ANNEX 3. The ins and outs of the Baltic unemployment rates

Introduction

The unemployment rate in the Baltic States is volatile. During the last recession the trough-to-peak increase in the unemployment rate was close to 15 percentage points. No other region in Europe portrays such high volatility in the dynamics of the labour market. To have a better understanding of the economics of Baltic unemployment, this annex uses standard methods to measure the rates of inflow to and outflow from unemployment for four economies – the three Baltic States and Poland, for comparison – and to decompose which of the two flows contributes to unemployment variation.

The rate of inflow to unemployment measures, on average, the percentage of employed workers that lose their job and become unemployed on a monthly basis. The rate of outflow from unemployment measures the average share of unemployed workers that find a job and leave the pool of unemployment. The two rates and their dynamics over time are essential in understanding labour market dynamics.

1. Measuring the flows of unemployment

To measure the probability that an unemployed worker finds a job, F_t, and the probability that an employed worker becomes unemployed, X_t, we follow Elsby et al. (2013) who generalise the method developed by Shimer (2012), which makes use of time series for the number of the unemployed and the measure of short-term unemployment. Let u_t denote the number of unemployed workers at year t and u_t^s – the total amount of short-term unemployed workers that at time t have been unemployed for less than a year.[16]

Then, the number of unemployed workers at date $t+1$ is equal to the sum of the number of unemployed workers who cannot find a job (fraction $1-F_t$) and the number of short-term unemployed workers, who are unemployed at date $t+1$ but had a job at some point between periods t and $t+1, u_{t+1}^s$:

$$u_{t+1} = (1-F_t)u_t + u_{t+1}^s.$$

Invert this,

$$F_t = 1 - \frac{u_{t+1} - u_{t+1}^s}{u_t}$$

to express the unemployment outflow probability as a function of unemployment and short-term unemployment.

Given that these flows are typically considered at monthly frequency, the (yearly) outflow probability, F_t, can be easily converted to the corresponding monthly rate, f_t, through $f_t = -\ln(1-F_t)/12.$[17] Equivalently, the number of unemployed workers at date $t+1$ is a sum of the number of unemployed workers who cannot find a job and the number of employed workers who lost their job (fraction S_t) in the previous period:

$$u_{t+1} = (1-F_t)u_t + S_t e_t,$$

where e_t denotes the number of employed workers. We can use this equation to express the unemployment inflow probability S_t. It should be noted that the last equation does not correct for the time aggregation bias which may arise if a worker who loses his/her job finds a new one without experiencing a measured spell of unemployment. Since the bias may be important for measuring both the level of the employment exit probability and its cyclicality, we use a method suggested by Shimer (2012) to correct for this bias.

2. Evidence from the Baltic region

The measures of the number of employed and unemployed workers are standard. They are obtained from the Labour Force Survey published by national statistics offices. The survey also asks unemployed workers how long they have been searching for a job and publishes the number of unemployed workers with different unemployment durations, which we use as a measure of short-term unemployment. The average unemployment inflow and outflow hazards are reported in Table A.

Table A. Average inflow and outflow rates in the Baltic region, 1998–2016 (percentages)

Country	Unemployment rate (u)	Outflow rate (f)	Inflow rate (s)
Estonia	9.8	6.8	0.7
Latvia	12.2	7.4	1.0
Lithuania	11.7	7.4	0.9
Poland	12.6	7.2	0.9

Source: Data from Statistics Lithuania, Statistics Estonia, Statistics Latvia, and the Central Statistical Office of Poland.

[16] We use a version of Elsby et al. (2013) methodology that makes use of the short-term unemployed workers as defined by those with unemployment duration of less than one year. We have also experimented with other definitions of short-term unemployment, but the results remained unchanged.

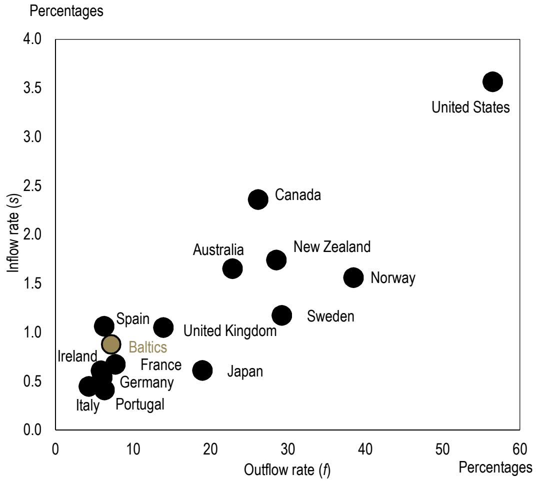
[17] The probability of not finding a job for 12 months is $(1-f)^{12} = 1-F$; hence $f \approx -\ln(1-F)/12$.

A striking observation from this table is the similarities across the four countries in terms of their unemployment dynamics. Chart A reveals that unemployment dynamics in the Baltic region are similar to those in continental European countries: unemployment outflow rates lie below 10 per cent, whereas the monthly inflow rates are at around 0.5 to 1 per cent.

The average job finding and job separation rates for the countries analysed by Elsby et al. (2013) as well as our results are presented in Chart A. As seen in the chart, the Baltics along with continental and Southern European countries stand in contrast to the Anglo-Saxon and Nordic economies, which are characterised by an average monthly unemployment outflow hazard that exceeds 20 per cent and monthly inflow rates that lie above 1.5 per cent. These observations imply that Baltic labour markets display low rates of reallocation of labour, a diagnosis that has been confirmed for many European labour markets, as documented in Blanchard and Wolfers (2000).

Chart B displays the time series for the inflow and outflow hazards for each country in our sample and reveals substantial variation in unemployment hazard rates over time.

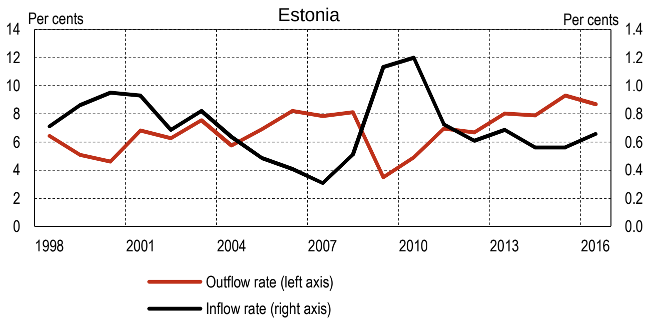
Chart A. Average inflow and outflow rates across countries



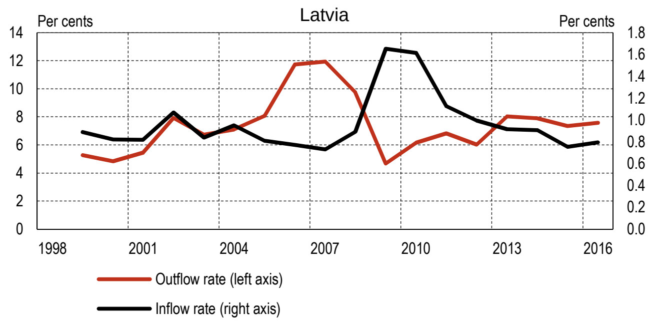
Sources: Data from Statistics Lithuania, Statistics Estonia, Statistics Latvia, and the Central Statistical Office of Poland, Elsby et al. (2013), and Bank of Lithuania calculations.

Note: The time period for each country depends on when the data was first available.

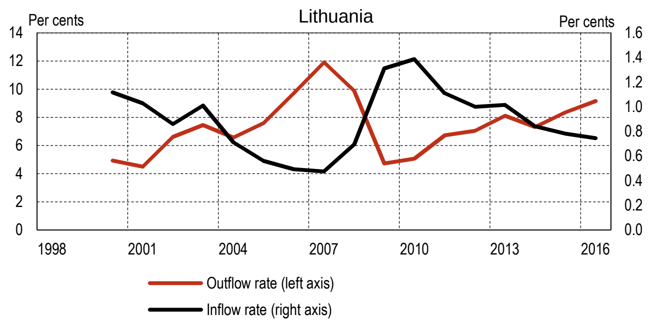
Chart B. Inflow and outflow rates



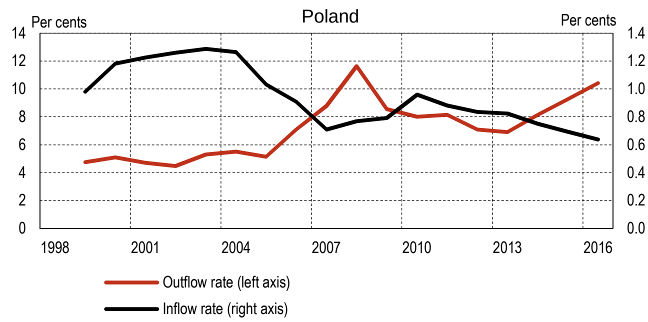
Sources: Data from Statistics Estonia and Bank of Lithuania calculations.



Sources: Data from Statistics Latvia and Bank of Lithuania calculations.



Sources: Data from Statistics Lithuania and Bank of Lithuania calculations.



Sources: Data from the Central Statistical Office of Poland and Bank of Lithuania calculations.

A clear cyclical pattern emerges in all of the four countries: the outflow rate is strongly procyclical, whereas the inflow rate – strongly countercyclical. The strong cyclicality of flows is similar to the Nordic and European economies. These are in contrast to the relatively stable inflow rates in the United States, a point that has been emphasised in the recent literature.[18]

3. Decomposing unemployment fluctuations

In this section, we would like to answer the question of how much of the observed variation in unemployment in each country can be accounted for by variation in the inflow rate into unemployment and variation in the outflow rate from unemployment, respectively. To do so, we follow Elsby et al. (2013) and apply a formal decomposition of changes in the inflow and outflow rates for each country. The evolution over time of the unemployment rate can be written as[19]

[18] See Fujita and Ramey (2009), among others.

[19] Note that we abstract the equation from inflows into unemployment on account of non-participation and labour force growth. The labour force is normalised to 1, which makes unemployment stocks and rates equivalent.

$$\frac{du_t}{dt} = s_t(1 - u_t) - f_t u_t.$$

Assuming that the flows are constant within a year, we can solve the latter equation relating the continuous time evolution of unemployment to the unemployment rates that we observe at discrete annual intervals and to variation in the worker flows, s_t and f_t:

$$u_t = \lambda_t u_t^* + (1 - \lambda_t) u_{t-1},$$

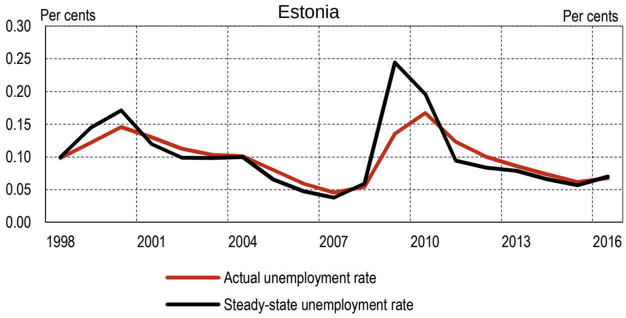
where

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

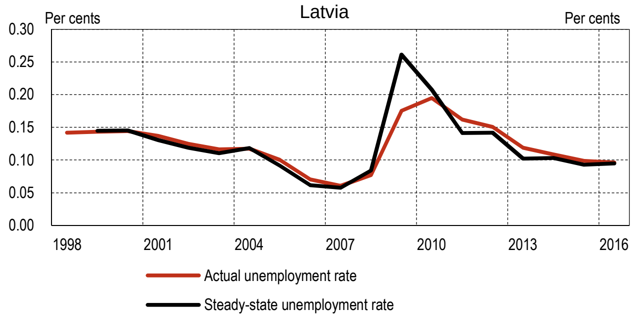
denotes the steady-state unemployment rate, $\frac{du_t}{dt} = 0$, i.e. such that the rates of inflow to and outflow from unemployment are equal, and $\lambda_t = 1 - e^{-12(f_t + s_t)}$ is the annual rate of convergence to the steady-state unemployment rate. If unemployment dynamics are rapid (like in the United States), i.e. $f_t + s_t$ is a relatively large number, λ_t is close to 1 and the unemployment rate can be approximated closely by its steady-state value. This is not likely to be the case in the Baltics due to sluggish unemployment dynamics as seen in Table A and Chart A.

Chart C plots the actual unemployment rate, u_t, as well as the steady-state unemployment rate, u_t^*, for the four countries.

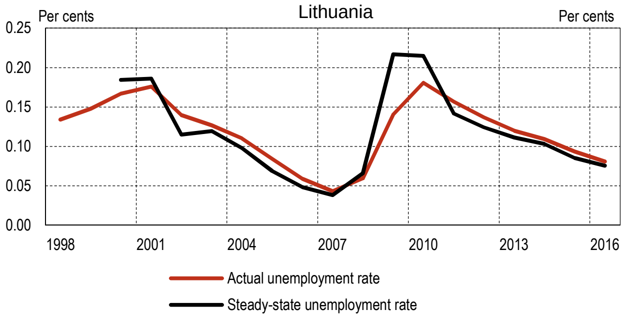
Chart C. Actual versus steady-state unemployment



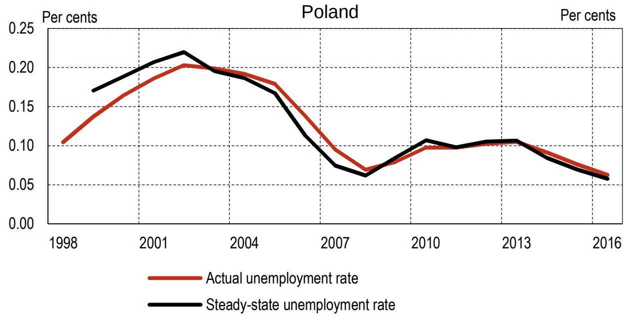
Sources: Data from Statistics Estonia and Bank of Lithuania calculations.



Sources: Data from Statistics Latvia and Bank of Lithuania calculations.



Sources: Data from Statistics Lithuania and Bank of Lithuania calculations.



Sources: Data from the Central Statistical Office of Poland and Bank of Lithuania calculations.

We can see that the latter is a relatively good approximation to the actual unemployment rate before and after the recession. The actual unemployment rate in Poland appears to be out of the steady-state during the late 1990s, but it tracks the steady-state equilibrium relatively well during the rest of the sample of observation.

During the recent crisis, the Baltic States experienced considerable departures from steady-state unemployment. As discussed earlier, the reason is that the unemployment flow hazards in these economies are relatively low, making convergence to the steady-state slow. Out of the steady state, contemporaneous variation in the Baltic unemployment rate is driven by both contemporaneous and lagged variations in the flow hazards. The steady-state unemployment rate, u_t^*, does not take into account lagged values of the flow hazards, thus creating a difference between the actual and the steady-state values of unemployment.[20]

Given significant departures from the steady-state unemployment rate in the four countries, we follow Elsby et al. (2013) and use a decomposition of unemployment changes that holds even when unemployment is out of the steady state. The proposed methodology allows capturing fluctuations in the unemployment rate into three components: varia-

[20] Also, allowing for inflows and outflows from non-participation may help to close the gap between the steady-state and actual unemployment rates, however, it complicates the analysis significantly.

tions in the outflow and inflow rates, as well as the initial deviation from the steady-state at the beginning of the time series. The results of the decomposition in Table B in many ways confirm the suggestive picture that one can discern from the time series in Chart C.

Table B. Decomposition of unemployment fluctuations, 1998–2016 (percentages)

Country	Outflow rate (f)	Inflow rate (s)	Initial deviation from the steady-state	Residual
Estonia	0.46	0.62	0.00	–0.08
Latvia	0.60	0.48	0.00	–0.09
Lithuania	0.52	0.54	0.00	–0.06
Poland	0.52	0.37	0.08	0.04

Sources: Data from Statistics Lithuania, Statistics Estonia, Statistics Latvia, and the Central Statistical Office of Poland, and Bank of Lithuania calculations.

Both variation in outflow rates and variation in inflow rates play a significant role in terms of the four economies. In fact, we find an almost 50:50 inflow-outflow split for the Baltic region. Poland presents a slightly different picture, where the role of the inflow rate is somewhat less significant. The reason is that the Polish inflow rate has barely increased during the great recession. Again, these findings confirm a similar picture for the Baltics to the one that has been established for continental Europe and Nordic countries.

Table C. Correlations with changes in the unemployment rate, 1998–2016

Country	$corr(\Delta u_t, \Delta F_{t+k})$			$corr(\Delta u_t, \Delta S_{t+k})$		
	k = –1	k = 0	k = 1	k = –1	k = 0	k = 1
	(1)	(2)	(3)	(4)	(5)	(6)
Estonia	–0.3	0.1	0.8	0.6	0.8	0.0
Latvia	–0.3	0.0	0.8	0.4	0.8	-0.1
Lithuania	–0.2	0.1	0.8	0.7	0.8	0.0
Poland	0.0	0.2	0.6	0.7	0.6	0.2

Sources: Data from Statistics Lithuania, Statistics Estonia, Statistics Latvia, and the Central Statistical Office of Poland, and Bank of Lithuania calculations.

Finally, we follow Elsby et al. (2013) to construct the total number of workers who flow in and out of the unemployment pool. We use these measures to analyse the timing of changes in these flows. The six columns of Table C report contemporaneous, lead, and lag correlations between changes in the flows and changes in the unemployment rate. We uncover the following. In the year prior to the rise in the unemployment rate, inflow into the unemployment pool increases: the one-year lead correlation between changes in inflows and contemporaneous unemployment is positive for all countries in our sample (column 4). Inflows remain positive in the year that unemployment rises: the contemporaneous correlations between changes in inflows and changes in unemployment are at their highest (column 5). In the year following the rise in the unemployment rate, outflows begin to increase: the one-year lag correlation between changes in outflows and changes in unemployment is strongly positive (column 3). These findings, again, confirm a similar pattern in the Baltics to the one found by Elsby et al. (2013) in OECD countries.

These observations are an interesting addition to the debate that has progressed for the United States and Europe. A growing trend in modern macroeconomic models of the aggregate labour market has been to assume that the inflow rate into unemployment does not respond to cycles. This annex confirms that neglecting variation in unemployment inflows as an important driving force for changes in unemployment in the Baltics should be done with caution.

Conclusions

We provide four main results. First, the level of unemployment flows in the Baltics is low, indicating that labour market dynamics in this region are slow. Second, both the unemployment outflow and inflow rates portray strong cyclical patterns. The strong cyclicality of flows closely resembles the findings in Nordic and continental European economies. Third, the two flows contribute almost equally to the dynamics of the unemployment rate in the four economies under discussion. Fourth, in terms of the timing, we show that changes in inflows tend to lead to changes in the unemployment rate, a fact that has been highlighted for the OECD countries.

References

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