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Ins and Outs of Polish Unemployment

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Abstract

This paper studies flows on the labour market in Poland in 1995-2008. We show that the main driving force behind the unemployment rate is the behaviour of outflow to employment.
In addition, this flow is found to be procyclical, while the separation rate is acyclical.

Keywords: unemployment, job finding, worker flows

JEL Classification: J63, J64.

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1 Introduction

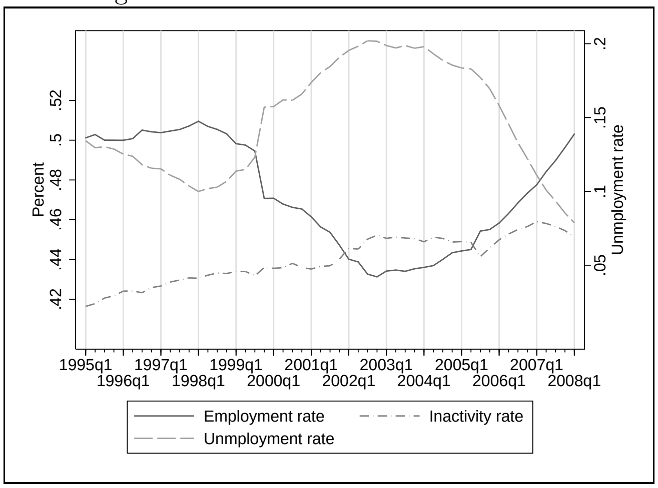
Market economies are characterised by a high level of job turnover. For that reason the flow approach to modelling labour markets has recently acquired the acceptance among labour market economist and dominates recent works on labour market related issues. One has to notice an important distinction between jobs and workers flow. The job flows are caused by the employers and reflect job creation and job destruction processes. Worker flows concerns factors that influence workers and makes them move among labour market states. In this article we look deeply at the latter. In other words, job flow measures capture demand-side developments, while workers flows reflect events and developments in both categories; see Davis, Faberman, Haltiwanger (2005).

Despite the underlying theory being well established, not many empirical works have been issued. However, the vast majority are concerned with job flows or the U.S. labour market or both. Nevertheless, they make a substantial contribution, as information contained in the flow data is potentially more useful than the information enclosed in the stocks; see Mortensen and Pissarides (1994).

European labour markets are characterised by greater rigidity and therefore job and workers flows are limited in comparison to the US. In a recent study, Petrongolo and Pissarides (2008) analysed three European labour markets and showed that the contribution of inflows and outflows to unemployment volatility is nearly equal. Our aim is to conduct analogous analysis for the biggest European transition economy that has recently joined the European Union, i.e. Poland. Time span of the analysis is from the first quarter of 1995 to the first quarter 2008. This period is particulary interesting for at least two reasons. Firstly, it covers the second phase of transition. secondly, also includes the entrance to the European Union. The unemployment rate oscillated between 9% and 22%. This study tries to explain what happened to the labour market in Poland. The polish economy during fifteen years successfully transitioned from command rule to liberal market. It is well-known that such a big reform completely changes labour demand and, at the same time, labour supply is not able to adjust so quickly. We try to explain the behaviour of the unemployment rate by looking though the dynamics of the Polish labour market. The main research question concerns factors that influence the actual and steady-state unemployment level. A special attention is paid to the question of what drives the unemployment rate: increased supply of workers or decreased supply if vacancies. Our analysis is conducted within the framework of Shimer (2007). Additionally, we use extensions proposed by the other authors, see Fujita and Ramey (2009), Petrongolo and Pissarides (2008), to relate the variability of the unemployment rate to the observed flows on the labour market. Moreover, we try to shed some light on the cyclicality of the unemployment rate.

The results indicate that the labour market in Poland is somewhat flexible and rather comparable to the UK or the US labour market than to the ones in continental Europe. Poland has an unemployment profile similar to that of Spain during the 1990's,

Figure 1: Evolution of the labour market



Note: Computation based on CSO data

and similarly to that country the strong economic expansion is assisted by a considerable fall in the unemployment rate. However, the impact of the flows into and out of unemployment is much larger. We show that the transition from unemployment to employment explains a considerable share of the variation in the unemployment rate. We study this particular flow in great detail and show that its impact is lessened during the time of relatively stable unemployment level. At those times the impact of inactivity related flows raises. Moreover, the employment-unemployment transition rate is found to be pro-cyclical. Therefore, we conclude that the job creation process drives the unemployment rate level.
The next section present a short literature review concerning issues related to labour flow modelling as well as some facts and figures in relation to Polish labour market. In section 3 we describe two-state model, discuss dataset properties and presents the results of conducted analysis. The closing paragraph relates observed movements on the labour market to the general state of the economy. Section 4 summarises and concludes.

2 Literature review

The common research question considered in labour market literature is the main cause of the actual unemployment level. The reported evidence is mixed and the given answer depends on chosen methodology. Some researchers indicate that the crucial role belongs to the inflows, see e.g. Darby, Haltiwanger, Plant (1986), Elsby, Michaels, Solon (2007), while the others point out that the outflows are decisive; see

e.g. Shimer (2007). However, this issue could not be separated from cyclical nature of the economy and therefore most of works investigate those problems together.
Darby, Haltiwanger, Plant (1986) assert that the changes in the size and the distribution of the inflow into the unemployment are the most important determinants of the unemployment rate. Since the probability of leaving unemployment is primarily determined by the characteristics of those being unemployed and is little affected by the business cycle, the outflows from unemployment and hence the actual changes in the unemployment rate are primarily determined by the inflows.
In a very recent study Elsby, Michaels, Solon (2007) draw similar conclusions and reveal an important role of increased inflows into unemployment. They noted that increased inflows are important in most recessions, especially the most severe ones.
On the contrary, Shimer (2007) using microeconomic data shows that an outflow from unemployment is a key determinant of the unemployment level. He provides evidence that "virtually all of the increase in unemployment and decrease in employment during the 1991 and 2001 recessions was a consequence of a reduction in the job finding probability". Nevertheless, his measures rely on two strong assumptions: workers neither enter nor exit labour force but simply transit between the employment and the unemployment and all workers are *ex-ante* identical, and, in particular, in any period all unemployed workers have the same job finding probability and all employed workers has the same job exit probability.
Fujita and Ramey (2009) criticised Shimer's approach and point out that his analysis is problematic for at least two reasons. Firstly, cyclicality is not evaluated properly and therefore conclusions about procyclical job finding probability and acyclical separation probability could be misleading. Secondly, and more importantly for our purpose, the measured contributions to unemployment variability do not decompose unemployment variability, because the unemployment is actually a non-linear function of the hazard rates.
The European labour markets are characterised by both greater quantity and price restrictions and therefore job and workers flow are limited; see Haltiwanger and Vodopivec (2003). The actual evidence for European countries is rather limited. Blanchard and Portugal (2001) compared US and Portugal labour market flows. They concluded that despite the unemployment rate and proportions of gross flows being very similar, unemployment duration in Portugal is three times longer, and henceforth flows in relation to working population are three times lower.
In a recent study, Petrongolo and Pissarides (2008) looked at the contribution of inflows and outflows to the dynamics of unemployment in three large European Union members, i.e. the United Kingdom, France and Spain. In the UK the separation rate account for 25 to 40 percent of unemployment variability measure based on administrative data. On the other hand, estimates based on LFS data suggest that inflow into employment contribution is about 48 %. The picture is very different for continental Europe. In France the contribution of inflow rate to unemployment volatility varies from 5 % to 45 % depending on chosen period. It is very low during the period with

stable unemployment level and high during the expansion period.
Labour market in Spain in the 1990's was very similar to one that we observe in Poland in the recent years. The unemployment rate was above 20 % and reached its maximum in 1994, and then it started to fall gradually. The contribution of inflows and outflows to unemployment volatility are nearly equal. However, during the strong rise in the unemployment rate level, inflow accounts for just over 60% of total unemployment variability; see Petrongolo and Pissarides (2008).
Góra and Walewski (2002) conducted a study concerning steady state unemployment rate in Poland in 1993-2001. They point out that the steady state equilibrium unemployment in the 1990's were lower than the actual unemployment rate. the main driving factors were low inflows and relatively high outflows from unemployment. The rise in the unemployment level was sudden and sharp in 1999 and 2001/2002.
There is no clear evidence on flow behaviour in Polish labour market. Therefore, our aim is to fill in that gap and investigate this very interesting issue.

3 Two State Model

3.1 Theory

The model for transition probabilities follows Shimer (2007). The model itself describes the job finding probability for unemployed workers $\mathcal{P}(F)_t$ and the separation probability $\mathcal{P}(S)_t$. To extract those measures from raw data it is necessary to make strong behavioural assumptions. We follow the original model and ignore out of the labour force status, and assume that workers just move from employment to unemployment and vice versa. This simplification is justified since, as noted by Blanchard and Diamond (1992), a distinction between unemployed and not in the labour force status is fuzzy, with many workers moving between these two states.
The model is expressed in continuous time. However, the data are available only at discrete dates. For $t \in \{0, 1, 2, \ldots\}$, refer to interval $[t, t+1)$ as period t. The goal is to recover the job finding probability $\mathcal{P}(F)_t \in [0, 1]$ and the separation probability $\mathcal{P}(S)_t \in [0, 1]$ during the period t from commonly available data. It is assumed that all workers are identical and their probability of movement between labour market states is uniformly distributed on time interval t. Therefore, during period t, all unemployed workers find a job according to a Poisson process with arrival rate $f_t \equiv -log[1 - \mathcal{P}(F)_t]$ and all employed workers lose their job according to a Poisson process with arrival rate $s_t \equiv -log[1 - \mathcal{P}(S)_t]$. Throughout the paper we will follow terminology proposed by Shimer and refer to f_t and s_t as job finding and separation rates and to $\mathcal{P}(F)_t$ and $\mathcal{P}(S)_t$ as the corresponding probabilities.
For a fixed $t \in \{0, 1, 2, \ldots\}$ let $\tau \in [0, 1]$ be a time elapsed since the last measurement date. Let $e_{t+\tau}$ denote the number of employed workers at time $t + \tau$, $u_{t+\tau}$ denote the number of unemployed workers at time $t + \tau$, and $u^s_t(\tau)$ denote "short term unemployment", those workers who are unemployed at time $t + \tau$ but were employed

at some time period $t' \in [t, t+\tau]$. Note that $u_t^s(0) = 0$ for all t. It is convenient to define $u_{t+1}^s = u_t^s(1)$ as the total amount of short term unemployment at the end of period t.
The total unemployment outflow during t, denoted by F_t, is given by the equation (1) in Petrongolo and Pissarides (2008):

$$F_t = (1 - e^{-f_t})u_t + \int_0^1 \left[1 - e^{-f_t(1-\tau)}\right] u_t^s(\tau) d\tau \tag{1}$$

where u_t is unemployment level at start of the period, and $u_t^s(\tau)$ is the unemployment inflow between t and $t + \tau$. The first element on right hand side of (1) counts those people that were unemployed at t and are employed at $t + \tau$ and the second element captures people that inflow into unemployment and find a new job within period t.
For $t \in \{0, 1, 2, \ldots\}$ and $\tau \in [0, 1]$, unemployment and short term employment evolve according to the following differential equations:

$$\dot{u}_{t+\tau} = e_{t+\tau}s_t - u_{t+\tau}f_t \tag{2}$$

$$\dot{u}_t^s(\tau) = e_{t+\tau}s_t - u_t^s(\tau)f_t \tag{3}$$

Unemployment level increases when employed workers separate, at an instantaneous rate s_t, and decreases when unemployed workers find jobs, at an instantaneous rate f_t. Short term unemployment increases when employed workers separate and decreases when short term unemployed find jobs.
To solve above equations for a job finding probability, eliminate $e_{t+\tau}s_t$ between these equations, resulting

$$\dot{u}_{t+\tau} = \dot{u}_t^s(\tau) - [u_{t+\tau} - u_t^s(\tau)]f_t \tag{4}$$

for $\tau \in [0, 1)$. By construction, $u_t^s(0) = 0$, so given an initial condition for u_t, this differential equation can be solved for u_{t+1} and $u_{t+1}^s \equiv u_t^s(1)$:

$$u_{t+1} = [1 - \mathcal{P}(F)_t]u_t + u_{t+1}^s \tag{5}$$

The number of unemployed workers at time $t+1$ is equal to the number of unemployed workers at date t who did not find a job (fraction $1 - \mathcal{P}(F)_t = e^{-f_t}$) plus short term unemployed workers u_{t+1}^s, those who are unemployed at date $t+1$ but were employed at some point during period t. One can express the job finding probability as a function of unemployment and short term unemployment.

$$\mathcal{P}(F)_t = 1 - \frac{u_{t+1} - u_{t+1}^s}{u_t} \tag{6}$$

One can also solve the differential equation (2) forward to obtain an implicit expression for the separation probability

$$u_{t+1} = \frac{1 - e^{-f_t - s_t}}{f_t + s_t} l_t + e^{-f_t - s_t} u_t \tag{7}$$

where $l_t \equiv u_t + e_t$ is a size of the labour force during period t, which is assumed to be constant since the model does not allow for entry and exit from the labour force. Since $l_t \geq u_t$ the right hand side of the expression is non decreasing in s_t. Given the job finding probability from equation (6) and data on employment and unemployment, equation (7) uniquely defines the separation probability $\mathcal{P}(S)_t$.

To understand equation (7), note first that if unemployment is constant during period t, the unemployment rate is determined by the ratio of the separation rate to the job finding rate $\frac{u_t}{l_t} = \frac{s_t}{s_t+f_t}$, a standard formula. More generally, it helps to compare equation (7) with discrete time model in which there is no possibility of both finding and loosing job within a period. In this case

$$u_{t+1} = \mathcal{P}(S)_t e_t + [1 - \mathcal{P}(F)_t] u_t \tag{8}$$

A fraction $\mathcal{P}(S)_t$ of employed workers lose their job and a fraction $\mathcal{P}(F)_t$ of unemployed workers find a job during period t, determining the unemployment rate at the start of period $t+1$. When the time period is sufficiently short, or equivalently $s_t + f_t$ is sufficiently small, equation (7) converges to this simple expression.

The distinction between equations (6) and (7) is quantitatively important for measuring both the level of separation probability and its cyclicality. When the job finding rate f_t is high, equation (7) captures the fact that a worker who loses her job is more likely to find new one without experiencing a measured spell of unemployment. These separations are missed in equation (6), so the latter formula yields fewer separations and, more importantly as stressed by Shimer (2007), a negative bias in the measured correlation between job finding and separation rate. Starting explicitly from a continuous time environment avoids this time aggregation bias.

3.2 Data

We use micro-level data from the Labour Force Survey. The LFS is representative individual level survey, however the population covered by the survey is observed through the households. The information is collected quarterly with a focus on the labour market activity. Each quarter the survey gathers information of about 50.000 individuals.

LFS is designed as a rolling panel. The whole sample for each quarter consist four elementary sub samples. In a given quarter there are two sub samples surveyed in the previous quarter, one newly introduced into the survey, and one which has been not surveyed in the previous quarter and was introduced exactly a year before. We exploit this design to calculate the transition probabilities.

There are some methodological problems with the dataset such as redesigns of the survey. Looking from macroeconomic perspective the major concern is the survey discontinuity that occurred during the 2nd and 3rd quarter 1999. To remove this gap in the dataset we estimate using available data from neighbouring periods seasonal patterns and then replace missing data with linear predictions.

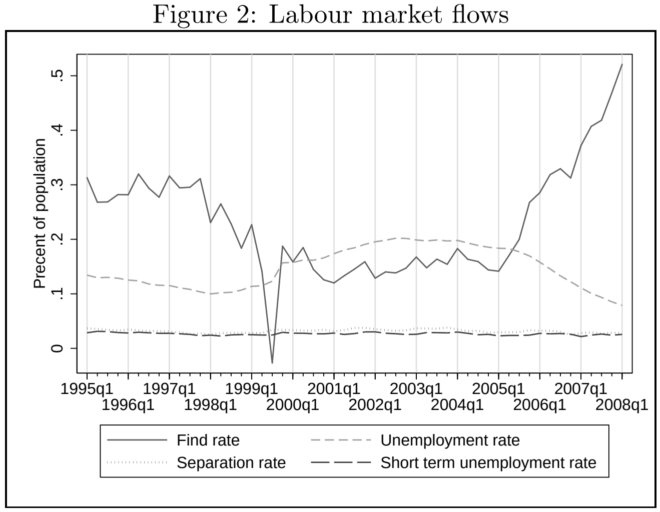
The measures of the number of employed, unemployed and inactive are directly accessible from the LFS. The series are seasonally adjusted. To capture the short time unemployment level u_t^s we use the question asked to currently unemployed about the last day of employment. We treat as short-time unemployed individuals who are unemployed at the time of the survey and declared that were employed in some point during last three months before the week of the survey.

3.3 Empirical Results

We follow seminal work of Shimer (2007) and ignore the out of the labour force status. The changes in the number of inactive persons reflect changes in the demographic structure and are not directly responsible for short-run adjustments on the labour market.

Figure 2. presents the find rate (solid line) and the separation rate (dotted line). Both series are constructed according to (6) and (7) respectively. Additionally, we plot a series for the unemployment rate (dashed line) and short term unemployment rate (dotted and dashed line). The job finding rate is high and very volatile in comparison to the remaining series. The evident pattern is that when the find rate is relatively high and goes over 20% then the unemployment level is starting to fall. Unfortunately, we do not have the real data from 1999 slowdown period, but it is apparent that at this time find rate was declining. It is interesting to see that the separation rate behaviour

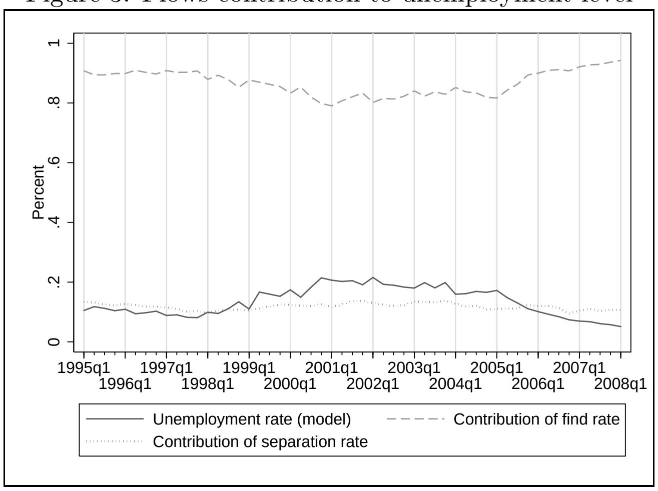
Figure 2: Labour market flows



Note: Computation based on LFS data

is very similar to the short term unemployment level. Basically, those measures are closely related. However, the separation rate is derived from the find rate and the stock of unemployed, while the short-term unemployment rate is computed directly from matched microdata. The difference represents those people that separate and immediately, within one quarter, find new job. They account for 0.005% of working population only. In other words, the time aggregation bias adjustment suggested by Shimer (2007) is negligible when working on LFS data. To examine the contribution

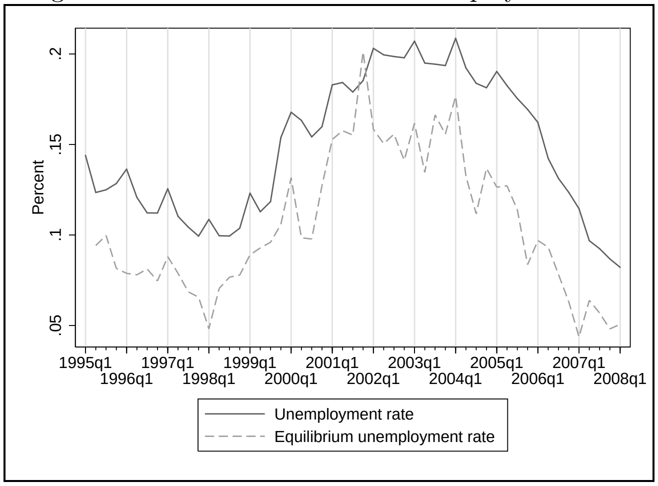
Figure 3: Flows contribution to unemployment level



Note: Computation based on LFS data

of the find and separation rates to unemployment level at first we utilise Shimer (2007) approach. Following his paper we construct two measures: $\frac{s_t}{s_t+\bar{f}_t}$ for the separation rate and $\frac{\bar{s}_t}{\bar{s}_t+f_t}$ for the find rate, where $\bar{s}_t$ and $\bar{f}_t$ are the sample averages of the separation and find rate, respectively. They represent the hypothetical unemployment rates if there were only fluctuations in one component. As it is presented on Figure 3, the find rate explains on the average 85% of the variability of unemployment rate, with the standard deviation of 0.05. The separation rate explanatory power ranges between 9% and 18%, with 13.5% on the average. Another way to capture the contribution of each component is to quantify the variances and the correlations between the changes in constructed rates and the changes in the unemployment rate level. We constructed measures for the entire sample period and four subsamples. The latter are driven by a market fluctuation changes and the available data. The first period, up to the 1999Q1, is characterised by a stable level of unemployment around 13 %. During the analysis, we omit the artificially reconstructed data. The next period consists information from 1999Q4-2001Q4, a time when the unemployment rate rose to 17.5 %. The following period (2002Q1-2004Q1) is characterised by a high and persistent

Figure 4: Stock and Flow based unemployment rate



Note: Computation based on LFS data

unemployment level. The unemployment passed 20 % mark at this time. The last period begins with the entrance to the European Union (2004Q2) and is characterised by a declining unemployment rate. The actual figure in the 2008Q1 is 9.5 %. The results are reported in Table 1. The second, third and fourth column consists variances of the unemployment rate, the find rate and the separation rate respectively. In the fifth column the correlations between the unemployment rate and the separation rate are reported. Two last columns consists the contribution of the separation and the find rate. In each row values for the different time span are reported. The first row represents results for whole sample. The variance of the unemployment rate was at

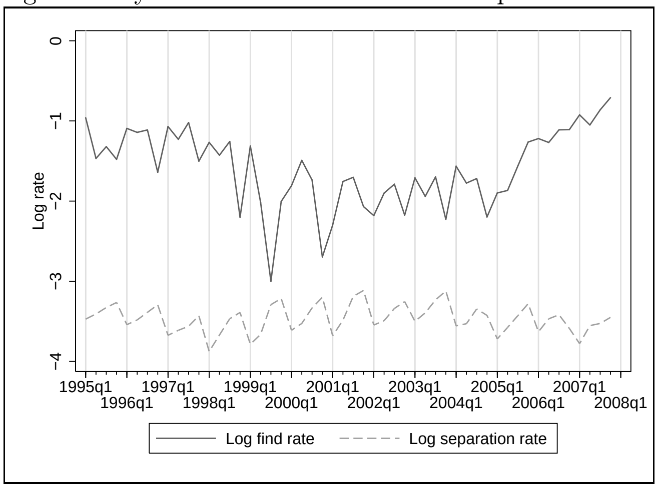
Table 1: Contributions from separation rate to unemployment volatility

Period	var(u_t)	var(f_t)	var(s_t)	corr(u_t, s_t)	s_t	f_t
1995Q1-2008Q1	.0025627	.0018024	.0001220	0.63	0.14	0.85
1995Q1-1999Q1	.0001811	.0002252	.0001259	0.32	0.27	0.83
1999Q4-2001Q4	.0004531	.0004214	.0000555	0.28	0.10	0.85
2002Q1-2004Q1	.0002439	.0002391	.0000384	0.17	0.07	0.85
2004Q2-2008Q1	.0021347	.0019584	.0000569	0.42	0.07	0.99

Note: calculations based on LFS data.

relatively low level at the starting quarters of the analysis. Then it sharply rose in 1999 and slowly decreased up to the first quarter 2004. Since the 2nd quarter 2004, the overall volatility moves up considerably. An obvious explanation of that phenomenon can be given. Joining the European Union has opened the common market to Polish producers and result with an increase in economic activity. At this time Polish economy recovers from the stagnation, thus the GDP growth boosted. The variance of the find rate is much greater than the variance of the separation rate. The

Figure 5: Cyclical behaviour of find and separation rates



Note: Computation based on LFS data

striking observation is that the correlation between the separation rate and the actual unemployment level is considerably higher in the first period. This can be explained by restructurisation caused by privatisation and therefore increased inflows to unemployment; see Góra and Walewski (2002). The conducted analysis shows clearly that the main determinants of the unemployment rate movements are fluctuations in the find rate. They account for over 80 % of the total variance.

Another way to look at the problem of variance decomposition is to use a correction proposed Fujita and Ramey (2009). Despite this method is more accurate, it also provides a steady-state linear approximation only. The results are presented in Table 2. The overall results are very similar to the previous analysis. The explanatory power of decomposition for the full sample is 81%. The contribution of the separation rate not exceeds 10 %, except for the period whit the highest unemployment level. The contribution of the find rate is about 90 %. This suggests that the labour market became more flexible. The sum of contribution is a measure of labour market volatility. Thus, increased flows imply increased volatility. The more volatile the market the more flexible, i.e. time spends in unemployment at work search is shorter. Since European Union enlargement estimate of the contribution exceeds 100 %. This clearly indicates that the equilibrium level of unemployment has changed. Moreover, the flexibility increased further. Together with decreasing unemployment

level and increased employment this lead to the conclusion that previously inactive people started to enter the market.
In general, the contribution values are closer to those calculated for the United States or the United Kingdom than continental Europe countries. Like in the original Shimers' paper, we showed that outflows from unemployment are the primary determinant of the unemployment level. It seems that labour market is just more flexible than the European Union average. In order to deeply investigate the problem we decompose change of unemployment rate in a way proposed by Petrongolo and Pissarides (2008). Their decomposition uses the fact that when there are not many people that separate and find new job within one period, one can replace the differential equation (2) with the following difference equation

Table 2: Contributions from separation rate to unemployment volatility

Period	s_t	f_t
1995Q1-2008Q1	0.074	0.889
1995Q1-1999Q1	0.031	0.918
1999Q4-2001Q4	0.078	0.851
2002Q1-2004Q1	0.163	0.851
2004Q2-2008Q1	0.059	1.054

Note: calculations based on LFS data.

$$\Delta u_t = (1 - u_t)u_{t-1}\frac{\Delta s_t}{s_{t-1}} - u_t(1 - u_{t-1})\frac{\Delta f_t}{f_{t-1}} \tag{9}$$

The first term on the right hand side of equation (9) reflects the contribution to the change in unemployment rate of the separation rate, while the second informs about the contribution of the inflows. However, one must bear in mind that while the labour market is not stable changes in labour force participation can outnumber flows into and out of unemployment.
To obtain instantaneous flow rates it is assumed that the inflows and the outflows from unemployment are uniformly distributed. Consequently, one could replace (1) with

$$F_t = (1 - e^{-f_t})u_t + \left(1 - \frac{1 - e^{-f_t}}{f_t}\right)S_t \tag{10}$$

where S_t is the total number of separations during period t. Similar expression could be derived for the separation rate.
The relation between continuous and discrete-time transitions rates is given by equation 4 and 5 in Petrongolo and Pissarides (2008):

$$\hat{f}_t = \frac{f_t}{f_t + s_t}\big[1 - \exp(f_t + s_t)\big] \tag{11}$$

$$\hat{s}_t = \frac{s_t}{f_t + s_t}\big[1 - \exp(f_t + s_t)\big] \tag{12}$$

where $\hat{f}_t$ is a proportion of job finders between $t-1$ and t to the number of unemployed in period $t-1$ and $\hat{s_t}$ is the number of separating individuals divided by the unemployment level. Both figures are recovered from raw microdata.

The major advantage of this approach is that flows into and out of inactivity are included in the analysis. Under investigations are not only flows between employment and unemployment. Since a vast number of inflows into unemployment originate from non-participation one could expect that the decomposition will differ from the previous result.

Table 3 consists the results of decomposition. As it is expected in all periods the obtained estimates of contribution differ from the previous ones. The more emphasis is put on the role of the separation rate. The contribution of the separation rate varies

Table 3: Contributions from separation rate to unemployment volatility

Period	s_t	f_t
1995Q1-2008Q1	0.595	0.405
1995Q1-1999Q1	0.329	0.671
1999Q4-2001Q4	0.407	0.593
2002Q1-2004Q1	0.950	0.050
2004Q2-2008Q1	0.693	0.307

Note: calculations based on LFS data.

between a third and 2/3 of total unemployment rate volatility after controlling for inactivity related flows. During the period of high unemployment (2002Q1-2004Q1) the contribution is even higher and the separation rate is responsible for almost whole unemployment rate changes. Despite that this results differ from the previous, they are closely related to Petrongolo and Pissarides (2008) findings for the UK and Spain and shows that the overall shape of the separation rate curve is not able to explain observed changes in the unemployment level.

We showed in that section that the variability in the unemployment rate is nearly one to one explained by fluctuations in the find rate. The inflows to unemployment are more important during changes in the labour market structure while the outflows form unemployment dominates when the situation is stable. However, the picture changes when we explicitly control the state of inactivity. In addition, the literature provides similar evidence; see e.g. Elsby, Michaels, Solon (2007).

3.4 Cyclicality

A very important question is how the find and separation rates behave during the business cycle. There is no widely held consensus in the literature about the cyclical nature of labour market flows. We investigate this issue using recently proposed approach by Elsby, Michaels, Solon (2007). Their approach extends Shimer's decomposition based on the hypothetical steady-state unemployment rate. Shimer's counterfactual unemployment rates are sensitive to arbitrary decision of choosing the constant value of find and separation rates.

Flow based unemployment level can be considered as a level of steady-state unemployment. On the figure 4, the actual unemployment rate derived from the number of employed and unemployed is compared with an estimate of the equilibrium unemployment. The latter corresponds with a hypothetical situation, what should be unemployment level if the find rate and separation rate would be held at the last period values.

The obtained estimates of the steady state level are in line with previous studies; see Góra and Walewski (2002). The steady state level is primarily influenced by the inflow stream into the unemployment as inflows outnumber outflows. On the other hand, at some quarters when the unemployment rate was about over 20% level, the outflow rate exceed the inflow rate.

It is interesting to observe that the steady-state movement precedes the changes in the unemployment level by one quarter. The relation between the actual and the steady state unemployment is not stable over time. Two underlying series seems to converge to each other.

The analysis of Elsby et al. departs from the steady-state equilibrium. The actual unemployment rate in the steady state is approximated by relation of the separation rate to the sum of the find and separation rates. By taking logs and differentiating one can express the log of change in unemployment rate as the sum of log changes in the find and separation rates.

Figure 5 presents results of decomposition conducted according to the above mentioned method. The graphs represent the changes in the log of inflow rate into unemployment and log of outflow rate from the unemployment for each quarter.

The picture reveals two important patterns. Firstly, the find rate is evidently lower when the unemployment rate is high, and is higher at the time of relatively low unemployment. In addition, the variation of inflow into unemployment is higher during the slowdown. Hence, it seems to be that the find rate is procyclical. Secondly, the separation rate beside its seasonal pattern is stable over time and has no link to the business cycle of the economy.

To deeply investigate this issue we correlate the find and separation rate with GDP growth rates. The reason is quite obvious. The GDP is thought as a good indicator of the general condition of the economy. The results indicate that the find rate is pro-cyclical (correlation 0.4) and the separation rate is slightly counter-cyclical (correlation -0.24). These results are very similar to the previous findings in the literature. During the expansions, entrepreneurs create more jobs and consequently more vacancies are available to the unemployed. Hence, more people are prone to find a job. Similarly, when the economy slows down, firms stop recruitment process, hence find rate declines.

4 Summary and conclusions

In this study, we analysed the changes in the unemployment rate level in Poland. In the framework of two-state labour flow model and with use of quarterly data on flows we showed that the main driving force behind the unemployment rate is the behaviour of outflow to employment. To quantify the impact of particular transition rates we have used extensions to the basic model proposed by Fujita and Ramey (2009) and Petrongolo and Pissarides (2008).

Two-state model gave us general picture of the labour market behaviour and potential explanations. The inflows from employment to unemployment exhibit little variation and are likely to be stable over the time. The separation rate itself is very closely related to the short term unemployment level. However, the picture derived from different approaches to decomposition of unemployment variance is a bit blurry. From the first model one can see the link is between level of unemployment and the find rate,while the evidence from the approach proposed by Fujita and Ramey confirms that results. The contribution of the separation rate does not vary greatly between periods. It reaches a maximum value during the slowdown, and has low values during the expansion.

The results from the models that ignore the state of inactivity indicate that about 85% - 90% of the changes in unemployment rate may be attributed to the job finding rate, while the separation rate is stable over time. Furthermore, the overall results indicate that flows are determined by the demand for labour.

The highest estimates of contributions to unemployment from the separation rate are obtained via approach proposed by Petrongolo and Pissarides (2008). This is in line with the expectations, as the inactivity related flows are considered. The obtained result differs from previous ones, in the sense that the largest contributions of the separation rates are observed in the period with difficult labour market situation.

One should notice that inflows and outflows derived by Petrongolo and Pisarides method are completely different from those obtained by Shimer method. The primarily source of difference is a diverse treatment of inactivity related flows. The second source of the existing differences may arise from not the same information explored during calculations. Shimer's method relies on stock data, while Petrongolo and Pissarides computations combines stocks and flows information. This may be an explanation for the completely different results of decomposition, and may confirm a major inconsistencies between micro and macro data regarding observed flows, and general information about the sizes of stocks.

The information about stocks, i.e. the number of employed, unemployed and inactive people is directly obtained from the survey. However, to compute the flows, the cross-sectional files from neighbouring quarters are used. On average, only 48% of observations are used. In addition, the LFS is subject to the increasing problem of missing data Myck, Morawski, Mycielski (2007). In addition, the sample is representative to the working population on yearly, not quarterly basis. This causes serious inconsistencies between the micro flow data and the macro stock information.

The overall result shows that the estimated find and separation rate values are higher than in other continental Europe countries. This implies that the labour market in Poland is characterised by a greater flexibility and, therefore, is more close to the UK or US labour market.

Aside from the main research question, we investigated the issue of cyclical behaviour various flows. It turns out that transitions to employment are positively related to the changes in GDP and follow procyclical patterns, however, the estimated correlation values are very small. The important result is that the impact of UE flow is lower when the unemployment level is relatively stable and rises as the labour market conditions are changing. During the expansions, more people are able to find new jobs and move into employment. On the other hand, we found that the EU transition rate is rather countercyclical. The countercyclicality of this particular rate is consistent with Blanchard and Diamond (1992) theoretical model and Fujita and Ramey (2009) evidence for U.S. economy.

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