# Large worker flows in the Finnish economy

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Viewed in the light of Finland's employment and unemployment figures, the labour market impact of the weak economic performance of recent years would appear so far to be less than feared. These aggregate-level figures do not, however, reveal anything about changes between sectors or worker flows. The present article explores the labour market's internal dynamics and worker flows. Our aim is to take an overview of the dynamics of the Finnish labour market that lie behind the typically reported aggregate figures. We also use worker flows to explain observed changes in unemployment. In addition to this, the article presents the results achieved when probit analysis is used to study labour market flows.

The analysis of worker flows reveals that a significant proportion of labour market movement by individuals is due to people leaving and joining the labour market – thus not simply moving between employment and unemployment. We can also observe that the labour market behaviour of different age groups is very different.

A more detailed sectoral examination of the changes in employment demonstrates that the economy is undergoing a period of structural change. Analysis reveals that the changes in employment have been spread very unevenly between different sectors during the years 2008–2013. At the same time as there has been a net loss of jobs, particularly in the IT sector and the forest industries, new jobs have also been generated, especially in service sectors. These include both low and high productivity services. The analysis presented here is based primarily on micro-level quarterly data from Statistics Finland's Labour Force Survey for the years 2001–2013 (covering 15–74-year-olds). This, in turn, is based on monthly data from questionnaires. The material comprises one and a half million observations and contains data on e.g. respondents' age, gender, educational background, sector of employment, labour force participation, labour market state, professional status, duration of unemployment and duration of current job.

### Aggregate employment figures changed only marginally in recent years

Employment in Finland responded surprisingly little to the dramatic contraction in GDP in the early phase of the international financial crisis, or indeed in the post-crisis recession. By the end of 2013, the number of employed had declined by around 84,000 from its peak in 2008, and the number of unemployed had grown by around 56,000 (Chart 1). Thus, there had been a net outflow of some 28,000 people from the labour market since 2008.

During the Finnish depression of the early 1990s, there was a net loss of around 475,000 jobs and an increase of 361,000 in the number of unemployed. At the same time, 114,000 people left the labour market, some of whom remained permanently outside the labour market (inactive). During the 1990s crisis, approximately 76% of the decline in employment was expressed in



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higher unemployment, and the remainder, around 24% as a fall in labour market participation. During the current crisis, around 66% of the reduction in employment is reflected as an increase in the numbers of

unemployed. Thus, in net terms, 34% of those employed people whose employment has come to an end have left the labour market altogether.

The changes in employment during the period 2008–2013 were distributed very unevenly between sectors of the economy. This illustrates the structural change currently ongoing in the Finnish economy, but also a long-term weakness of demand in the global economy. The sectors in which employment has declined most are largely export-driven and connected with manufacturing. The structural upheaval has been most marked in the number of jobs in the IT sector (Chart 2). In addition to this 'Nokia effect', there has also been a prolonged contraction in the forest and paper industries, reflected in a major decline in the numbers of people employed in these industries.





Change in number of employed in those sectors with the largest change in 2008–2013

At the same time as there has been a net loss of jobs in some sectors, particularly those affected by the structural change, new jobs have emerged in other sectors, and particularly in services. The past five years have seen the emergence of a large number of new jobs in social and health care services, as also in the education sector. The jobs generated in these sectors are primarily public sector jobs (in 2013, of the jobs in education, approximately 85% were in the public sector, and in health and social services, 72%).

In addition to these public sector jobs – traditionally characterised by low productivity – Finland has also seen the emergence of a relatively large number of private sector service jobs with higher productivity, despite the unfavourable cyclical situation and the ongoing restructuring in the economy. This is reflected in, for instance, growth in financial services, management consultancy services, architectural and engineering services, and legal and accounting services.

Thus, in the structure of employment we can observe some sort of creative destruction. As employment dwindles in some sectors, new jobs emerge elsewhere. New jobs in highproductivity sectors within the private sector are particularly interesting from both a structural and a cyclical perspective. In part, they demonstrate that the weak cyclical situation has not smothered the emergence of new jobs in these sectors: as some sectors contract, others are growing.

# Plenty of multidirectional movement on the labour market

Employment relationships begin and end many times more than could be concluded on the basis of net changes in employment and unemployment. People move between employment and unemployment, but also leave and return to the labour market itself (Chart 3). In addition to these flows, large numbers of workers move directly from one job to another, movement that is invisible in these calculations. In both high and low phases of the economic cycle, thousands of people move between labour market states every quarter.

During the period 2001–2013, an average of 47,000 unemployed workers (a good 20% of the total unemployed) found work every quarter. At the same time, around 36,000 employed workers

#### Chart 3.



Sources: Statistics Finland and calculations by the Bank of Finland.

(approximately 1.5% of the total employed) became unemployed. Also worthy of note are the large flows of people out of and into the labour force. An average of 94,000 employed workers (almost 4% of the total employed) left the labour market each quarter, but at the same time 86,000 inactive persons (approximately 6.6% of all those outside the labour force) found employment.

The labour market flows in Finland relative to the number of employed are around a third of the size of those in the United States,<sup>1</sup> the labour market flows in Finland per quarter being equivalent to the monthly flows in the United States. Within the euro area, however, Finland's labour market flows are relatively large, larger

 $^1$  For example, Fujita (2007) has described the labour market flows in the United States.

#### Chart 4.



than, for example, in Austria, Ireland, Italy, France and the Netherlands.<sup>2</sup>

The relative size of labour market flows in different directions in Finland is very similar to the United States. A rough rule of thumb would seem to be that the flow between employment and non-participation in the labour force, or inactivity (E-I-E) is around twice the size of both the flow between employment and unemployment (E-U-E) and that between unemployment and inactivity (U-I-U).

## Large flows out of and into the labour force

Over the period 2006–2013, the flow into and out of employment was around 130,000 workers every quarter. At the beginning of the economic crisis, the flow out of employment grew, and that into employment contracted strongly. The flow into employment has since been restored almost to the same level as before the crisis, but the outward flow has remained stronger than before the crisis and grew further in the years 2012-2013 (Chart 4). In Chart 4, the flow out of employment embraces both the flow from employment to unemployment (EU) and that from employment to inactivity (EI). The flow into employment similarly embraces both the flow from unemployment to employment (UE) and the flow from inactivity to employment (IE).

The large flows from employment to inactivity and vice versa reflect primarily the labour-market behaviour

 $<sup>^{2}</sup>$  ECB (2012).

of the young, at one end, and people in the oldest age groups of working age, at the other. A large part of the flow into employment from inactivity is among the young (16-24 age group) and presumably includes a large number moving from education into working life. In the case of the young, the flow from inactivity into employment is in general larger than the flow in the other direction (Chart 5, upper graph). In contrast, a large part of the flow from employment to inactivity is among older people (55-74 age group) and presumably includes numerous people retiring at the end of their working careers. The flow of older people from employment to inactivity is in general larger than the flow in the opposite direction (Chart 5, lower graph). The flows in the middle of the age distribution (25-54 age group) are closer to each other (Chart 5, middle graph), reflecting the fact that workers in this age group move more in both directions (for example between work and childcare). As a rather large number of people enter employment from inactivity, this suggests that a substantial proportion of those officially inactive in reality constitute a usable part of the labour force.

# Probability of job loss important in the dynamics of unemployment

An increase in unemployment can be due to an increased flow from employment into unemployment, or to a reduction in the flow from unemployment into employment, or a combination of the two. In a simplified analysis that takes into account only

#### Chart 5.



flows between employment and unemployment, the impact of the flows on changes in employment can be depicted as follows.

$$\Delta U_{t+1} = EU_t - UE_t \tag{1}$$

In the equation, the flow from employment into unemployment ( $EU_t$ ) increases unemployment, while the flow from unemployment into employment ( $UE_t$ ) reduces unemployment.<sup>3</sup>

These flows between employment and unemployment comprise two factors. The flow from unemployment into employment depends, on one hand, on the probability of unemployed people finding work, and, on the other hand, on the number of unemployed. Similarly, the flow from employment to unemployment depends, on one hand, on the probability of employed people losing their job, and, on the other hand, on the number of employed. Thus

$$\Delta U_{t+1} = s_t E_t - f_t U_t \tag{2}$$

In this equation, the loss of jobs is a function of the probability of losing one's job ( $s_t$ ) and the number of employed ( $E_t$ ), while the generation of new jobs is a function of the probability of finding work ( $f_t$ ) and unemployment ( $U_t$ ).

Analysing the probability of finding and losing work separately from the gross flows is an interesting exercise, as both the transition probability from one labour market state to the other and the size of the pools of employed and unemployed workers influence the gross flows. When, for example, the gross flow from unemployment into employment grows, we can envisage a situation in which the probability of finding a job remains unchanged or declines and growth in the flow is due solely to an increase in the pool of unemployed workers (if the flow into unemployment has grown). In such a situation, the position of the individual is no better than before, despite the growth in the gross flow.

Below, the logic of our analysis is illustrated using only the flows between employment and unemployment, albeit the results are also presented from the perspective of the three labour market states.

In the simplified analysis, the probability of losing or finding employment can be expressed as follows:<sup>4</sup>

$$s_t = \frac{EU_t}{E_t} \text{ and } f_t = \frac{UE_t}{U_t}$$
 (3)

Here, the probability of moving from one labour market state to another is expressed by the number of people moving divided by the number of people in the source group. Thus, for the years 2001–2013, this gives us an average probability of losing or finding employment of  $s_t = 0.015$  and  $f_t = 0.22$ , i.e. on a quarterly basis 1.5% of employed people have lost their job and become unemployed, while 22% of the unemployed have found a job. When

<sup>&</sup>lt;sup>3</sup> See Annex.

<sup>&</sup>lt;sup>4</sup> See Annex.

the flow out of the labour force is also taken into account, we get an average probability of losing or finding employment of  $s_t = 0.03$  and  $f_t = 0.24$ .

The large difference in probabilities is due to the large differences in the pools of employed, unemployed and inactive people. Although the differences of scale between the categories make it harder to compare the flows, we can nevertheless observe how the probability of losing one's job grew and the probability of finding one declined during the early years of the crisis in 2008–2010 (Chart 6).

Rather than the probability of movement from one labour market state to another, it is more natural to analyse percentage changes in the variables. The impact on changes in the unemployment rate of the probability of losing or finding a job can be estimated with a method applied in the recent research literature.<sup>5</sup> An equation is derived for the change in unemployment that depends on the rate of losing or finding a job and the equilibrium rate of unemployment.<sup>6</sup> It takes the form

$$\Delta \ln u_t^* \approx \alpha_t [\Delta \ln s_t - \Delta \ln f_t],$$
  
where  $\alpha_t = 1 - \bar{u}_t,$  (4)

According to this equation, the percentage change in the unemployment rate can estimated approximately using the percentage changes in the probability of losing or finding employment, as  $1 - \bar{u}_r \approx 1$ .











If we analyse the percentage changes in the rates of movement – including movement from and to the labour market – in the years 2002–2013, we can see clearly how in the early phase of the crisis in 2008–2009 the probability of losing one's job increased and the probability of finding a job declined (Chart 7).

<sup>&</sup>lt;sup>5</sup> For example Shimer (2012) and Elsby et al. (2011).<sup>6</sup> See Annex.

#### Table 1.

Significance of inward and outward flows in unemployment dynamics 2001–2013

Impact on changes in unemployment variance				
Probability of losing employment, $\beta_s$	65%			
Probability of finding employment, $\beta_f$	35%			
Sources: Statistics Finland and calculations of the Bank of Finland.				

The probability of losing employment would appear to have reacted more strongly and accounted for around 2/3 of the percentage change in employment, while the impact of the probability of finding employment is only around 1/3.

A similar decomposition between the flows explaining the unemployment rate can also be achieved by using Fujita and Ramey's variance decomposition derived from the equation presented above.<sup>7</sup> According to these researchers, the variance in the unemployment rate, i.e. its fluctuations, can be written in the form

$var(\Delta lnu_t^*)$	
$\approx cov(\alpha_t \Delta lns_t, \Delta lnu_t^*)$	(5)
$+ \operatorname{cov}(-\alpha_t \Delta \ln f_t, \Delta \ln u_t^*)$	

From this variance decomposition we can derive intuitive measures for two flows as determinants of the change in the unemployment rate:

$$\beta_{\rm s} = \frac{\operatorname{cov}(\alpha_t \Delta \ln s_t, \Delta \ln u_t^*)}{\operatorname{var}(\Delta \ln u_t^*)}, \text{ and}$$

$$\beta_{\rm f} = \frac{\operatorname{cov}(-\alpha_t \Delta \ln f_t, \Delta \ln u_t^*)}{\operatorname{var}(\Delta \ln u_t^*)}$$
(6)

These two variables sum approximately to one. Around 65% of the fluctuation in unemployment is explained by changes in the probability of losing work, while the remaining 35% is explained by changes in the probability of finding work (Table 1).

On the Finnish labour market, changes in both the probability of losing a job or of finding a job are important from the point of view of changes in the unemployment rate. However, the probability of job loss would appear to be the more significant of the two. In comparison with other countries, the relative significance of labour market flows is similar to the United Kingdom.<sup>8</sup> In Spain, the flows in both directions have been fairly equal in their significance, whereas in France the rate for finding work has been more significant, as in the United States.<sup>9</sup>

## Unemployed women find work more easily than men

In this article, we have used panel data from Statistics Finland's Labour Force Survey to estimate the probability of respondents to the survey moving from one labour market state to another. In the probit models employed, a binary variable indicating change in labour market state is explained, and the explanatory variables describe factors that include age structure, sector, gender and duration of unemployment. The aim is to discover whether the normal basic dependencies apply in the statistical data used here and whether

<sup>&</sup>lt;sup>7</sup> Fujita and Ramey (2009).

<sup>&</sup>lt;sup>8</sup> Elsby et al. (2011); Smith (2011).

<sup>&</sup>lt;sup>9</sup> Petrongolo – Pissarides (2008); Shimer (2012); Smith (2011).

the results reveal clear changes during the period reviewed. In pursuit of this latter aim, in all the models the variable of time used is the calendar year, making the trend linear.

In this context (Table 2) only the coefficient values and the z-statistics depicting their precision (which can be related to t-test quantities) are analysed. The estimated coefficients are the changes that occur in marginal probabilities when moving from one comparison group formed by a categorical variable to another. Thus, for example, the variable 'woman' refers to the difference between the marginal probabilities of men and women. With the exception of the variable 'year', the explanatory variables are categorical and represent different subgroups of variables.

The study clarified firstly what factors influence changes in the flows from unemployment to employment (UE). There is a statistically significant difference between men and women in the probabilities of finding work, and specifically in moving from unemployment to employment (Table 2). Unemployed women would appear to find work more easily. The models lack sectoral variables, as it is difficult to define the sector of an unemployed person, but the final outcome suggests that the sectors showing increased employment are largely female-dominated. Age-variable coefficients allow us to conclude that older jobseekers have a lower probability of returning from unemployment to employment. The coefficient for the educational level variable, for its part, tells us that a more highly educated person has a higher probability of moving from unemployment to employment than someone with a lower level of education. As we would expect, variables describing duration of unemployment reveal that the longer a respondent to the survey has been unemployed, the smaller the (marginal) probability of their moving from unemployment back into the ranks of the employed. All these results are intuitive (i.e. as expected) and reinforce the article's other outcomes as well as earlier research results.

If we analyse the flows from unemployment to inactivity (UI) (Table 2), we notice the gender variable is here, too, significant. Its coefficient suggests that women's marginal probability of leaving the labour market is greater than men's. The data does not tell us to what extent these movements are temporary or permanent. The age variable, too, has significance for labour market movements. The marginal probability of people in the age group 55-74 leaving the labour market is significantly larger relative to younger age groups. The duration of unemployment also has a clear statistical correlation with the probability of transition from one state to another. This applies particularly to those unemployed for over 24 months, whose marginal probability of leaving the labour market grows noticeably relative to the control group (unemployed under 6 months). The annual variable is in this case statistically significant, which would suggest that the marginal probability to move from unemployment to inactivity

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Results of the probit model								
Variable	UE	UI	EU	EI	IE	IU		
Woman	0.025 (4.25)	0.028 (5.29)	-0.002 (4.4)	0.010 (13.94)	-0.003 (1.47)	-0.017 (10.14)		
Age 25–34	-0.032 (4.03)	-0.078 (11.19)	-0.002 (3.35)	-0.027 (36.78)	-0.033 (12.19)	-0.004 (1.94)		
Age 35–44	-0.066 (7.75)	-0.092 (12.32)	-0.002 (3.82)	-0.037 (46.94)	-0.058 (19.55)	-0.009 (3.47)		
Age 45–54	-0.096 (11.44)	-0.94 (12.88)	-0.002 (2.59)	-0.039 (49.72)	-0.094 (35.89)	-0.026 (11.51)		
Age 55–64	-0.186 (18.41)	0.014 (1.49)	-0.003 (4.44)	-0.016 (17.29)	-0.199 (76.29)	-0.089 (43.76)		
Tertiary qualification	0.069 (1.41)	-0.066 (1.59)	-0.007 (3.30)	-0.011 (3.17)	0.078 (3.08)	0.030 (1.57)		
U duration 6–11	-0.103 (13.02)	-0.013 (1.68)						
U duration 12–23	-0.154 (16.59)	-0.002 (0.19)						
<i>U</i> duration > 23	-0.203 (19.83)	0.080 (8.18)						
Industry			-0.003 (4.89)	-0.011 (7.29)				
Construction			0.007 (4.89)	-0.003 (1.79)				
Market sector services			-0.002 (1.63)	-0.014 (9.60)				
Other services			-0.006 (5.50)	-0.014 (9.60)				
Temporary employment			0.080 (77.00)	-0.091 (71.80)				
Self-employed			-0.007 (10.13)	-0.008 (6.68)				
Year	-0.019 (0.24)	0.285 (4.04)	-0.013 (2.40)	-0.092 (10.57)	-0.003 (0.12)	-0.006 (0.29)		
Pseudo R <sup>2</sup>	0.047	0.017	0.126	0.117	0.100	0.051		
Log L	-15,801	-13,869	-26,938	-50,394	-35,119	-24,638		
LR(10)	150.78	474.98	7,774.71	1,3326.45	7,806.60	2,658.69		

U duration refers to duration of unemployment (the control group has a duration of under 6 months). The sector of the control group is agriculture and forestry. The type of employment in the control group is regular, permanent employment. UE = flow from unemployment to employment. UI = flow from unemployment to inactivity (i.e. exit from the labour market).

EU = flow from unemployment to unemployment. EU = flow from employment to unemployment. EI = flow from inactivity to employment. IU = flow from inactivity to unemployment.

Sources: Statistics Finland and calculations by the Bank of Finland.

(dependent on other explanatory variables) has grown.

If we examine the flows from employment to unemployment (EU) and from employment to inactivity (EI), we observe that women's marginal probability of becoming unemployed is lower than men's. On the other hand, women's probability of moving from employment to inactivity is strikingly higher than men's. This presumably reflects the fact that women leave the labour market e.g. to care for children, and perhaps also for their parents, more than men do. A higher level of education reduces the marginal probability of moving from employment to unemployment or labour market inactivity. In the construction sector there is a higher marginal probability of becoming unemployed than in other sectors. This presumably reflects the seasonal nature of the construction industry. People on fixed-term contracts have a higher probability than those in regular employment of becoming unemployed or inactive, whereas the probability among the self-employed is lower.

If we look at the flow from inactivity into employment (IE) and unemployment (IU), based on the estimation results, we can conclude that, relative to men, women have a lower marginal probability of moving from labour market inactivity to unemployment. This suggests that women's labour market transitions occur more rarely via unemployment. With age, the marginal probability of rejoining the labour market is markedly reduced. A higher level of education means a higher marginal probability of moving from inactivity back to the labour market. In this case it is unknown whether this is to do with permanent state shifts (from education into working life) or the end of a temporary change (e.g. a move from parental leave back to working life).

## Finnish labour market exhibits more movement than previously thought

Aggregate-level reactions on the labour market during the crisis - seemingly perhaps insignificant - actually conceal a much more dynamic labour market than previously thought. There have been large flows of people between sectors, and the flows between labour market states are also considerable. On the Finnish labour market, changes in the unemployment rate are explained more by changes in the probability of losing work than changes in the probability of finding work. The situation would appear to be similar to that in e.g. the United Kingdom but opposite to that in the United States.

The flows out of the labour market and back onto the labour market are fairly considerable. This tells us that those outside the labour market are an important factor for labour market dynamics; particularly prominent in this respect are the young and the middle-aged, whose transitions are not a one-way street out of the labour market.

Keywords: labour market flows, unemployment, sector, probit

### Annex.

<sup>3</sup> When we take into account the flows out of the labour force and back in, we get  $\Delta U_{t+1} = EU_t + IU_t$ -  $UE_t - UI_t$ , where  $IU_t$  is the flow from labour market inactivity to unemployment and  $UI_t$  is the flow from unemployment to inactivity.

<sup>4</sup> Presented in a general form, the transition degrees from state A to state B are in the form

$$\lambda_t^{AB} = \frac{AB_t}{A_t}$$

The equation describing the change in unemployment can then be written in the form

$$\Delta \mathbf{U}_{t+1} = \lambda_t^{EU} \mathbf{E}_t + \lambda_t^{NU} \mathbf{N}_t - (\lambda_t^{UE} + \lambda_t^{UN}) \mathbf{U}_t$$

<sup>6</sup> We initially define the 'unemployment rate' that prevails when the probability of finding or losing a job is unchanged. This is achieved by posing  $\Delta U_{t+1} = 0$  and solving the text's equation, whereby the 'equilibrium unemployment rate' is

$$u_t^* = \frac{U_t^*}{L_t} = \frac{s_t}{s_t + f_t}$$

The text's equation can also be written in the form

$$\Delta U_{t+1} = s_t E_t - f_t U_t$$
$$= s_t (L_t - U_t) - f_t U$$
$$= s_t L_t - (s_t + f_t) U_t$$

Because

$$\frac{\mathbf{U}_{\mathbf{t}}^{*}}{\mathbf{L}_{\mathbf{t}}} = \frac{\mathbf{s}_{\mathbf{t}}}{\mathbf{s}_{\mathbf{t}} + f_{\mathbf{t}}}$$

can be written

$$(\mathbf{s}_{\mathsf{t}} + f_{\mathsf{t}})\mathbf{U}_{\mathsf{t}}^* = \frac{\mathbf{s}_{\mathsf{t}}\mathbf{L}_{\mathsf{t}}}{\mathbf{s}_{\mathsf{t}} + f_{\mathsf{t}}}$$

and gives

$$\Delta U_{t+1} = -(s_t + f_t)(U_t - U_t^*)$$

This can be presented in a log difference form

$$\Delta \ln u_t^* \approx \alpha_t [\Delta \ln s_t - \Delta \ln f_t]$$

where  $\alpha_t = 1 - \bar{u}_t$ , from which we can naturally estimate the relative roles of the probabilities of losing or finding a job in the determination of equilibrium unemployment on an integrating scale.

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