# Sources of Job and Worker Flows: Evidence from a Panel of Regions

**Petri Böckerman — Kari Hämäläinen — Mika Maliranta**

*Abstract.* This study explores the structure and the dynamics of regional job and worker flows. The measures of job and worker flows are related to economic fluctuations, demographic factors and industry structure by employing the data of 85 Finnish regions over the period 1988–97. It is shown that labour market dynamics differ markedly between regions. As in previous analyses of linked employer–employee data, job and worker flows are shown to behave cyclically. In addition, the results indicate that observable differences in regional productivity, in-migration, demographics and industry structure help to explain the prevailing disparities in regional labour markets.

## 1. Introduction

Market economies are in a state of continuous turbulence. During the past 10 years a growing body of literature has emerged that employs longitudinal, linked employer–employee data in analysing the pace of job reallocation and worker flows (see, for example, Abowd, Kramarz, 1999; Haltiwanger *et al.*, 1999). The novelty of this approach follows from the possibility of decomposing net employment changes into gross job and worker flows. These gross

---

Petri Böckerman, Labour Institute for Economic Research, Pitkänsillanranta 3A, FIN-00530 Helsinki, Finland. Fax: +358 9-2535 7332; E-mail: petri.bockerman@labour.fi.

Kari Hämäläinen (author for correspondence), Government Institute for Economic Research, Arkadiankatu 7, FIN-00101 Helsinki, Finland. Fax: +358 9-703 2968; E-mail: kari.hamalainen@vatt.fi.

Mika Maliranta, Research Institute of the Finnish Economy, Lönnrotinkatu 4B, FIN-00120 Helsinki, Finland. Fax: +358 9-601753; E-mail: mika.maliranta@etla.fi.

We are grateful to Eija Savaja (Labour Institute for Economic Research) for her help with the construction of the data.

LABOUR 18 (1) 105–129 (2004) JEL C23, J63, R23

flows are much larger in magnitude than the observed net changes in employment. Davis and Haltiwanger (1999) report that in most Western economies roughly 10 per cent of jobs are created/destroyed each year. Worker flows are even larger in magnitude.

The previous empirical studies have focused mainly on the pace of job reallocation and worker flows in different phases of a business cycle and across countries. However, the available US evidence suggests that the components of net employment change can behave quite differently over time and across regions. Job destruction is associated primarily with cyclical variation, and job creation with regional variation as reported by Eberts and Montgomery (1995). Another typical finding is also that gross job flows are persistent; the majority of newly destroyed (or created) jobs are not reopened (or destroyed) within the next few years. Moreover, a substantial part of gross job flows follows from rather large annual changes in plant-level employment, according to Davis and Haltiwanger (1999).

In terms of country differences, the turnover rates are found to be fairly similar across countries regardless of different labour market institutions (e.g. Nickell, 1998). For instance, Gautier and Broersma (2001) have recently discovered that gross flows are large, relative to net employment change in the Netherlands. This very same pattern of labour markets, which are characterized by narrow wage dispersion across individuals, has been found in the Nordic countries. Thus, Albæck and Sørensen (1998) report that there is a great deal of heterogeneity in the plant-level adjustment of labour demand in Danish manufacturing. The observation that the turnover rates are high in different institutional frameworks of labour markets is consistent with the perspective put forward in Bertola and Rogerson (1997), according to which the rate of job reallocation is a decreasing function of wage dispersion that tends to be larger in less regulated labour markets.

Even though the differences in job and worker reallocation in different phases of a business cycle and across countries are well reported, the additional determinants of gross flows have remained relatively unexplored. The aim of this study is to shed some light on this issue by analysing the establishment-level turnover rates during the years 1988–97 in 85 Finnish regional labour markets that share the same labour market institutions and roughly the same wage dispersion produced by the binding collective agreements. In this study, an effort is made to investigate the impact of economic fluctuations, migration flows, demographic factors and industry structure on job reallocation and worker flows.

The issue of interest in this study is closely connected to a large body of literature that explores regional unemployment and employment differentials. A comprehensive survey of the earlier evidence by Elhorst (2003) reveals that these studies have analysed the determinants of regional unemployment and employment through net measures. For instance, there has been a rapidly expanding empirical literature on the dynamics of regional labour markets based on VAR models started by Blanchard and Katz (1992).[1] However, these empirical investigations apply solely to the net measures of employment change. In other words, they fail to take into account the plant-level heterogeneity of regional labour markets. Against this background, the examination of gross turnover flows along with net flows from the regional perspective is interesting in its own right. In particular, it may provide new explanations for the factors behind the persistence of regional unemployment disparities. This issue is especially in interesting in the Finnish context, because an investigation by the OECD (2000) into unemployment differentials revealed that the regional disparities of the unemployment rates in Finland are among the highest in the whole EU.

The rest of the study is organized as follows. The second section provides the definitions of the measures of turnover in labour markets and introduces the data. In addition, the section provides the stylized features of job and worker flows in the Finnish regions. The third section contains a description of the explanatory variables and the econometric methods employed in analyses. The fourth section provides the estimation results concerning the effects of various factors on regional job and worker flows. The final section concludes.

## 2. Job and worker flows

The gross flows of jobs and workers measure the number of jobs created/destroyed, and workers moving in and out of establishments (i.e. hiring and separation of workers). The measure of the job creation rate (JC) is given by

$$\mathrm{JC}_t = \sum_i \Delta E_{it}^{+} \Big/ \left(\left(\sum_i E_{it} + \sum_i E_{i,t-1}\right)\Big/ 2\right), \qquad [1]$$

where $E$ denotes employment in an establishment $i$ in year $t$ and the superscript '+' refers to a positive change in employment. To obtain the turnover rate, the overall sum of jobs created is divided by the average employment in periods $t$ and $t-1$. It can be shown that this definition has several technical advantages over more conventional growth rate measures (see Davis *et al.*, 1996).

The measure of the job destruction rate (JD) is calculated similarly as

$$\mathrm{JD}_t = \left|\sum_i \Delta E_{it}^-\right| \Big/ \left(\left(\sum_i E_{it} + \sum_i E_{i,t-1}\right)\Big/2\right), \qquad [2]$$

where the superscript '–' refers to a negative change in employment in an establishment $i$. The job destruction rate is defined as the absolute value of the sum of negative changes in employment within establishments, divided by the average number of employees in time periods $t$ and $t-1$.

The definitions above can be employed in measuring the net rate of employment change $\mathrm{NET}_t = \mathrm{JC}_t - \mathrm{JD}_t$, the gross job reallocation rate $\mathrm{JR}_t = \mathrm{JC}_t + \mathrm{JD}_t$ and the excess job reallocation rate $\mathrm{EJR}_t = \mathrm{JR}_t - |\mathrm{NET}_t|$. The excess job reallocation is an index of simultaneous job creation and destruction (e.g. Davis, Haltiwanger, 1999). If this measure is positive, the magnitude of (gross) job reallocation in a region exceeds the change in net employment.

In addition to job reallocation, linked employer–employee data provide means of measuring gross worker flows. By combining data from two consecutive years it is possible to calculate the number of employees who have entered a plant during a given year and who are still working at the same plant at the end of the year. The sum of these employees over all plants gives the total worker inflow. By the same token, the total worker outflow is obtained by summing the number of employees who have separated from plants during a year.

Worker inflow (WIF) and outflow (WOF) rates are obtained in a similar fashion to job flows by dividing the total worker inflow/outflow by the average of employment in periods $t$ and $t-1$. The difference between the hiring rate and the separation rate gives the net rate of change in employment, i.e. $\mathrm{NET}_t = \mathrm{WIF}_t - \mathrm{WOF}_t$.

The hiring (separation) rate can be decomposed by the source (destination) of worker inflow (outflow). To examine the regional dynamics of unemployment, it is convenient to measure the worker inflow rate from unemployment (WIFU) and the worker outflow rate into unemployment (WOFU). The difference between these measures gives the net rate of change in unemployment, i.e. $\mathrm{UNET}_t = \mathrm{WIFU}_t - \mathrm{WOFU}_t$. Thus, this study is able to decompose the net change in regional unemployment into gross flows, something that has rarely been possible in the previous literature.

The final definitions of job and worker flows consist of the worker flow rate (WF), which is the sum of the hiring (WIF) and separation rates (WOF), and of the churning rate (CF):

$$CF_t = WF_t - JR_t. \qquad [3]$$

The churning rate completes the picture of labour adjustment in regional labour markets by combining establishment-level worker and job flows together. The churning rate is also called 'excess worker turnover rate' since it compares worker flows with job flows. By this means, the churning rate measures the structural change of regional labour markets within plants.

Job and worker flows needed in empirical analyses are constructed from the linked employer–employee data that cover more than 80 per cent of total employment in the non-farming business sector of the Finnish economy (see the Appendix). Thus, the data contain more than 1.1 million employees in approximately 100,000 plants. The annual rates of job and worker flows are aggregated to 85 regions corresponding to the NUTS4 level of the EU. The public sector has to be excluded from the analyses owing to practical problems in measuring annual gross job and worker flows in the population of public-sector establishments. Agriculture is also excluded, since the source of information about the numbers employed in establishments is Employment Statistics, which does not include farmers.

Even with these limitations the data cover a substantially larger part of the economy than most of the previous studies on job and worker flows that have concentrated mainly in manufacturing industries (e.g. Davis, Haltiwanger, 1999). What is more, the data cover almost the entire population of establishments and employees in all regions within a single country, so analyses of regional job and worker flows become possible. This is not always the case, especially in the USA (see Davis *et al.*, 1996; Shimer, 2001).[2]

The time period of empirical analysis spans the years 1988–97. These years include a rapid increase in unemployment in the early 1990s (from 4 per cent to almost 20 per cent) and the gradual decrease in unemployment from the mid-1990s onwards. (For an analysis of the Finnish recession, see Honkapohja, Koskela, 1999.) The changes were not evenly distributed across regions, so the data offer a unique opportunity to investigate a broad range of factors influencing the differences in job and worker turnover rates among regions.

**Figure 1.** The gross job creation rates (JC) in Finnish regions in 1991 and 1994

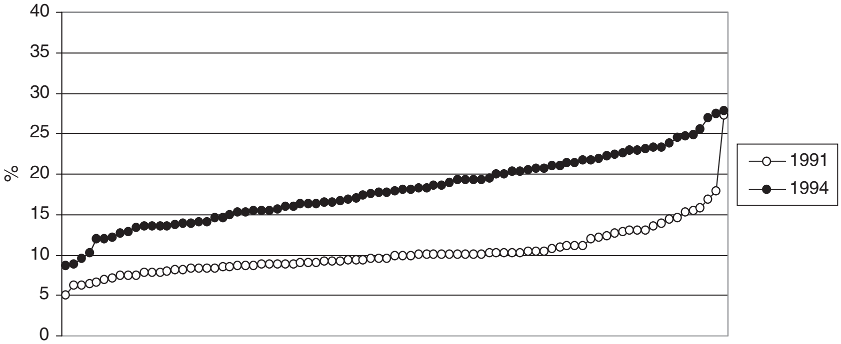
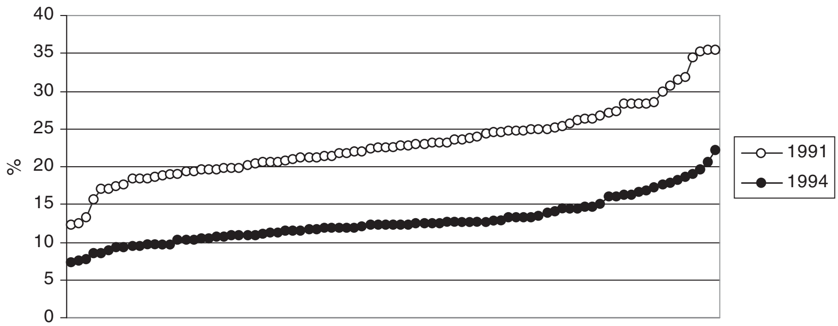



**Figure 2.** The gross job destruction rates (JD) in Finnish regions in 1991 and 1994




Figures 1 and 2 show regional job flows for selected years.[3] Several observations can be made. Firstly, regions differ substantially in their ability to create jobs. The largest differences in gross job creation rates are found to be 20–30 points. Secondly, the variation in job destruction rates is less pronounced, the difference being some 15–25 points. Third, the recovery from the great slump of the early 1990s happened in all regions both by an increase in the rate of job creation and by a decline in the rate of job destruction.

The most interesting observation reveals the strong connection between the average job creation and the job destruction rates (see

**Figure 3.** A scatterplot of the average job creation rates (JC) and the average gross job destruction rates (JD) across Finnish regions

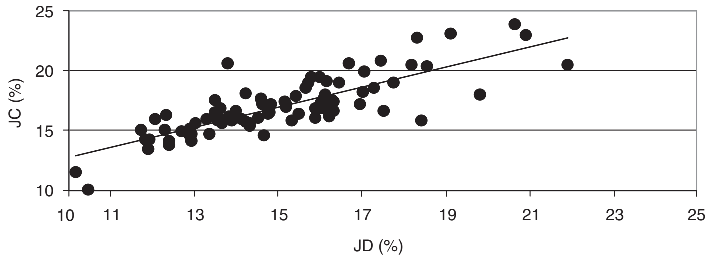



**Figure 4.** A scatterplot of the average worker inflow rates (WIF) and the average worker outflow rates (WOF) across Finnish regions

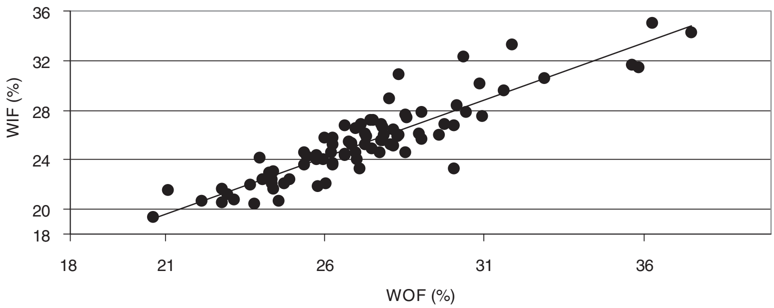



Figure 3), and the equally strong correlation between the worker inflow and outflow rates (see Figure 4).[4] This means that regions with a high ability to create jobs (hirings) also tend to experience sizeable job losses (separations). The findings are similar to those reported in Greenway *et al.* (2000), who analysed gross job flows in different UK industries. It should be emphasized that the positive correlation cannot be totally accounted for by the intensive entry and exit of firms/establishments in the service sector, i.e. to the industry structure of regions. Ilmakunnas and Topi (1999) report that entries and exits account only for some 3 per cent of overall change in employment, and the Finnish regions are not completely specialized.

## 3. Empirical specifications

Regional job and worker flows are explained by various factors that control for observable differences in regional growth, productivity, migration, demographics and industry structure.[5] This information is collected from different registers maintained by Statistics Finland. Time-varying changes that are common to all regions are controlled by the inclusion of year dummies.

Gross job and worker flows have been observed in the previous literature to depend on the business cycle, so the change in regional production per capita (DGDP) is also included among the regressors in this study. Other terms, called macroeconomic indicators, control for observable differences in regional productivity level (PROD) and in the financial situation of municipalities (DEBT). These variables aim to capture the large underlying differences in the economic performance of the Finnish regions (reported in Table A2 in the Appendix) that are not directly linked to macroeconomic expansion or contraction. In particular, the inclusion of the regional productivity term is motivated by the findings according to which an increase in productivity level may be associated with a positive impact on employment in growing establishments (see Bartelsman, Doms, 2000). It is expected that the high-productivity regions are able to create more jobs and hire more workers. The DEBT variable is related to the economic performance of the Finnish regions, because the high level of regional public debt tends to coincide with the high level of taxation in municipalities that may depress the ability of the non-farming business sector to create jobs and hire workers.

Variables of migration and demographics reflect regional differences in in-migration, age structure and education. Gross migration flows form an important part of the reallocation of the labour force and the competitiveness of regions. This is especially relevant in the Finnish context, because there has been an increase in migration flows across regions during the recovery from the great slump of the early 1990s. In addition, the clustering of producers and workers at a particular region creates positive externalities that boost the growth of the region (see Krugman, 1998, among others). If this is the case, in-migration is positively connected to job creation and the hiring rate. The effect of in-migration on job destruction and worker outflow is less evident, a priori. Provided that migrants compete with workers and unemployed people living in destination areas, higher in-migration may increase worker outflow rates. This crowding-out effect is most likely to arise in the context of in-migration of highly educated workers that is captured by the MIG2 variable. Accordingly, the net effect of in-migration on job destruction and worker outflow remains an empirical issue.

The first variable controlling for the impact of demographic factors on labour market flows is the proportion of individuals over the age of 55 in the population (AGED). A shift in labour demand away from older workers after the slump is expected to show up in the parameter estimates of this particular variable. The variables controlling for regional differences in the proportion of individuals with upper secondary education (UPSEC) and the proportion of individuals with higher education (HIGHEDU) are included in the analysis in order to take account of possible changes in the composition of plant-level labour demand that are put forward in the literature on skill-biased technological change (e.g. Atkinson, 1999; Card, DiNardo, 2002). It is therefore interesting to see whether the educational attainment of individuals has shaped the turnover rates in regional labour markets.

We next turn to the industry structure. The earlier empirical studies have shown that there are differences in the evolution of gross job and worker flows across industries (e.g. Davis, Haltiwanger, 1999). This observation has been connected to regional differences in Böckerman and Maliranta (2001), who examined gross and net flows in 20 provinces of Finland. They found that the two-digit standard industry classification helps to explain part of the observed differences in regional net employment changes. However, the industry structure was of limited value in explaining the differences in regional gross job and worker flows. It is interesting to examine whether this pattern also holds true in a more complex setting.

Since the data cover all NUTS4 regions in Finland, the natural starting point for the analysis is the fixed-effects model of the form:

$$Y_{it} = \beta X_{it} + \eta_i + \delta_t + e_{it}, \quad i = 1, \ldots, 85; t = 1, \ldots, 10, \qquad [4]$$

where $Y$ stands for the selected measure of job or worker flow and $X$ is a vector of explanatory variables. The unobserved regional effect, $\eta_i$, 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 for by the regional-invariant time effects, $\delta_t$. Finally, the disturbances, $e_{it}$, are assumed to be independently and identically distributed over $i$ and $t$.

Under certain assumptions the model set up in equation [4] can be consistently and efficiently estimated by means of the within-group estimator (e.g. Baltagi, 1995; Hsiao, 1985). However, in the current context the within-group estimator has at least two potential shortcomings. Firstly, it assumes that all explanatory variables are strictly exogenous, i.e. uncorrelated with the past, present and future realizations of $e_{it}$. This assumption is violated, for instance, if an unexpected shock to job creation or worker flows in some region affects the future in-migration to that region. Secondly, the within-group estimator generates inconsistent estimates in dynamic specifications if the number of time periods is fixed (see Nickell, 1981).

To overcome these difficulties, we also analyse the data by means of the following dynamic model:

$$Y_{it} = \sum_{k=1}^{P} \alpha_k Y_{i,t-k} + \sum_{k=0}^{P} \beta_k X_{i,t-k} + \eta_i + \delta_t + \varepsilon_{it}. \qquad [5]$$

The model set up in equation [5] 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, $\Delta Y_{it-1}$, 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 $t = 3, \ldots, T$ and $2 \leq s \leq t - 1$, 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 $\varepsilon_{it}$ does not hold, some of the explanatory variables are correlated with the disturbance term as $E(X_{it}\ \varepsilon_{is}) \neq 0$ if $s \leq t$. In this case, the valid instrument set for period $t$ consists of lagged values of the dependent variable $Y_{i,t-s}$, $s \geq 2$ and of the lagged values of endogenous variables $X_{i,t-s}$, $s \geq 2$. Accordingly, the set of valid instruments becomes larger as $t$ increases. Monte Carlo experiments show that the use of the full set of moment conditions in the later cross-sections may result in over-fitting biases in the estimates (see Arellano, Honore, 2001). 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 changes in the number of jobs/workers within establishments 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 job and worker 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 $t-1$.

There are three endogenous variables, namely the rate of in-migration (MIG1), the share of highly educated individuals among in-migrants (MIG2), and the change in regional production per capita (DGDP). The underlying hypothesis of this specification is that individuals move for work-related reasons, in which case an unexpected drop in, say, job creation is already reflected in in-migration during the period $t$. At the same time, this drop is allowed to affect regional production. Finally, the regional productivity level is measured from the period $t-2$ to avoid the possible correlation with the DGDP variable. It should be noted, however, that adding the productivity term lagged once produces similar results to those reported below.

## 4. Results

The results differ sharply between the unreported conventional fixed-effects models and the dynamic GMM models reported in Tables 1 and 2.[6] This is mainly due to the lack of dynamics in the static fixed-effects specification. If the same lag structure is employed in fixed-effects estimations as in GMM estimations, the results become similar in qualitative terms with different methods. Naturally, the parameter estimates differ, owing to the misspecification of the FE model when lagged endogenous variables are included in the estimation (see Nickell, 1981). Since the preliminary results imply that the conventional, static fixed-effects model can produce seriously biased results, at least in the current context, we focus on the results of the GMM models in what follows.

Three cross-sections are lost in constructing lags and taking first differences in dynamic specifications. The GMM results correspond to specifications with the minimum number of instruments that managed to pass the implemented tests for the second-order autocorrelation, AR(2), and for the validity of the instrument set, SARGAN. More extensive instrument sets produce largely similar results to those reported in Tables 1 and 2. The only difference is that some variables reported as insignificant turn out to be statistically significant. This indicates the presence of an over-fitting bias in large instrument sets discussed in Arellano and Honore (2001). By and large, the parameter estimates are also robust to different

**Table 1.** The GMM results for job flows

| Variable | JC | JD | NET | JR | EJR |
|---|---|---|---|---|---|
| Dependent$_{t-1}$ | –0.116* | –0.112* | –0.249*** | 0.093 | 0.083 |
| Macroeconomic indicators | | | | | |
| DGDP$^{+}_{t}$ | 0.138* | –0.315 | 0.106 | –0.256 | –0.041 |
| DGDP$^{+}_{t-1}$ | 0.418*** | –0.314* | 1.014*** | 0.115 | 0.150 |
| PROD$_{t-2}$ | 0.343** | –0.273 | 1.016*** | 0.138 | 0.177 |
| DEBT$_{t-1}$ | 0.003 | 0.001 | –0.001 | 0.002 | 0.005 |
| DEBT$_{t-2}$ | 0.001 | 0.006 | –0.001 | 0.009 | 0.001 |
| Migration flows and demographics | | | | | |
| MIG1$^{+}_{t}$ | 0.010 | 0.128 | –0.379 | 0.080 | 0.361* |
| MIG1$^{+}_{t-1}$ | 0.322** | –0.078 | 0.502* | 0.308 | 0.077 |
| MIG2$^{+}_{t}$ | –0.010 | –0.004 | –0.087** | –0.043 | –0.049 |
| MIG2$^{+}_{t-1}$ | 0.021 | 0.028** | –0.001 | 0.044** | 0.023 |
| AGED$_{t-1}$ | –0.027 | 0.057 | –0.117 | 0.041 | –0.094 |
| AGED$_{t-2}$ | –0.140** | –0.022 | –0.087 | –0.164** | –0.249** |
| UPSEC$_{t-1}$ | –0.044* | 0.092*** | –0.136*** | 0.070** | 0.017 |
| UPSEC$_{t-2}$ | –0.005 | 0.013 | –0.029 | –0.008 | –0.084 |
| HIGHEDU$_{t-1}$ | –0.177 | 0.091 | –0.379 | –0.068 | –0.225 |
| HIGHEDU$_{t-2}$ | 0.129 | 0.120 | 0.123 | 0.227 | 0.132 |
| Industry structure | | | | | |
| MANU$_{t-1}$ | 0.054 | 0.111 | –0.166 | 0.165 | 0.099 |
| MANU$_{t-2}$ | 0.184 | 0.073 | 0.059 | 0.166 | 0.076 |
| ELEC$_{t-1}$ | 0.167 | –0.293 | 0.334 | –0.121 | 0.214 |
| ELEC$_{t-2}$ | –0.082 | 0.328 | –0.374 | 0.182 | 0.832** |
| SERV$_{t-1}$ | 0.443* | 0.462 | 1.050*** | 1.222*** | 0.575 |
| SERV$_{t-2}$ | 0.271 | 0.302 | 0.036 | 0.534 | 0.399 |
| PUBL$_{t-1}$ | 0.960*** | –0.309 | 2.129** | 0.705 | 0.649 |
| PUBL$_{t-2}$ | –0.239 | 0.053 | 0.050 | –0.156 | –0.322 |
| HIGH$_{t-1}$ | –0.342 | 0.122 | –0.131 | –0.133 | –0.443* |
| HIGH$_{t-2}$ | 0.171 | 0.257 | 0.284 | 0.542* | –0.844* |
| HISE$_{t-1}$ | –0.786 | 0.052 | –1.890* | –0.960 | –0.054 |
| HISE$_{t-2}$ | 0.747 | 1.047 | –0.234 | 1.937** | 0.206 |
| Test statistics | | | | | |
| WALD | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| SARGAN | 0.25 | 0.33 | 0.21 | 0.15 | 0.21 |
| AR(2) | 0.66 | 0.66 | 0.93 | 0.19 | 0.46 |
| Instruments | | | | | |
| Lag length | 2 | 2 | 1 | 2 | 2 |

*Notes*: The results correspond to the one-step estimates excluding the SARGAN test for over-identifying restrictions and the AR(2) test for the second-order autocorrelation of the residuals that correspond to the two-step estimates. The superscript '+' indicates that the variable is instrumented. *** (**, *) indicates that the parameter estimate is statistically significant at the 1 (5, 10) per cent significance level. The WALD test is a test for the joint significance of the explanatory variables. All test statistics are reported as *p*-values. Instruments indicate the number of lags of the dependent variable and the predetermined variables employed in the instrument matrix. Year dummies and a constant are included in all models.

**Table 2.** The GMM results for gross worker flows

| **Variable** | **WIF** | **WIFU** | **WOF** | **WOFU** | **UNET** | **WF** | **CF** |
|---|---|---|---|---|---|---|---|
| $\text{Dependent}_{t-1}$ | –0.074 | –0.406*** | –0.066 | 0.149*** | –0.059 | 0.104 | 0.105 |
| Macroeconomic variables | | | | | | | |
| $\text{DGDP}^{+}_{t}$ | –0.203 | 0.011 | –0.405*** | –0.193** | 0.240*** | –0.674* | –0.038 |
| $\text{DGDP}^{+}_{t-1}$ | 0.503** | 0.050 | –0.255 | –0.140* | 0.485*** | 0.161 | –0.019 |
| $\text{PROD}_{t-2}$ | 0.539** | 0.031 | –0.161 | –0.096 | 0.472*** | 0.358 | 0.012 |
| $\text{DEBT}_{t-1}$ | –0.001 | 0.001 | –0.002 | –0.001 | 0.001 | –0.002 | –0.002 |
| $\text{DEBT}_{t-2}$ | 0.008* | 0.000 | 0.010** | 0.001 | –0.001 | 0.016** | 0.004 |
| Migration flows and demographics | | | | | | | |
| $\text{MIG1}^{+}_{t}$ | 0.099 | –0.022 | 0.117 | –0.004 | –0.123 | 0.350 | 0.451*** |
| $\text{MIG1}^{+}_{t-1}$ | 0.597*** | 0.125*** | 0.050 | 0.057 | 0.116 | 0.628** | 0.183 |
| $\text{MIG2}^{+}_{t}$ | –0.051 | 0.005 | –0.006 | –0.008 | 0.008 | –0.031 | 0.022 |
| $\text{MIG2}^{+}_{t-1}$ | 0.025 | 0.003 | 0.024* | 0.017** | –0.014 | 0.050** | 0.001 |
| $\text{AGED}_{t-1}$ | –0.068 | –0.021 | 0.032 | 0.011 | –0.036 | 0.003 | –0.044 |
| $\text{AGED}_{t-2}$ | –0.145* | –0.019 | –0.038 | 0.042 | –0.053 | –0.144 | –0.027 |
| $\text{UPSEC}_{t-1}$ | –0.069** | –0.051*** | 0.081** | 0.071*** | –0.125*** | 0.050 | –0.029 |
| $\text{UPSEC}_{t-2}$ | 0.021 | –0.017* | 0.024 | –0.007 | 0.025 | 0.015 | 0.006 |
| $\text{HIGHEDU}_{t-1}$ | –0.335** | 0.004 | 0.027 | –0.042 | 0.065 | –0.194 | –0.120 |
| $\text{HIGHEDU}_{t-2}$ | 0.327** | –0.035 | 0.247 | 0.096 | –0.090 | 0.571** | 0.189* |

**Table 2.** Continued

| **Variable** | **WIF** | **WIFU** | **WOF** | **WOFU** | **UNET** | **WF** | **CF** |
|---|---|---|---|---|---|---|---|
| Industry structure | | | | | | | |
| $MANU_{t-1}$ | –0.073 | –0.006 | 0.060 | 0.143* | –0.191* | –0.072 | –0.050 |
| $MANU_{t-2}$ | 0.124 | 0.044 | 0.062 | 0.039 | –0.037 | 0.051 | 0.083 |
| $ELEC_{t-1}$ | –0.020 | –0.113 | –0.352 | –0.301* | 0.149 | –0.376 | –0.064 |
| $ELEC_{t-2}$ | –0.450 | –0.200*** | 0.030 | 0.206 | –0.301 | –0.552 | –0.522 |
| $SERV_{t-1}$ | 1.200*** | 0.044 | 0.677* | 0.323 | 0.023 | 1.980** | –0.014 |
| $SERV_{t-2}$ | 0.480 | 0.089 | 0.475 | 0.148 | –0.096 | 0.894* | 0.432*** |
| $PUBL_{t-1}$ | 1.434*** | 0.159** | –0.164 | 0.055 | 0.530*** | 0.966 | –0.109 |
| $PUBL_{t-2}$ | –0.023 | 0.016 | 0.227 | 0.210 | –0.158 | 0.247 | 0.258 |
| $HIGH_{t-1}$ | –0.191 | 0.083 | 0.175 | 0.086 | 0.046 | –0.082 | –0.131 |
| $HIGH_{t-2}$ | 0.490* | 0.217*** | 0.309 | 0.122 | 0.013 | 0.964* | –0.082 |
| $HISE_{t-1}$ | –1.558** | –0.194 | –0.136 | –0.542 | 0.057 | –1.869* | 0.071 |
| $HISE_{t-2}$ | 0.593 | 0.107 | 0.844 | 0.626 | –0.408 | 1.184 | –0.741 |
| Test statistics | | | | | | | |
| WALD | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| SARGAN | 0.44 | 0.38 | 0.24 | 0.34 | 0.22 | 0.25 | 0.62 |
| AR(2) | 0.90 | 0.89 | 0.39 | 0.16 | 0.09 | 0.26 | 0.50 |
| Instruments | | | | | | | |
| Lag length | 1 | 2 | 2 | 2 | 2 | 1 | 1 |

*Notes*: Please see Table 1.

specifications of migration flows and regional DGDP. However, if these variables are modelled as exogenous, all models fail to pass the SARGAN test for the validity of the instrument set.

The cyclical properties of job and worker flows have gained a considerable amount of attention in the previous empirical studies based on linked employer–employee data. In the current setting, this issue can be explored through the parameter estimates of the DGDP variable. The results show that an increase in regional GDP expands job creation and the hiring rate while decreasing job destruction and worker outflow. This finding is in line with the earlier Finnish studies in which labour market flows have been measured in different phases of a business cycle (see Ilmakunnas, Maliranta, 2003). As expected, the findings for unemployment flows imply that regional economic expansion is helpful in reducing unemployment, which is shown in the parameter estimate of the UNET variable. This pattern reflects the fundamental role of regional macroeconomic conditions for plant-level labour demand. In addition, the results from a panel of the Finnish regions indicate that an increase in GDP is not statistically significantly related to job reallocation. This means that there fails to be direct evidence for the 'cleansing role of recessions' as emphasized in the theoretical considerations by Caballero and Hammour (1994), according to which job reallocation should be more intensive during times of economic slowdown.

There fails to be a cyclical component in churning. The Finnish evidence is therefore in conflict with the perspective put forward by Burgess *et al.* (2001) by using matched employer–employee data from Maryland according to which buoyant regional labour markets measured by the growth rate are able to yield an increase in the churning rate. In addition, Burgess *et al.* (2001) include a lagged value of churning to their regression models. The variable gets a positive sign. Burgess *et al.* (2001) interpret the result as evidence for the view that there is persistence in employer behaviour. The Finnish evidence reveals no statistically significant persistence in the evolution of churning. The most likely explanation for this is the nature of regional data. Thus, different strategies in employer behaviour cancel each other at the level of regions producing no persistence in churning.

Certain further observations are worth making from the parameter estimates of DGDP. Firstly, the long-run elasticity of the net rate of employment change with respect to DGDP is around 1.0. Interestingly, considering job flows, this net effect is explained almost wholly by the equal magnitude of the impacts of DGDP on job creation and job destruction, whereas in worker flows the long-run elasticity of the net rate of employment change with respect to DGDP is explained mainly by the worker outflow rate (70 per cent) and less by the worker inflow rate (30 per cent). Having said that, the parameter estimates of DGDP reveal that it has a positive impact on worker inflow, as reported by Abowd *et al.* (1999) for France.

Secondly, the long-run elasticity of the net rate of unemployment change with respect to DGDP is around 0.7. An interesting pattern in the adjustment in regional labour markets is that the long-run impact of DGDP on net unemployment flow is driven by the worker outflow rate in unemployment (WOFU), the long-run elasticity of the worker inflow rate from unemployment (WIFU) with respect to DGDP being close to zero. In other words, regional output fluctuations are not reflected in WIFU in any major way. In contrast, regional output fluctuations and WOFU vary together relatively tightly. This means that the decomposition of net change into plant-level gross flows is able to provide an additional perspective on the persistence of regional unemployment during the 1990s.

Thirdly, the excess job reallocation rate is weakly, albeit not statistically significantly, procyclical, i.e. the magnitude of simultaneous gross job creation and destruction declines during times of economic slowdown.[7] This finding is in line with the earlier Finnish studies and sharply contrasts with the US evidence reported in Davis *et al.* (1996). The most likely explanation for this pattern is that the US evidence refers to manufacturing only, but the Finnish linked employer–employee data cover (almost) the entire market economy. The results from a panel of the Finnish regions therefore provide support for the pattern reported by Foote (1998) for Michigan according to which the cyclical nature of job turnover is different in the service sector compared with manufacturing.

Economic growth provides only a partial explanation for regional differences in job and worker flows. According to the results, regional productivity (PROD), which reflects the efficient use of the production factor, labour, by firms situated in a region, helps to explain many of the differences in regional job and worker flows. An explanation for this pattern is that, on average, more productive regions are able to gain market share from the plants located in other regions. Therefore, the high-productivity regions are able to create more jobs (and hire more workers). The effect of productivity is found to be more pronounced in the case of job flows than worker flows. The long-run impact of a one standard deviation change in productivity between the regions is estimated to be 0.06 in job creation and 0.15 in the net rate of employment change. These figures are large but not totally out of line. The actual difference between the highest and the lowest value of the job creation rate is 0.4 points, the corresponding difference being some 0.7 points in the case of the net rate of employment change. Hence, the results imply that the regional differences in productivity help to explain almost 20 per cent of the observed differences in job creation and in the net rate of employment change, other things being equal.

Another factor that is found to boost job creation and the hiring rate is in-migration (MIG1), the finding being consistent with the predictions of new economic geography (see, for example, Fujita *et al*., 1999). These positive gross effects result in an improvement in the net rate of employment change (NET). Having said that, the favourable effects of in-migration may materialize at the cost of workers living in a destination region as indicated by the positive and statistically significant parameter estimate of MIG2 in the worker outflow equations (WOF and WOFU). This result means that a large in-migration of highly educated individuals may yield a crowding-out effect in the destination areas. This feature is an indication of the fact that reallocation of labour resources can be costly in the context of regional labour markets. There is also some evidence that it takes time before migrants establish themselves in the labour markets of destination areas. In other words, the adjustment of regional labour markets to changes in in-migration is far from immediate. This is highlighted in the churning rate equation (CF) in which a large inflow of migrants is found to yield a high rate of excess worker reallocation with a rather large long-run impact of 0.06. In this sense, the external reorganization of regional labour markets measured by gross migration flows and the internal plant-level reorganization of regional labour markets measured by churning seems to be connected. This perspective has been neglected in the previous literature on regional labour markets (see Elhorst, 2003).

Demographic factors have only a modest role in determining regional job and worker flows. Even though the results imply that fewer jobs are created in regions with aged populations (AGED), there are no statistically significant effects of demographic factors on net employment. Having said that, there is some evidence that regions with a high proportion of individuals aged 55 or over tend to have a smaller hiring rate (WIF) than other regions, other things being equal. The result reflects a shift of labour demand away from older workers during the 1990s. In addition, an increase in the share of the aged population reduces the magnitude of job reallocation

(JR) and the magnitude of excess job reallocation (EJR). These findings reflect the higher turnover rates of young people (e.g. Ryan, 2001). Thus, the Finnish regional labour markets with a high share of young people are shown to be more dynamic in nature.

In the context of studies on skill-biased technological change, it is somewhat surprising to notice that the results do not show any great differences in regional job and worker flows across educational levels. The parameter estimate of the variable controlling for the proportion of individuals with higher education in the labour force (HIGHEDU) is statistically insignificant in almost all of the estimated equations. The parameter estimates of secondary education (UPSEC) are significant in most of the cases but fairly small in absolute values. The most likely explanation for these particular findings is connected to the time period under investigation. Thus, a sudden increase in the unemployment rates of all educational levels during the great slump of the early 1990s may be reflected in these parameter estimates. A alternative explanation is that the variables controlling the educational level of in-migrants, the industry structure and the age profile of the regions are entirely able to capture the impact of educational attainment.[8]

The parameter estimates of variables controlling for observable differences in the industry structure are reported in the lower parts of Tables 1 and 2. The difficulties faced by agricultural regions (omitted category) are evident in the results. Various industry variables enter net employment and unemployment equations positively and statistically significantly. Interestingly, these favourable net effects arise mainly from the better ability of regions to create jobs/to hire new workers. The rates of job destruction/worker outflow remain largely the same between regions with different industry structures, other things being equal. In addition, there is evidence for the perspective that the rate of churning is higher in the regions that have large numbers of private services. This result is in line with that reported by Burgess *et al.* (2001).

The pattern that suggests that the industry structure is a more significant factor in explaining the regional variation in job creation than in job destruction is consistent with findings by Eberts and Montgomery (1995), who discovered that job creation is associated primarily with regional variation and job destruction with cyclical variation. These observations have direct relevance for regional policy. If the target is to increase the number of jobs in a region, public measures should be aimed at improving the preconditions for the birth of new firms rather than aiding contracting firms.

## 5. Conclusions

During the past 10 years the analyses of linked employer–employee data sets have contributed to our knowledge on the adjustment of labour markets. These analyses are typically based on the examination of aggregated measures of job and worker flows in different phases of a business cycle and across countries. The interest has rarely focused on the differences in the adjustment of regional labour markets within a single country that have similar institutions.

This study aims to broaden the picture of regional differences in job and worker flows by combining the measures of job and worker flows together with data on various factors that describe the labour market and the economy of a region. It is shown that labour market dynamics differ markedly between regions of a single country despite similar labour market institutions and labour legislation. As in previous analyses of linked employer–employee data, job and worker flows are shown to behave cyclically. In addition, the results indicate that observable differences in regional productivity, in-migration, demographics and industry structure help to explain the prevailing disparities in regional labour markets.

The results reveal that the estimated impact on a net change can occur in many ways. For instance, the net rate of employment change is higher in booming regions where labour productivity is high, owing to greater job creation and lower job destruction. Net changes are also favourable in regions with a large service sector or high in-migration, but for other reasons: these are found to improve job creation and have no significant effect on job destruction. This implies that the mere examination of the factors affecting net employment/unemployment masks some interesting dynamics happening at establishment level in regions.

In terms of regional disparities, the following can be said about the factors influencing regional job and worker flows. More jobs are created in growing regions where the service sector is large. These regions gain more in terms of job creation and hiring from extensive in-migration that is directed to growth centres. This happens, however, at a cost. Migrants also tend to increase worker outflow that may be caused by the displacement of workers living in a destination region.

In contrast to growing regions, contracting regions with a large share of agriculture, small in-migration and old population face serious difficulties. The main reason for the poor record of net employment in these areas is the modest job creation and, accordingly, a low rate of hiring new employees. Owing to the absence of background characteristics that were found to boost job creation, the recovery of contracting regions remained weak, even in the era of rapid economic growth. Unfortunately, there seems to be no shortcut from the trap of high unemployment.

What advice, then, can we give to contracting regions with high unemployment? Given the persistence of regional unemployment differences, it is perhaps not surprising that we cannot give much. Growth, productivity and in-migration are related to the prevalent success of a region. The structure of in-migration is also unfavourable in contracting regions and results in even larger differences in the demographics and in the quality of the labour force among areas. Having said that, the results do give one policy suggestion that is easy to implement. If the target of policy makers is to increase the number of jobs in contracting regions, public measures should be aimed at improving the preconditions for the birth of new firms rather than aiding contracting firms.

## Appendix

### *Description of the Finnish linked employer–employee data*

The matched character of the data is fully exploited in the sense that gross job and worker flows are calculated from the same linked employer–employee data. This means that job and worker flows are not studied in isolation. Thus, the regional rates of job and worker flows fulfil the definition: JC – JD = WIF – WOF = NET, by the construction of the linked employer–employee data. There are administrative data sources in the Nordic countries that cover essentially the entire population of employees and plants (see Ilmakunnas *et al.*, 2001). Employment Statistics constitutes the backbone of the Finnish linked employer–employee data. It compiles information on the economic activity of individuals from a large number of administrative registers. Employment Statistics covers information on the employment status of the entire population in the last week of December. Employment Statistics is amended in the construction of linked employer–employee data by several available registers maintained by Statistics Finland, most notably the Business Register. The Business Register is a database that covers registered employers and enterprises subject to VAT and their plants in Finland. The unique plant identification codes are taken from the Business Register. In addition, the Business Register follows changes in the demographic structure of plants. The employer–employee links are determined in Employment Statistics. This means that for each person a unique plant appearing in the Business Register is determined based on his/her primary employer during the last week of each year. The industries of the Finnish linked employer–employee data are the following: mining (C), manufacturing (D), energy etc. (E), construction (F), trade (G), hotels and restaurants (H), transportation etc. (I), finance (J), and real estate, business services, etc. (K). This means that agriculture, forestry and fishing (A; B), public administration (L), education (M), health and social work (N), other social and personal services (O), international organizations (Q), and industry unknown (X) are excluded from the evaluation of regional gross job and worker flows.

**Table A1.** Description of variables

| Variable | Definition/measurement |
|---|---|
| Measures of gross job flows | |
| JC | Gross job creation rate in region *i* |
| JD | Gross job destruction rate in region *i* |
| NET | JC – JD (= WIF – WOF) in region *i* |
| JR | Gross job reallocation rate (= JC + JD) in region *i* |
| EJR | Excess job reallocation rate in region *i* |
| Measures of gross worker flows | |
| WIF | Worker inflow rate in region *i* |
| WIFU | Worker inflow rate from unemployment in region *i* |
| WOF | Worker outflow rate in region *i* |
| WOFU | Worker outflow rate into unemployment in region *i* |
| UNET | WIFU – WOFU in region *i* |
| WF | Worker flow rate (= WIF + WOF) in region *i* |
| CF | Churning rate (= WF – JR) in region *i* |
| Macroeconomic indicators | |
| DGDP | Percentage change in (GDP in region *i*/population in region *i*) |
| PROD | Log of (value added in region *i*/employment in region *i*) |
| DEBT | (Long-term municipal debt held in region *i*/population in region *i*) $\times 10^{-3}$ |
| Measures of migration flows and demographics | |
| MIG1 | (Gross in-migration (total) to region *i*/population in region *i*) ×10 |
| MIG2 | (Gross in-migration of individuals with higher university degrees to region *i*/gross in-migration (total) to region *i*) ×10 |
| AGED | (The number of individuals aged 55+ in region *i*/population in region *i*) ×10 |
| UPSEC | (The number of individuals aged 15+ with upper secondary education in labour force in region *i*/labour force in region *i*) ×10 |
| HIGHEDU | (The number of individuals aged 15+ with higher level education in labour force in region *i*/labour force in region *i*) ×10 |

**Table A1.** Continued

| Variable | Definition/measurement |
|---|---|
| Measures of industry structure | |
| AGRI | Value added by agriculture in region *i*/GDP in region *i* (reference) |
| MANU | Value added by manufacturing in region *i*/GDP in region *i* |
| ELEC | Value added by electronics in region *i*/GDP in region *i* |
| SERV | Value added by private services in region *i*/GDP in region *i* |
| PUBL | Value added by public sector in region *i*/GDP in region *i* |
| HIGH | Value added by high-tech manufacturing in region *i*/GDP in region *i* |
| HISE | Value added by high-tech services in region *i*/GDP in region *i* |

**Table A2.** Descriptive statistics (from 1988 to 1997)

| Variable | Mean | SD | MIN | MAX |
|---|---|---|---|---|
| JC | 0.151 | 0.055 | 0.051 | 0.466 |
| JD | 0.170 | 0.062 | 0.043 | 0.445 |
| NET | –0.019 | 0.087 | –0.374 | 0.330 |
| JR | 0.321 | 0.078 | 0.135 | 0.853 |
| EJR | 0.252 | 0.079 | 0.086 | 0.844 |
| WIF | 0.254 | 0.071 | 0.120 | 0.577 |
| WIFU | 0.047 | 0.031 | 0.000 | 0.181 |
| WOF | 0.273 | 0.068 | 0.139 | 0.519 |
| WOFU | 0.057 | 0.034 | 0.007 | 0.321 |
| UNET | –0.010 | 0.039 | –0.275 | 0.135 |
| WF | 0.527 | 0.108 | 0.276 | 0.985 |
| CF | 0.206 | 0.058 | 0.073 | 0.516 |
| DGDP[a] | 0.011 | 0.065 | –0.223 | 0.329 |
| PROD | 12.242 | 0.199 | 11.715 | 12.958 |
| DEBT | 4.993 | 1.554 | 0.953 | 12.020 |
| MIG1 | 0.275 | 0.086 | 0.096 | 0.564 |
| MIG2 | 1.506 | 0.339 | 0.706 | 2.667 |
| AGED | 1.060 | 0.172 | 0.660 | 2.136 |
| UPSEC | 5.664 | 0.917 | 2.887 | 7.712 |
| HIGHEDU | 1.093 | 0.345 | 0.564 | 2.590 |
| MANU | 0.323 | 0.120 | 0.074 | 0.643 |
| ELEC | 0.031 | 0.037 | 0.000 | 0.479 |
| SERV | 0.323 | 0.073 | 0.177 | 0.635 |
| PUBL | 0.202 | 0.055 | 0.081 | 0.401 |
| HIGH[b] | 0.008 | 0.029 | 0.000 | 0.344 |
| HISE[b] | 0.016 | 0.011 | 0.000 | 0.063 |

*Notes*: [a] Data available for the years 1989–97.
[b] Data available for the years 1988–96.

## Notes

[1] Pekkala and Kangasharju (2002a, b) have recently applied VAR models to the investigation of regional employment and unemployment dynamics in the Finnish regions.

[2] Foote (1998) provides evidence on job flows for Michigan, and Burgess *et al.* (2001) provide evidence on churning based on the linked employer–employee data from Maryland.

[3] For expository purposes all measures are multiplied by 100 in all figures.

[4] The high rates of job creation and job destruction are observed especially in northern Finland, and low rates in eastern Finland. One potential explanation for this is provided by active labour market policy that is targeted extensively on northern Finland. It should be noted, however, that the reported job flows are calculated by comparing the situation within an establishment between the end of year $t$ and the end of year $t-1$, and that the duration of a typical subsidized job period is 6 months. Accordingly, these spells are not, at least totally, included in the measures of gross job flows.

[5] For the definition of these variables, see Appendix Table A1. The summary statistics are reported in Appendix Table A2.

[6] The results of the unreported fixed-effects models are available from the authors on request.

[7] Caballero (1998) stresses that it is appropriate to measure the magnitude of restructuring by the excess reallocation rate.

[8] The younger cohorts are more educated in Finland, by a wide margin.

## References


Abowd J. M. and Kramarz F. (1999) ‘The Analysis of Labor Markets Using Matched Employer–Employee Data’ in Ashenfelter O. and Card D. (eds.) *Handbook of Labor Economics*, Vol. 3B, Amsterdam: North-Holland: 2629–2710.

Abowd J. M., Corbel P. and Kramarz F. (1999) ‘The Entry and Exit of Workers and the Growth of Employment: An Analysis of French Establishments’, *Review of Economics and Statistics* 81: 170–187.

Albæck K. and Sørensen B. E. (1998) ‘Worker Flows and Job Flows in Danish Manufacturing, 1980–91’, *The Economic Journal* 108: 1750–1771.

Arellano M. and Bond S. R. (1991) ‘Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations’, *Review of Economic Studies* 58: 277–297.

Arellano M. and Honore B. (2001) ‘Panel Data Models: Some Recent Developments’ in Heckman J. J. and Leamer E. (eds.) *Handbook of Econometrics*, Vol. 5, Amsterdam: North-Holland: 3229–3296.

Atkinson A. B. (1999) ‘The Changing Distribution of Income: Evidence and Explanations’, *German Economic Review* 1: 3–18.

Baltagi B. H. (1995) *Econometric Analysis of Panel Data*, London: John Wiley.

Bartelsman E. J. and Doms M. (2000) ‘Understanding Productivity: Lessons from Longitudinal Microdata’, *Journal of Economic Literature* 38: 569–594.

Bertola G. and Rogerson R. (1997) 'Institutions and Labor Reallocation', *European Economic Review* 41: 1147–1171.

Blanchard O. J. and Katz L. F. (1992) 'Regional Evolutions', *Brookings Papers on Economic Activity* 1: 1–75.

Böckerman P. and Maliranta M. (2001) 'Regional Disparities in Gross Job and Worker Flows in Finland', *Finnish Economic Papers* 14: 84–103.

Burgess S., Lane J. and Stevens D. (2001) 'Churning Dynamics: An Analysis of Hires and Separations at the Employer Level', *Labour Economics* 8: 1–14.

Caballero R. (1998) 'Comments' in Fuhrer J. C. and Schuh S. (eds.) *Beyond Shocks: What Causes Business Cycles?* Conference Series 42, Boston: Federal Reserve Bank of Boston: 338–348.

Caballero R. J. and Hammour M. L. (1994) 'The Cleansing Effect of Recessions', *American Economic Review* 84: 1350–1368.

Card D. and DiNardo J. E. (2002) 'Skill-biased Technological Change and Rising Wage Inequality: Some Problems and Puzzles', *Journal of Labor Economics* 20: 733–783.

Davis S. J. and Haltiwanger J. (1999) 'Gross Job Flows' in Ashenfelter O. and Card D. (eds.) *Handbook of Labor Economics*, Vol. 3B, Amsterdam: North-Holland: 2711–2805.

Davis S. J., Haltiwanger J. and Schuh S. (1996) *Job Creation and Destruction*, Cambridge, MA: MIT Press.

Eberts R. W. and Montgomery E. (1995) 'Cyclical versus Secular Movements in Employment Creation and Destruction', Working Paper No. 5162, National Bureau of Economic Research, Cambridge, MA.

Elhorst J. P. (2003) 'The Mystery of Regional Unemployment Differentials: A Survey of Theoretical and Empirical Explanations', *Journal of Economic Surveys* 17: 709–748.

Foote C. L. (1998) 'Trend Employment Growth and the Bunching of Job Creation and Destruction', *Quarterly Journal of Economics* 113: 809–834.

Fujita M., Krugman P. and Venables A. J. (1999) *The Spatial Economy*, Cambridge, MA: MIT Press.

Gautier P. A. and Broersma L. (2001) 'The Timing of Labour Reallocation and the Business Cycle: Evidence from the Netherlands', *Labour* 15: 663–684.

Greenway D., Upward R. and Wright P. (2000) 'Sectoral Transformation and Labour-market Flows', *Oxford Review of Economic Policy* 16: 57–75.

Haltiwanger J. C., Lane J., Spletzer J. R., Theeuwes J. J. M. and Troske K. R. (1999) (eds.) *The Creation and Analysis of Employer–Employee Matched Data*, Amsterdam: Elsevier.

Honkapohja S. and Koskela E. (1999) 'The Economic Crisis of the 1990s in Finland', *Economic Policy* 29: 400–436.

Hsiao C. (1985) *Econometric Analysis of Panel Data*, Cambridge: Cambridge University Press.

Ilmakunnas P. and Maliranta M. (2003) 'The Turnover of Jobs and Workers in a Deep Recession: Evidence from the Finnish Business Sector', *International Journal of Manpower* 24: 216–246.

Ilmakunnas P. and Topi J. (1999) 'Microeconomic and Macroeconomic Influences on Entry and Exit of Firms', *Review of Industrial Organization* 15: 283–301.

Ilmakunnas P., Maliranta M. and Vainiomäki J. (2001) 'Linked Employer–Employee Data on Finnish Plants for the Analysis of Productivity, Wages and Turnover' in Jensen T. P. and Holm A. (eds.) *Nordic*

*Labour Market Research on Register Data*, Copenhagen: Nordic Council of Ministers: 205–246.

Krugman P. (1998) 'What's New about the New Economic Geography?', *Oxford Review of Economic Policy* 14: 7–17.

Nickell S. (1981) 'Biases in Dynamic Models with Fixed Effects', *Econometrica* 49: 1417–1426.

Nickell S. (1998) 'Job Tenure and Labour Reallocation. The Labour Market Consequences of Technical and Structural Change', Discussion Paper No. 32, Centre for Economic Performance.

OECD (2000) *Employment Outlook*, Paris: OECD.

Pekkala S. and Kangasharju A. (2002a) 'Regional Labour Market Adjustment: Are Positive and Negative Shocks Different?', *Labour* 16: 267–286.

Pekkala S. and Kangasharju A. (2002b) 'Regional Labor Markets in Finland: Adjustment to Total versus Region-specific Shocks', *Papers in Regional Science* 81: 329–342.

Ryan P. (2001) 'The School-to-work Transition: Cross-country Perspective', *Journal of Economic Literature* 39: 34–92.

Shimer R. (2001) 'The Impact of Young Workers on the Aggregate Labor Market', *Quarterly Journal of Economics* CXVI: 969–1007.