the unemployment rate of the province does not enter

[9]An analysis with industry-disaggregated $NETO$ reveals that the (mostly negative) net changes in agricultural employment are behind this result. Thus, decreases in agricultural employment have had a role in driving people away from some provinces.

Table 1. Determinants of Inter-regional Migration. Two-Step GMM with Windmeijer Correction..

	(a)		(b)		(c)	
Source province (out-migration)						
H	3.05	(3.63)				
HU			-31.24***	(10.51)		
$HOTH$			0.14	(1.71)		
H_{ind}					-1.27	(2.33)
H_{constr}					-1.74	(5.07)
H_{serv}					4.63*	(2.81)
S	3.50	(9.12)				
SU			-3.98	(4.99)		
$SOTH$			-0.19	(2.36)		
S_{ind}					-1.47	(3.01)
S_{constr}					5.97	(7.92)
S_{serv}					-0.26	(5.21)
$NETO$	-17.54	(14.45)	-6.24**	(3.14)	-1.20	(3.85)
U	14.18	(10.52)	11.38***	(2.66)	-0.84	(2.58)
$WAGE$	0.01	(0.16)	0.07	(0.06)	0.01	(0.04)
JOB_{pri}	0.08	(11.62)	8.62	(5.52)	0.61	(4.66)
JOB_{ind}	5.61	(5.85)	2.08	(3.92)	-0.28	(3.13)
JOB_{constr}	-10.51	(9.33)	6.26	(5.02)	4.13	(5.55)
Destination province (in-migration)						
H	2.37	(2.52)				
HU			17.76**	(8.6)		
$HOTH$			-0.48	(1.35)		
H_{ind}					1.76	(1.85)
H_{constr}					5.47	(4.22)
H_{serv}					4.03*	(2.09)
S	-3.11	(3.55)				
SU			-17.25***	(3.41)		
$SOTH$			-4.59**	(1.83)		
S_{ind}					-2.44	(2.29)
S_{constr}					-5.66	(6.32)
S_{serv}					-8.54**	(4.34)
$NETO$	-6.45	(4.36)	2.96	(2.8)	1.73	(2.95)
U	4.14	(4.21)	-2.80	(2.24)	-1.86	(1.82)
$WAGE$	0.08	(0.09)	0.07*	(0.04)	0.06**	(0.03)
JOB_{pri}	-2.38	(5.81)	-0.50	(2.68)	-5.09*	(2.61)
JOB_{ind}	-0.41	(5.11)	1.01	(2.8)	-4.71**	(2.37)
JOB_{constr}	6.60	(6.16)	6.34	(4.31)	1.47	(4.84)
DIS	-9.72	(27.9)	-8.19	(14.59)	-1.97	(9.4)
$lagdep$	-0.28	(0.24)	-0.01	(0.11)	-0.03	(0.09)
No. of instruments	68		96		124	
Hansen	0.637		0.853		0.031	
AR(2)	0.536		0.562		0.382	

Dep. var.: log migrants from source to destination province per 1000 inhabitants in source. N = 2736. Additional controls (see text) and year dummies included. Robust standard errors in parentheses. (*) denotes significance at 10% level, (**) at 5% level and (***) at 1% level.

significantly, even though the coefficient has the expected sign. Worker flows seem to matter more. Worker flow from unemployment to employment (HU) enters positively and significantly. Meanwhile, hires from other sources do not seem to have a role in attracting migrants. Flows from employment to unemployment (SU) and to other destinations have statistically significant negative effects, although the effect of the flow to unemployment is distinctively larger. Further, higher wages are associated with higher in-migration. Measures of industrial structure and its dissimilarity between the source and the destination region enter without statistical significance.

The results from specification (c), where worker flows are disaggregated by industry, implies that sectoral boundaries do not generate the aforementioned heterogeneity in the effects of labour market flows. Our data contains an industry classification of seven industries[10]. For specification (c), we have aggregated these to form flow variables for three main industries: mining, manufacturing and energy (ind), construction ($constr$) and services ($serv$). This classification corresponds to the industry classification of our industry share variables (JOB_{ind} and JOB_{constr}). As in specification (a), most of the coefficients are insignificant. Also the diagnostics of the model are troublesome since Hansen test of overidentifying restrictions rejects the hypothesis that the instruments are not correlated with the errors of the model. We believe that these problems are, as in specification (a), due to misspecification of the model and the resulting weak explanatory power of the regressors.

Thus far, our results highlight the role of large pool of unemployed and limited labour market possibilities for them as factors that induce out-migration. In turn, people seem to be moving to regions with abundance of labour market possibilities for unemployed job seekers and low flow out of employment, flow into unemployment being more important.

[10]The industries are: 1) mining, manufacturing and energy etc., 2) construction, 3) trade, 4) hotels and restaurants, 5) transportation etc., 6) finance and 7) real estate and business services etc. Experimenting with models that separated between all 7 industries or with alternatively classified variables did not result in different conclusions than those obtained with specification (c).

To further utilise our data and to assess the robustness of the conclusions concerning Table 1 we have, in Table 2, estimated three additional migration models where explanatory variables are calculated differently. In these models, we allow the net change in employment to have a differential effect from simultaneous hiring and separation. The distinction between net changes and simultaneous hires and separations is often drawn in job flow and worker flow literature; see Davis *et al.* (1996) and Burgess, Lane and Stevens (2000). Albeit all job openings leading to hires may be available for potential migrants, hires exceeding simultaneous separations may be more effective in attracting migrants since they are associated with an increase in total employment. The results of specification (b) in Table 1 also hint that it can, in some occasions, be the net change that matters most since we found that the coefficients of the destination province's flow from unemployment to employment and flow from employment to unemployment are almost equal. This would mean that simultaneous hires and separations may leave in-migration unaffected. To assess the validity of this idea, we include net changes and simultaneous flows separately in specifications (d)-(f).

In the calculation of our measures for net employment changes and simultaneous hires and separations, as well as the measures for structural change, we utilise the conventions of earlier literature while slightly modifying the concepts to better serve the needs of the analysis. Routinely, worker and job flow literature introduces the following three concepts to measure, and to make a distinction between, net change in employment and simultaneously occurring hires and separations:

Net change in employment: $NET = H - S = JC - JD$,

Excess job reallocation: $EJR = JC + JD - |NET|$

and

Churning (or excess worker turnover): $EWT = H + S - |NET| - EJR$,

where H and S are the worker hires and worker separations, respectively, as defined earlier. JC and JD are job creation and job destruction flows, respectively. As defined in Davis *et al.* (1996), JC is the sum of employment changes in plants where net change in employment is positive. Correspondingly, JD is the sum of employment reductions in plants where net change in employment is negative. Therefore, excess job reallocation (EJR) is the number of jobs created plus the number of jobs (simultaneously) destructed that are not needed to attain the net employment change in the level of labour market as a whole. Another, and for us more useful, interpretation of EJR is that it is twice the number of jobs shifting from contracting plants to expanding plants.

Churning, also called excess worker turnover (EWT), is the sum of plant level hires (worker flow into employment) and separations (flow out of employment) that are not needed to attain the net employment change in the plant level. In another words, churning equals twice the sum of simultaneous hire and separation pairs occurring within individual plants. There is an analogy between churning and excess job reallocation: Whereas churning measures plant-level excess turnover, excess job reallocation measures the same at the level of aggregate labour market but leaving plant-level churning out. Compared with net changes in the total number of jobs, job reallocation and churning constitute a considerable share of the labour market flows in our data. Similar observation is made in studies documenting and using labour market flows; e.g. Davis *et al.* (1996), Davis *et al.* (2006), Burgess, Lane and Stevens (2000).

The most explicit difference between excess job reallocation and churning is that simultaneous hire and separation captured in EJR may constitute of a job change by one worker, whereas a hire and associated separation captured in EWT within a firm always involves two workers. Despite this point, the two flows are not exclusively different. As Davis *et al.* (1996) note, simultaneous hire and separation within a plant may involve two clearly distinct jobs with very different skill requirements. In this

case, an occasion counted in to churning is very similar to some occasions counted in to excess job reallocation. In our specifications (d) and (e) we do not make a distinction between churning and excess reallocation to be able to make a simple distinction between net employment change and simultaneous hires and separations. There, our labour market variables are NET, as defined earlier, and ER, the sum of EJR and $CHUR$ divided by two. We divide by two so that the variable can be interpreted as the number of hires with simultaneous separations. In specification (e), we calculate the net employment change and excess worker turnover variables separately for flows with unemployment as the source/destination and flows with other labour market states as the souce/destination.

Specification (f) serves as our most direct test for the effects of change in employment structure. There, we make a distinction between excess job reallocation and churning, but also between job reallocation between industries and within industries. We do the latter by further decomposing excess job reallocation variable EJR used in specification (d). The procedure by which the excess job reallocation is decomposed is introduced already by Dunne *et al.* (1989) and further used by e.g. Davis and Haltiwanger (1992) and Davis *et al.* (1996). By doing this, we get a measure for the number of jobs shifting from one of the seven industries to another industry (ERB) and the number of jobs shifting within industry but between plants (ERW). ERW is calculated by summing industry-level job reallocation measures over industries and dividing the result by two. Then, it is possible to calculate ERB as the residual term ER - ERW - $CHUR$; see the Appendix for the formal definitions of these variables.

To provide some further intuitive content for variables ERB, ERW and $CHUR$, notice that every hire counted in to the variable ER has a counterpart, a separation of a worker. This separation can occur in the same plant, in another plant within the same industry or in another industry. It feels natural to hypothesise that there are differences between these three situations. For example, if there occurs contemporaneous

separation only in some other industry, the skills of this newly separated worker may not be suitable for the new job opening. In this case, a job seeker from another region may be a good candidate for the job. In contrast, a situation with a contemporaneous separation in the same industry may involve less demand for the skills of other regions' candidates. The third category of excess reallocation is likely to be different from other two, but it is not perfectly clear what kind of situations it may characterise. Simultaneous hiring and separation in the same firm cannot involve hiring and separation of the same worker. Rather, these situations may reflect voluntary quits, retirements or other such occasions and their replacements. The question how, if in any way, this affects the job seekers of other regions, is left as an empirical question to be answered by our model. In short, $CHUR$ is the number of hires that have a separation as a counterpart within the same firm, ERW is the number of hires with counterpart separations within the same industry but in another firm and ERB is the number of hires with simultaneous separations only in other industries.

Model (d) suffers from similar problems as model (a) earlier. We do not find any statistically significant results concerning our variables of interest. It can be noted, however, that net changes in employment calculated from the flow data have expected signs. Model (e), where net employment change and excess reallocation are included separately for flows concerning unemployment ($NETU$, ERU) and other labour market statuses ($NETOTH$, $EROTH$), works better. For out-migration, none of the labour market flow variables appears significant. However, net changes have negative coefficients (as expected) whereas excess reallocation variables have positive coefficients. As in model (b), net employment change in other sectors ($NETO$) has a negative and unemployment rate a positive effect on out-migration. The measures of net changes and excess reallocation do not separate between hires and separations. Therefore, the result from model (b) that hires from, but not separations to, unemployment are important for out-migration is not captured by model (e).

Table 2. Determinants of Inter-regional Migration. Two-Step GMM with Windmeijer Correction..

	(d)		(e)		(f)	
Source province (out-migration)						
NET	-2.47	(6.9)			-0.64	(2.49)
$NETU$			-1.40	(4.97)		
$NETOTH$			-1.03	(2.46)		
ER	9.30	(9.49)				
ERU			3.72	(10.87)		
$EROTH$			2.74	(2.68)		
ERB					6.74	(5.06)
ERW					-2.58	(3.86)
$CHUR$					4.18	(5.11)
$NETO$	-19.76	(13.6)	-7.03**	(3.35)	-9.57**	(4.61)
U	17.10	(11.5)	8.66***	(2.49)	5.19*	(2.77)
$WAGE$	-0.01	(0.15)	0.00	(0.06)	-0.19**	(0.08)
JOB_{pri}	0.68	(9.27)	9.91*	(5.61)	6.22	(5.54)
JOB_{ind}	4.04	(5.68)	7.12**	(3.25)	3.80	(3.67)
JOB_{constr}	-4.41	(11.31)	8.31	(5.64)	6.76	(6.17)
Destination province (in-migration)						
NET	2.82	(2.96)			2.91*	(1.50)
$NETU$			14.10***	(3.1)		
$NETOTH$			3.29**	(1.54)		
ER	-1.57	(3.33)				
ERU			-15.00*	(8.1)		
$EROTH$			-4.99**	(2.00)		
ERB					-3.47	(4.72)
ERW					-2.80	(2.35)
$CHUR$					-0.70	(3.45)
$NETO$	-6.17	(4.35)	-1.65	(2.72)	-5.79**	(2.85)
U	4.18	(3.96)	-1.03	(1.92)	3.68	(2.38)
$WAGE$	0.09	(0.09)	0.09**	(0.04)	0.05	(0.05)
JOB_{pri}	-1.68	(5.62)	-0.81	(2.67)	1.60	(3.02)
JOB_{ind}	0.02	(5.21)	0.12	(2.82)	2.02	(3.23)
JOB_{constr}	4.91	(6.35)	5.70	(4.22)	5.74	(4.71)
DIS	-13.58	(29.95)	-25.24	(15.36)	-1.48	(13.57)
$lagdep$	-0.25	(0.27)	-0.02	(0.13)	-0.09	(0.11)
Number of instruments	68		96		96	
Hansen	0.732		0.619		0.022	
AR(2)	0.480		0.813		0.271	

Dep. var.: log migrants from source to destination province per 1000 inhabitants in source. N = 2736. Additional controls (see text) and year dummies included. Robust standard errors in parentheses. (*) denotes significance at 10% level, (**) at 5% level and (***) at 1% level.

With regard to in-migration, model (e) roughly reproduces the results of model (b). Net change in employment through hires from and separations to unemployment enters positively and with a strong significance. However, contrary to the suggestion of model (b), also excess reallocation matters. This variable has a negative coefficient with a significance level of 10%. This would mean that, *ceteris paribus* (e.g. with equal net change in employment), a simultaneous increase in hires and separations discourages in-migration. One interpretation for this is that one newly unemployed worker has a greater negative effect through increased competition for jobs than the positive effect one hire of an unemployed worker has through increased job opportunities. For worker flows between employment and other labour market statuses than unemployment, we find similar results, but the coefficients are smaller in size. When the net change of employment through outside the labour force increases, this has a positive effect on in-migration. However, simultaneous hiring and separation has a hindering effect. A large share of this reallocation is likely to be due to employed workers changing jobs. This could be interpreted so that active on-the-job search and resulting job switching increases the competition for jobs, keeping the workers of other regions out of the local market.

Model (f), to some extent, supports our notion related to model (c) that structural change, as we are able to measure it, is not as important factor in inter-regional migration as the source and destination of hiring and separation of workers. Although some of the estimated coefficients are now significantly different from zero, Hansen test indicates that the instruments are not valid. We, again, interpret this partly as a sign of insufficient explanatory power of the included variables. This may be in part due to the fact that the boundaries between different industries or between firms may not be the boundaries hindering recruitment of workers. Indeed, Bjelland, Fallick, Haltiwanger, and Mcentarfer (2008) have recently documented that a very large share of workers switching jobs is also changing industry. The structural change causing problems in the

matching of skills and jobs in the labour market is likely to be more about boundaries between occupations. However, our data does not allow occupational disaggregations, so that our way of measuring structural change may be imperfect. Despite this, we think that our findings from specifications (b) and (e) are the ones of importance in understanding the determinants of inter-regional migration.

In none of the models (a)-(e) we find statistically significant effect for lagged migration variable. The coefficient may be biased since, even if not true for the key variables of interest, lagged levels are poor predictors for differences of this variable. The explanatory power of instruments is not markedly increased by including more lags or by explaining levels of migration variable by lagged differences (i.e. by using GMM-system rather than GMM-difference estimator). Increasing moment conditions makes the coefficient of past migration positive but not significant, and the conclusions regarding labour market variables remain qualitatively similar. Since we are not mainly interested in past migration's effect, we have conducted these additional analyses predominantly to assure ourselves of the robustness of other results.

To assess how important different labour market characteristics have been in determining the migratory flows in our data, we can compare the coefficient estimates with the actual variation in the corresponding variables; for standard deviations of the variables, see the Appendix. For out-migration, a change of one standard deviation in province's unemployment rate has a larger effect than a standard deviation change in any other variable in both models (b) and (e). In specification (b) this effect is 4.6 times as large as the effect of one standard deviation change in hires from unemployment variable (HU). For its part, the effect of variation in net change in employment in other sectors ($NETO$) is considerably smaller than both of these. We can therefore say that variation in the unemployment rate is the most important labour market determinant of out-migration. Rationale for this is easily given, since unemployed individuals have a relatively high propensity to move, as discussed earlier. Additionally,

it is conceivable that unemployment rate, to some extent, captures province's labour market possibilities. Related to results from specification (e), it should also be noted that the effects of changes in industry shares (JOB_k) appear large.

With regard to in-migration, labour market flows have relatively large significance as determinants. Even though the coefficients of the flows with unemployment as the source or destination (HU and SU) are markedly larger than the coefficients of the other flows ($HOTH$ and $SOTH$), their significance is reduced by their relatively small variation. The effect of one standard deviation change in employment-unemployment or unemployment-employment flow roughly corresponds with the effect of one standard deviation change in the flow from employment to employment and outside the labour force. Therefore, each hire from and job separation to unemployment has a larger effect on in-migration than any other hire or separation but due to the relatively small variation in the former flows their economic significance remains limited. An interesting observation in relation to specification (e) is that the excess reallocation of workers through employment and other labour market states ($EROTH$) is the most important flow measure while net employment change from unemployment ($NETU$) is almost as important. Meanwhile, excess reallocation through unemployment (ERU) and net change of employment from other labour market states ($NETOTH$) are contributing much less to in-migration. It should also be noted that variation in wage affects largely to in-migration.

In addition to our results concerning the labour market variables of interest, we find some statistically significant results for the other control variables not included in the result tables. In reporting these results, we focus on those coefficients that appear significant in both models (b) and (e). Firstly, a higher share of owner-occupied housing in a province is associated with lower out-migration. This result is intuitive and in line with micro-level evidence of lower geographical mobility of home-owners; for recent Finnish results, see Nivalainen (2004). Secondly, the share of early retired inhabitants

has a positive effect on out-migration, probably because retired individuals' lack ties to local labour market and are therefore freer to move to other locations. Again in accordance with micro-evidence (Nivalainen 2004), we find that the more highly educated the population in a province is, the higher is out-migration. An exception of this is that the share of population in the highest educational category (upper university degree or more) is associated with lower out-migration. Housing prices in the source province enter models (b) and (e) negatively and statistically significantly (at 5% and 10% level, respectively). This result is in contrast with our expectation, but a rationale for it can be easily given. Since housing prices concern the actual transactions of houses and apartments, they are likely to be responsive to changes in housing demand. Thus, out-migration for other than housing market reasons may depress the local housing prices. It is conceivable that we identify this reverse link since we may not have a proper instrument for housing prices in our set of instruments. It should be noted here that in specification (b), we find a negative and significant (at 10 % level) effect on in-migration for rent variable, which is likely to better capture variation in housing costs between provinces. The fact that our results for the control variables are intuitive or in line with theory or micro studies increases our confidence in the results of models (b) and (f). We believe that the sufficient set of salient controls increases the reliability of our conclusions concerning the main variables of interest.

Studies using labour market flow variables to explain inter-regional migration are rare but some comparisons to earlier studies can still be made. Most importantly, our result that worker flow from unemployment to employment decreases out-migration and increases in-migration is in line with the results of Carlsen *et al.* (2006). In that study, the authors find that the probability of region's unemployed to exit unemployment is positively associated with in-migration. However, other labour market flows are not included in the model so that, in this respect, our analysis is more comprehensive. Interestingly, our results concerning the effects of excess worker reallocation deviates

from the results obtained by Hämäläinen and Böckerman (2004) who use very similar data from almost the same time period. They find that both excess job reallocation and churning increase net migration to the region through in-migration whereas we find that excess worker reallocation reduces in-migration. However, Hämäläinen and Böckerman (2004) study migration between smaller regional units, they are unable to simultaneously control the characteristics of source and destination regions, their labour market flow variables are calculated as rates (flows divided by the level of employment) and they do not separate between flows from and to unemployment and flows from and to other sources. Thus, possible interpretations of the discrepancy between the results are that either excess worker reallocation affects short-distance and long-distance migration differently or that there are non-linearities in the effects of the flows.

Our most important result that labour market flows from and into unemployment have strong effects which are differential from the effects of other labour market flows, is in line with Davis', Faberman's and Haltiwanger's (2006) notion that flows from and to unemployment are different from other flows. One way to interpret the result is related to social networks and information. Potential in-migrants may have problems to create networks and to get information on the labour market of the target region. If the unemployed individuals of the destination region are also weakly attached to the surrounding labour market, hiring them may indicate that jobs are available for in-migrants with weaker networks and less information, too. These ideas are in line with such theories of inter-regional job search that stress the role of geographical distance in preventing inter-regional information flows. In the same way, being in the state of unemployment may generate some distance to the labour market that is realised in weaker networks and less information for the unemployed.

A further point should be made about the functional form of our migration equation. Semilog function was chosen because it produced the most credible results and,

more importantly, because with it the specification tests rejected both correlation between errors and instruments and second-order autocorrelation in residuals. However, the interpretation of the models' coefficients is highly intuitive and in line with theoretical ideas. A coefficient of a semilog specification should be interpreted as the marginal effect of one unit change in the explanatory variable on relative change in the dependent variable. Therefore, for instance, an one unit increase in per capita hires from unemployment increases per capita in-migration by the same percentage for all provinces. This means that the effects of the explanatory variables on migration are stronger when the migration is, in the baseline, high between the two provinces. Theoretically, this may be due to short geographical distance between the two provinces, past strong migratory link between the provinces or other factors, such as cultural similarity between the provinces. Factors of this kind are likely to facilitate information exchange between the two provinces and strengthen the role of the other province as the potential destination of moving. Thereby, changes in the labour market (and other) characteristics of the other region are more relevant for potential movers.

6 Concluding Remarks

To thoroughly explore the relationship between inter-regional migration and the state and dynamics of regional labour markets, we utilised data on bilateral migration flows and disaggregated labour market flows from Finnish provinces in the years 1988-1996. Analysing the data with dynamic panel GMM method led to clear conclusions on the labour market reasons for out- and in-migration. According to our results, the ability of a region to offer labour market possibilities to unemployed workers is a crucial factor in holding back out-migration and attracting in-migrants. Results indicated that the reasons for out-migration are to some extent different from the reasons for in-migration. Hiring from the pool of employed workers and those outside labour force also attracts

in-migrants but to a much lesser extent than hires from unemployment do. However, when a region simultaneously experiences separations of workers from their jobs, this more than offsets the positive in-migration effect of hires. Therefore, simultaneous hires and separations hinder in-migration, whereas net increases in employment increases it. We also found an effect for the unemployment rate, a variable often used to explain migratory flows. Our results show that high regional unemployment rate leads to increases in out-migration. We discuss that this effect may be due to the higher propensity of the unemployed to migrate, a result previously found in many micro-level studies.

We also tested a hypothesis that the extent of structural change in local labour markets affects inter-regional migration. However, we found no robust evidence on the effects of inter-industry or intra-industry inter-firm shifts in employment. As well, simultaneous hires and separations within firms did not gain statistical significance in our estimations. This result is in line with a finding from studies of job switching: workers who change jobs often cross industry-boundaries.

Another interesting finding of our study is that, in addition to persistence in bilateral inter-regional migration flows, there may be heterogeneity in the effects of various variables on migration. The empirical model suggests that the more a region-pair currently experiences bilateral migration, the more changes in regions' (labour market and other) characteristics influence these flows. We discuss that this may be due to geographical distance or other factors, which partly determine the baseline attractiveness of another region or the information flow between the two regions.

Our results highlight that to understand the determinants of migration, future empirical studies should use explanatory variables more closely related to the labour market possibilities of the regions. By choosing this strategy, we were able to add to the understanding of the phenomenon.

Appendix

Table A1. Variable Definitions.

dep. var.	log of migrants aged 15-74 years from source to destination province divided by 1000 inhabitants aged 15-74 years in source
H	hires*
HU	hires from unemployment*
$HOTH$	hires from employment and outside the labour force*
H_k	hires in industry k*
S	separations*
SU	separations into unemployment*
$SOTH$	separations into employment and outside the labour force*
S_k	separations in industry k*
NET	H - S
$NETU$	HU - SU
$NETOTH$	$HOTH$ - $SOTH$
ER	$0.5\times(H + S$ - $\lvert NET\rvert)$
ERU	$0.5\times(HU + SU$ - $\lvert NETU\rvert)$
$EROTH$	$0.5\times(HOTH + SOTH$ - $\lvert NETOTH\rvert)$
ERB	$0.5\times[\sum_{k\in K^+} NET_k - \sum_{k\in K^-} NET_k - \lvert NET\rvert]$
ERW	$0.5\times\sum_k[\sum_{f\in F_k^+} NET_f - \sum_{f\in F_k^-} NET_f - \lvert NET_k\rvert]$
$CHUR$	$ER - ERB - ERW$
$NETO$	net employment change in sectors excluded from job/worker flow data*
U	unemployment rate
$WAGE$	total wage income divided by the number of wage earners
JOB_k	share of jobs in industry k
DIS	$\sum_k(JOB_{ik} - JOB_{jk})^2$ (i = source province, j = destination province)

* = divided by population aged 15-74 years in the province.

Table A2. Descriptive Statistics. 19 provinces 1988-1996.

Variable	Mean	Std. Dev.	Min	Max
dependent variable	1.787	0.514	0.144	3.098
H	0.080	0.032	0.033	0.204
HU	0.011	0.006	0.003	0.030
$HOTH$	0.069	0.033	0.019	0.198
H_{ind}	0.027	0.013	0.007	0.072
H_{constr}	0.012	0.005	0.005	0.031
H_{serv}	0.044	0.018	0.018	0.134
S	0.087	0.029	0.039	0.195
SU	0.016	0.007	0.005	0.036
$SOTH$	0.071	0.031	0.023	0.190
S_{ind}	0.029	0.013	0.008	0.066
S_{constr}	0.014	0.005	0.006	0.026
S_{serv}	0.046	0.016	0.026	0.127
NET	-0.007	0.021	-0.056	0.028
$NETU$	-0.005	0.009	-0.027	0.017
$NETOTH$	-0.002	0.015	-0.042	0.027
ER	0.075	0.030	0.033	0.195
ERU	0.010	0.004	0.003	0.019
$EROTH$	0.064	0.031	0.019	0.190
ERB	0.002	0.003	0.000	0.016
ERW	0.039	0.015	0.017	0.093
$CHUR$	0.036	0.014	0.015	0.099
$NETO$	-0.003	0.007	-0.025	0.011
U	0.138	0.076	0.013	0.285
$WAGE$	19.514	2.286	13.120	24.877
JOB_{pri}	0.118	0.047	0.010	0.228
JOB_{ind}	0.229	0.053	0.150	0.346
JOB_{constr}	0.060	0.011	0.039	0.086
DIS	0.012	0.010	0.001	0.053

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