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## Immigration (from Ukraine) and labour market in Poland: evidence from Bayesian VAR models

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19th South-Eastern European Economic Research Workshop, Tirana, 6-7 November 2025

The standard disclaimer applies



## Agenda

1. Motivation
2. Related literature
3. Data and method
4. Results
5. Conclusions



# 1. Motivation

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# Motivation

- For many years, particularly after joining the EU, Poland was a country of emigration
- Since 2014 Poland has experienced significant influx of Ukrainian immigrants, raising many questions about its impact on the Polish economy
- The outbreak of full-scale Russian aggression against Ukraine entailed another spike in the number of Ukrainians coming to Poland
- The situation on the labour market in Poland:
  - the LFS unemployment rate fell from ~10% in 2014 to ~3% in 2023 (lower than 5% since 2017) and seems to be very robust to fluctuations of the economic activity
  - the growth rate of real wages lower than the GDP growth rate (on average)
  - typical demographic challenges: population ageing, declining fertility, and labour shortages

## This paper

- analyses the importance of immigration shocks in shaping the unemployment and wages fluctuations in Poland
- estimates several BVAR models using quarterly data for Poland (including newly constructed proxies for immigration size)
- identifies shocks using sign restrictions
- does not take a position on the long-term impact of immigration on the labour market in Poland
- Estimated effects of immigration shocks in the recent period:
  - unemployment rate – moderate negative
  - real wages – strong negative
  - nominal wages – strongly positive



## 2. Related literature

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## Related literature

- Papers on immigration to Poland: e.g., Górny et al. (2019), Duszczuk and Kaczmarczyk (2022), Kaczmarczyk (2022), Strzelecki et al. (2022, 2025), Chmielewska-Kalińska et al. (2023)
- In the broader context, studies on immigration:
  - SVAR models: Furlanetto and Robstad (2019), Kiguchi and Mountford (2019), Maffei-Faccioli and Vella (2021)
  - theoretical frameworks: e.g., Storesletten (2000), Mandelman and Zlate (2012), Aubry et al. (2016), Caliendo et al. (2021)
- Empirical papers disentangling technology, demand and labour market shocks:
  - labour supply, wage bargaining and matching efficiency shocks: Foroni et al. (2018), Consolo et al. (2023), Diwambuena and Ravazzolo (2021a)
  - reallocation and matching efficiency shocks: Hairault and Zhutova (2018), Consolo and Petroulakis (2022)
  - automation shock: Diwambuena and Ravazzolo (2021b), Bergholt et al. (2022)



## 3. Data and method

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# Data and method

- Quarterly data for Poland, 2004q1-2023q3
- Baseline BVAR model inspired by Foroni et al. (2018):
  - four variables: log real GDP, log CPI, log real wages, LFS unemployment rate
  - normal diffuse priors with standard parametrization (robust if Minnesota prior)
  - five lags (robust if four lags)
  - four shocks: demand, technology, labour supply, wage bargaining / wage mark-up
  - identification using sign restrictions (only on the impact response)
  - estimation conducted in BEAR (Dieppe et al., 2016)
- Extended to include measures of working and non-working immigration
- Many robustness checks

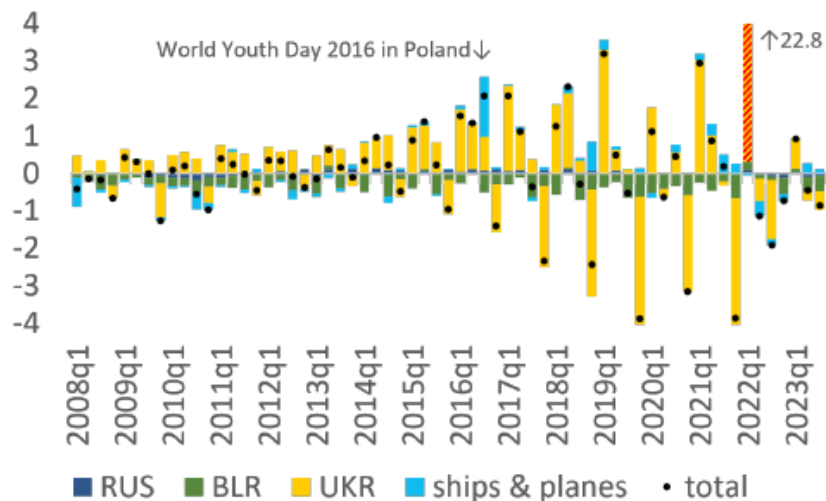
## Proxy for total immigration

- Polish Border Guard data on the net number of Schengen Area border crossings (inflow minus outflow) by foreigners for 2007q1–2023q4:
  - accumulated quarterly
  - seasonally adjusted for 2007q1-2021q4; raw series for 2022q1-2023q3
  - backcast for 2004–2006 using exponential smoothing
- The exact numbers are not important from the perspective of VAR modelling, but the proxy should satisfy:  $true \approx a + b \cdot proxy$
- Caveats fully acknowledged:
  - permanent residence vs temporary basis
  - Poland as a transit country
- Alternative proxy based on the Eurostat annual data + robustness checks

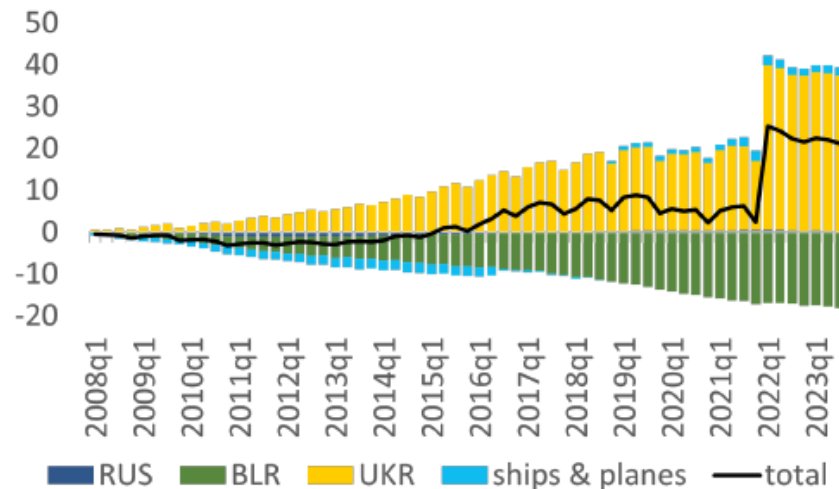
# Net number of Poland's border crossings by foreigners

(hundreds of thousands)

(a) quarterly flows



(b) accumulated since 2008q1

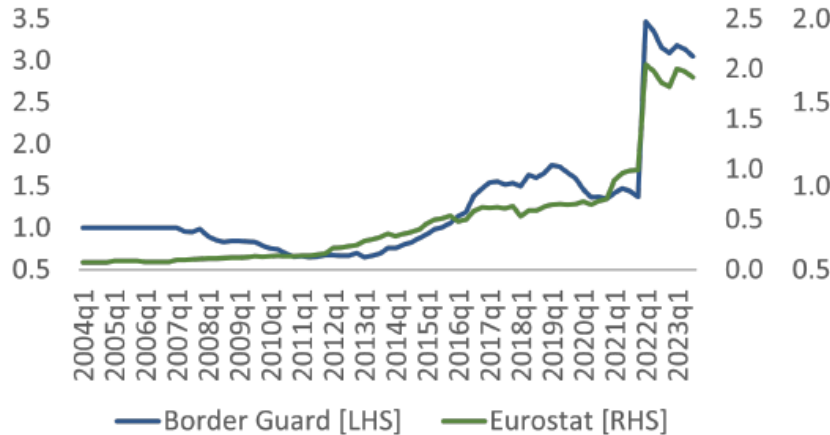


Notes: net number of crossings := inflow - outflow

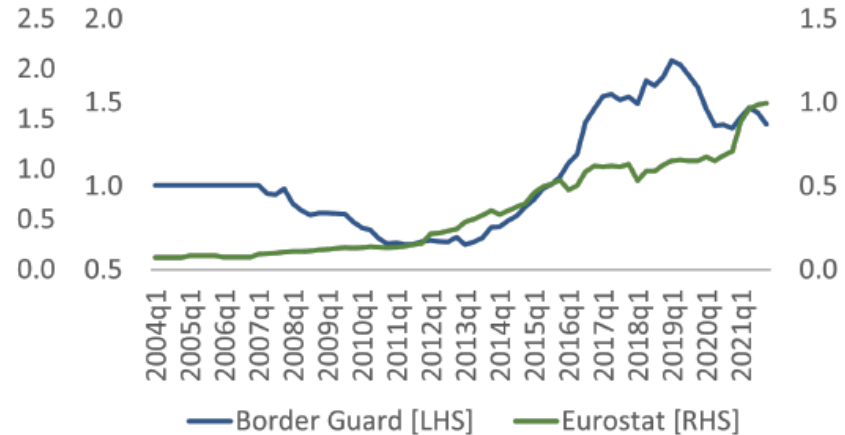
# Immigration proxies

(millions)

(a) 2004q1–2023q3 sample



(b) 2004q1–2021q4 sample



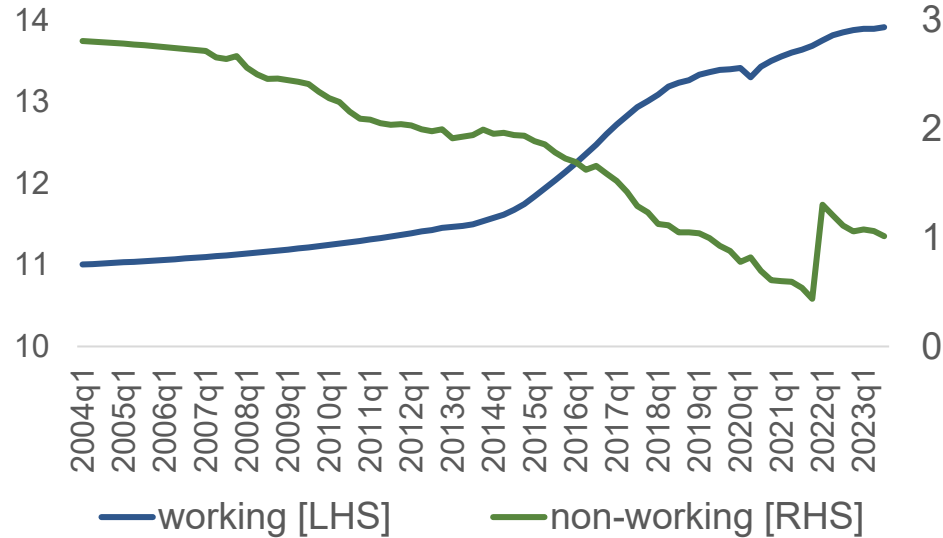
- The proxies differ in levels but are closely correlated and yield even more correlated series of the identified (median) immigration shocks
- Therefore, despite conceptual differences, the results from models with both immigration proxies are barely the same.

# Proxies for working and non-working immigrants

- Polish Social Insurance Institution (ZUS) data on the number of foreign citizens registered for pension and disability insurance, 2012q1–2023q3:
  - backcast for 2004-2011 using exponential smoothing
  - proxy for working immigration enters the model in log levels
  - the remainder of immigration (an implicit proxy for non-working immigration) is expressed as the log difference between our proxy for total immigration and the proxy for working immigration
- Again, the exact numbers are not important from the perspective of VAR modelling, but the proxy should satisfy:  $true \approx a + b \cdot proxy$
- Caveats fully acknowledged:
  - shadow economy
  - civil law contracts
  - no distinction between unemployed and economically inactive immigrants

# Immigration proxies

(log level and log difference)



- The model results are robust when we substitute our preferred proxies with those provided by NBP experts for inflation and GDP projections

# Identification scheme

	Shocks					
	demand	technology	labour supply	wage bargaining	immigration (1)	immigration (2)
output	+	+	+	+	+	+
prices	+	-	-	-		+
real wages		+	-	-	-	
unemployment	-		+	-		-
working immigrants	+		-		+	
other immigrants					+	+

- Upper-left 4x4 matrix based entirely on Foroni et al. (2014)
- Working immigration shock (1) – demand & supply shock
- Non-working immigration shock (2) – demand shock

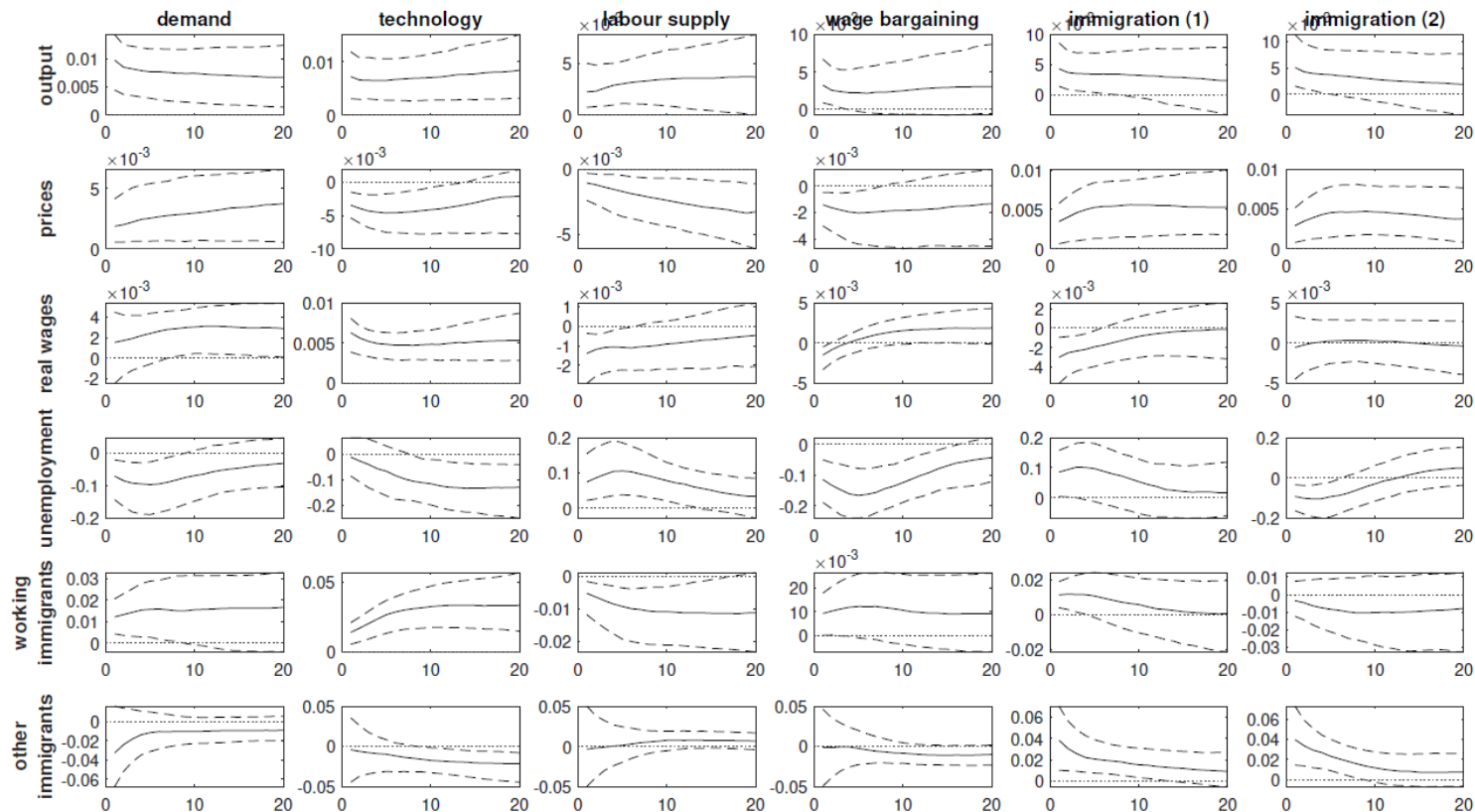


## 4. Results

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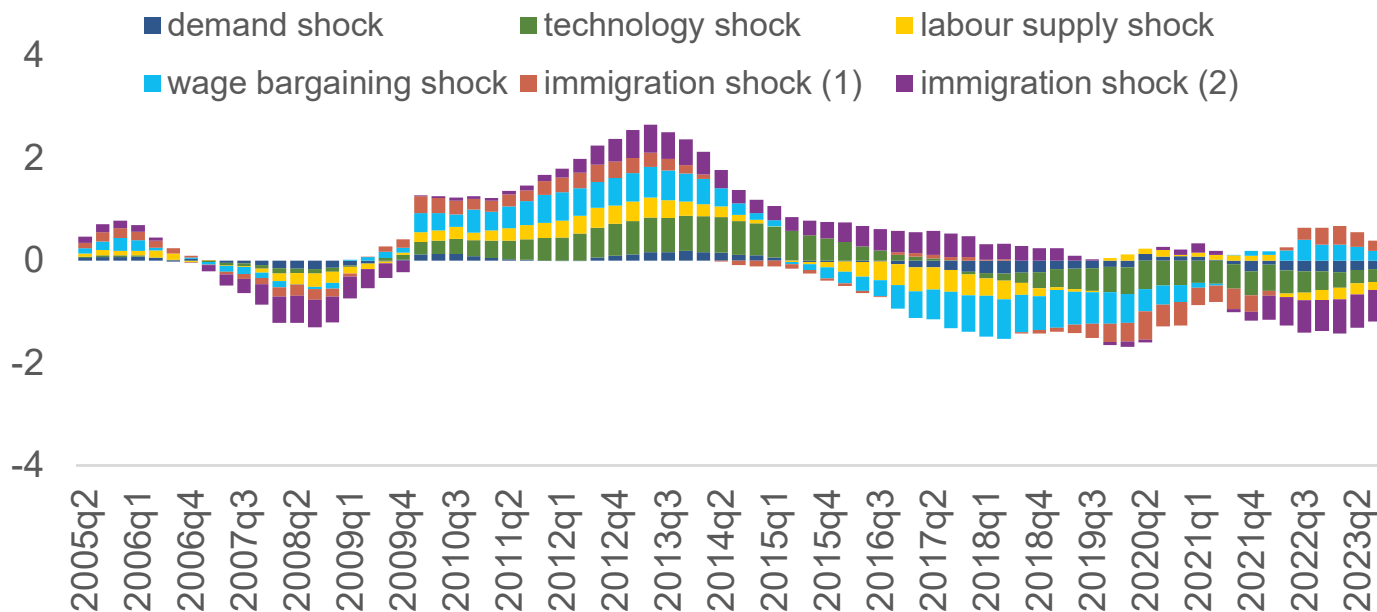


# Impulse responses (posterior median)



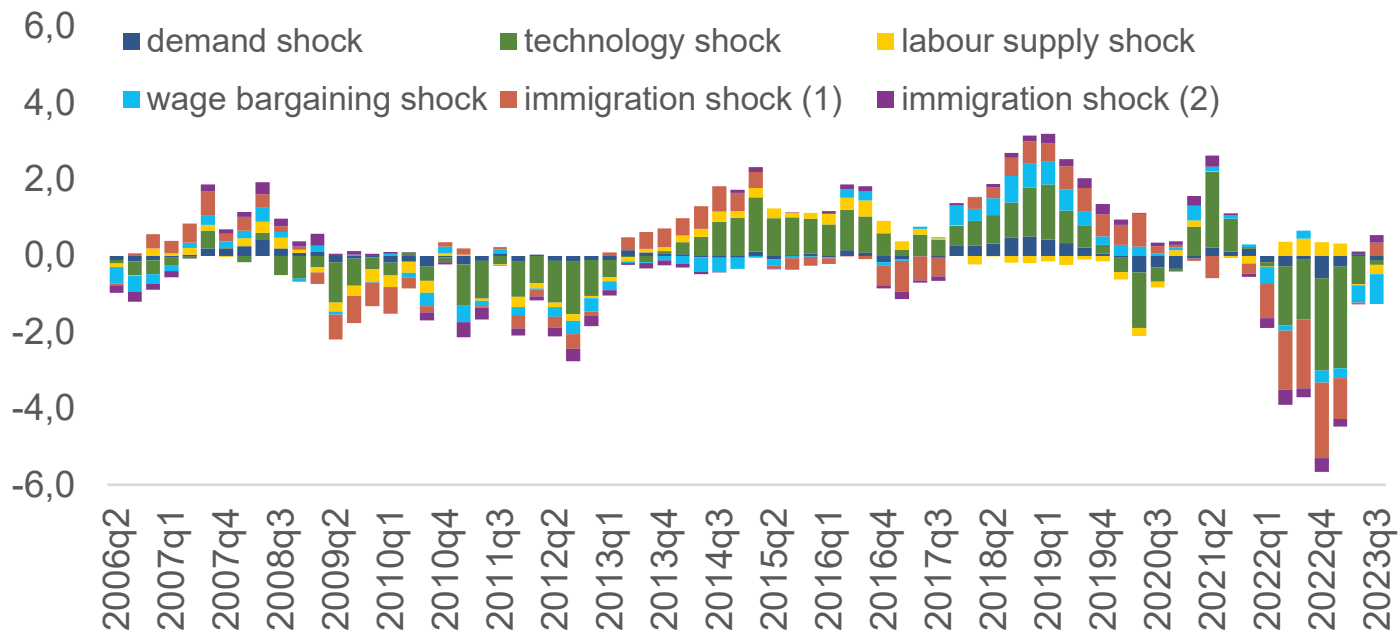
Notes: The solid lines represent the posterior median at each horizon, whereas the dashed lines indicate the 16th and 84th percentiles of the impulses responses.

# Historical decomposition of unemployment rate (in pp.)



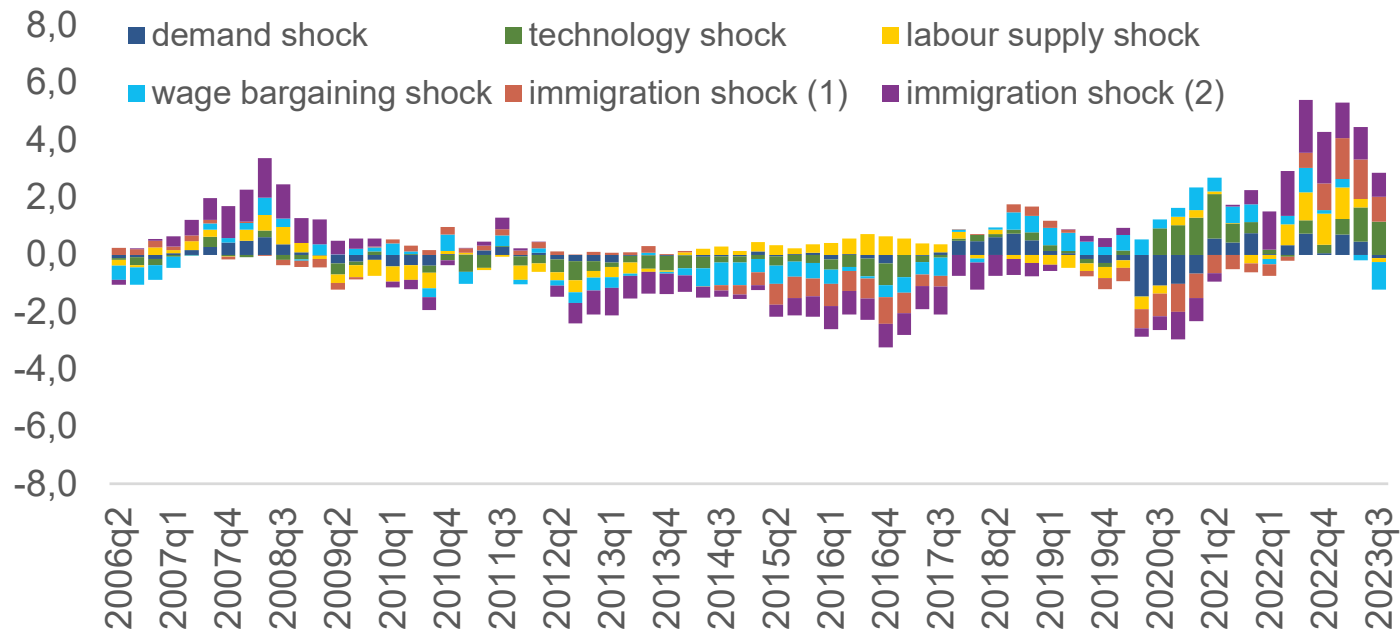
Notes: The graph presents the median of the posterior distribution of the historical contribution of the structural shocks for the variable in deviation from its posterior median (see Dieppe and van Roye, 2018).

# Historical decomposition of real wage growth (% yoy)



Notes: The graph presents the median of the posterior distribution of the historical contribution of the structural shocks for the variable in deviation from its posterior median (see Dieppe and van Roye, 2018).

# Historical decomposition of nominal wage growth (% yoy)



Notes: The graph presents the median of the posterior distribution of the historical contribution of the structural shocks for the variable in deviation from its posterior median (see Dieppe and van Roye, 2018).

# Robustness checks

- Sample 2008q1-2023q3 / sample 2014q1-2023q3:
  - excluding the period of peak population outflows after EU accession / excluding the period before the Russian annexation of Crimea
  - no meaningful impact on the IRFs and FEVDs
  - lower magnitude of the immigration shocks, but HD patterns still hold
- Sample 2004q1-2019q4:
  - excluding both the COVID-19 pandemic and the full-scale Russian invasion of Ukraine
  - greater importance of immigration shocks for output and real wage dynamics
  - smaller role of immigration shocks in shaping prices
- Adding energy prices and supply chain disruptions:
  - the large and rapid inflow of immigrants in 2022 coincided with sharp increases in energy prices and supply chain disruptions
  - omitted variables (and shocks) problem?
  - only a slightly lower role of immigration shocks for all three labour market variables considered



## 5. Conclusions

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# Conclusions

- Immigration does matter for the dynamics of labour market variables in Poland
- In recent years, immigration shocks have slightly reduced the unemployment rate and, to a greater extent, the annual growth rate of real wages
- The identified immigration shocks contributed significantly to higher nominal wage growth, particularly after 2022
- The impact of the 2022 refugee wave on the Polish economy differs from previous immigration inflows, primarily boosting aggregate demand and, to a lesser extent, labour supply
- The inflationary effects of immigration shocks appear to be an interesting area for future research, particularly from a monetary policy perspective



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**Thank you for your attention!**

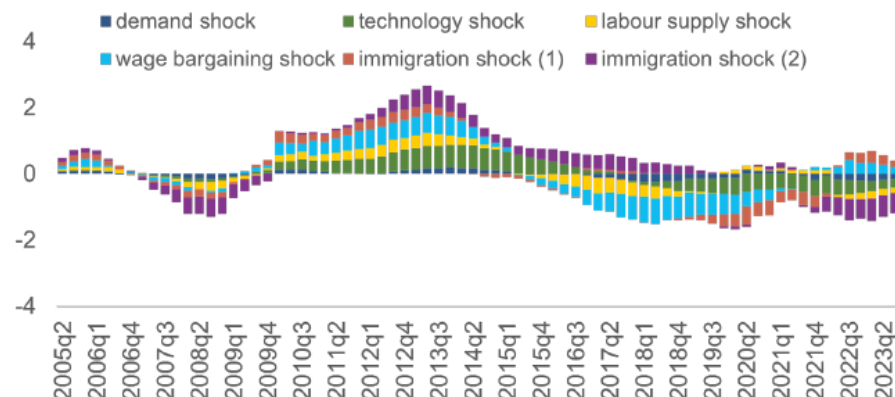
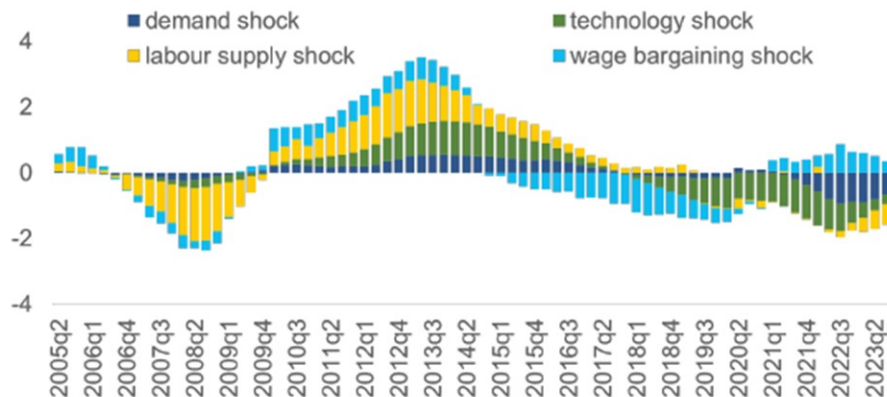




## Additional slides

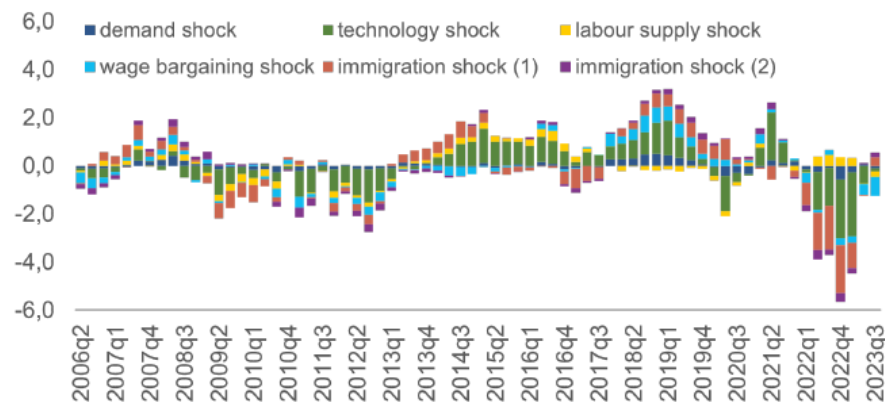
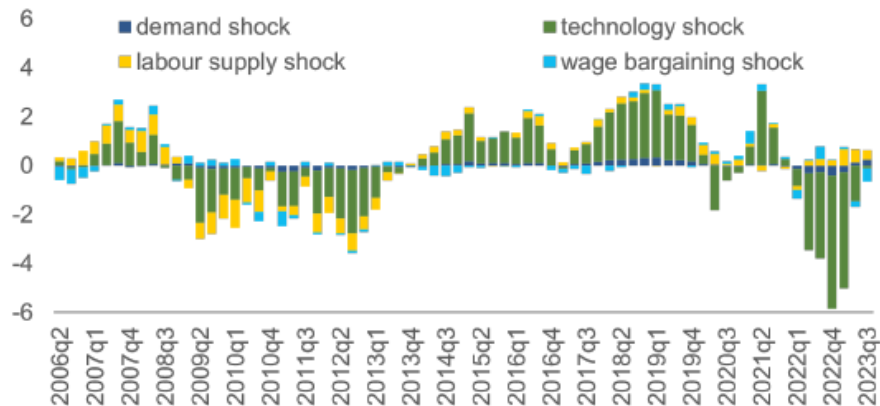
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# Historical decomposition of unemployment rate (in pp.)



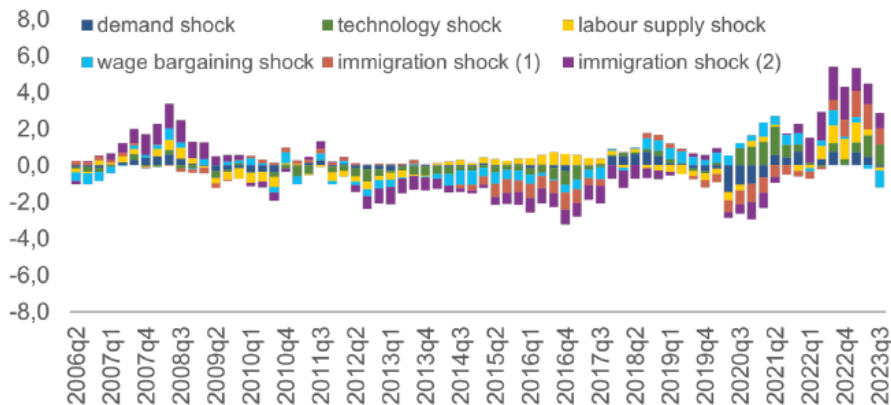
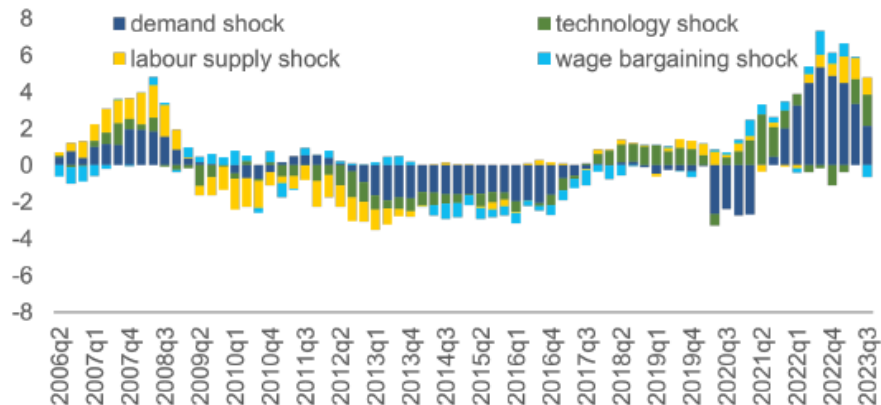
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# Historical decomposition of real wage growth (% yoy)



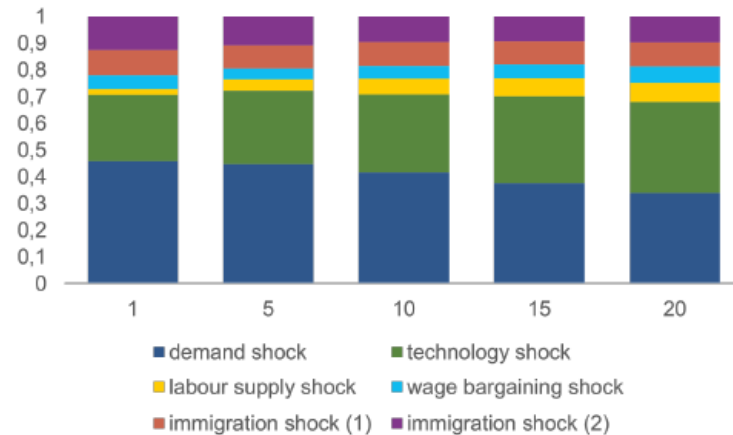
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# Historical decomposition of nominal wage growth (% yoy)

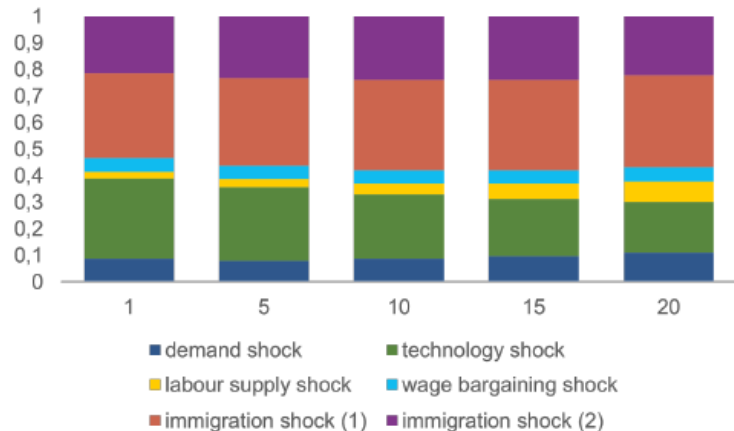
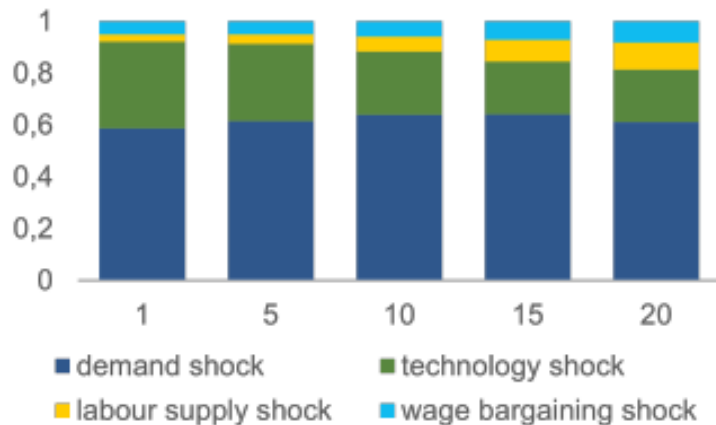


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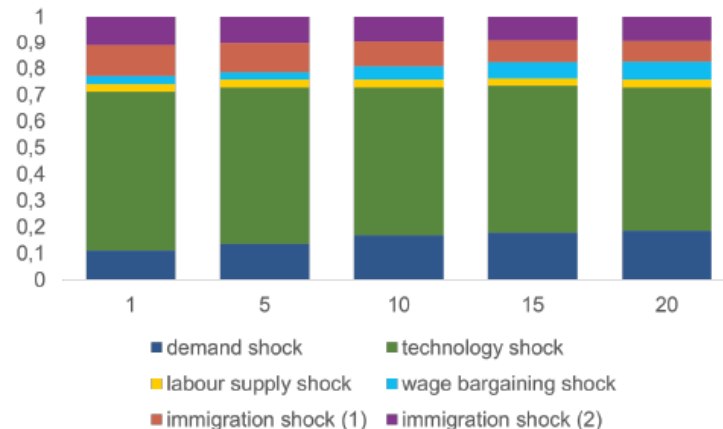
# Forecast Error Variance Decomposition (FEVD) for output



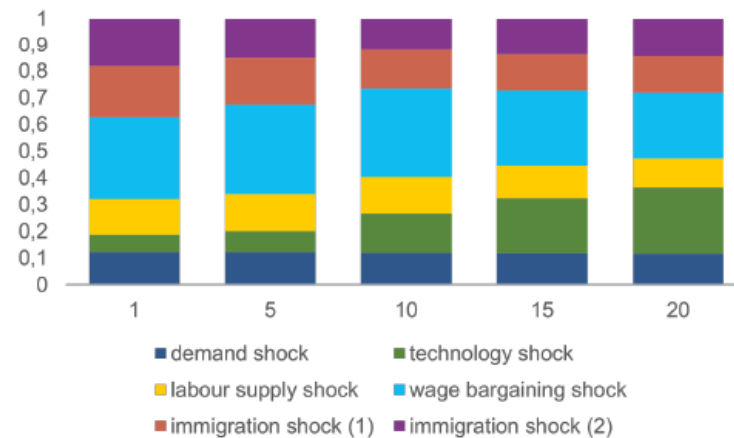
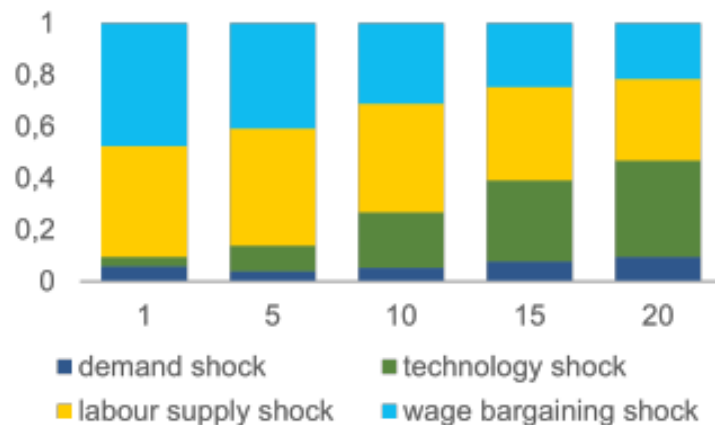
# Forecast Error Variance Decomposition (FEVD) for prices



# Forecast Error Variance Decomposition (FEVD) for real wages



# Forecast Error Variance Decomposition (FEVD) for unemployment







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