The impact of monetary policy on employment in Poland through the lens of disaggregated data

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Abstract

The impact of monetary policy actions on the labour market has been at the forefront of central banks' policy decisions. With the growing availability of micro data, the transmission channels of monetary policy can be revisited in a way that captures the heterogeneity of responses of economic agents to monetary policy actions and shocks. We analyse the reaction of employment to the unexpected (surprise) component of monetary policy in Poland, considering heterogeneity with respect to the size of firms. The analysis of disaggregated data shows that monetary policy surprises affect the labour market in general via its impact on larger firms. Neither the unexpected component of changes to policy rates, nor the revision of expectations about future policy rates affect employment levels in small firms in a quantitatively significant way. Our results stress the existence of labour market rigidities and indicate that these rigidities are more pronounced for the smallest firms. From the policymaking perspective, this shows not only the possible distributional effects of policy "surprises", but could also provide some input into possible regulatory changes related to the functioning of financial markets.

JEL classification: D22, E24, E52, J2, L25.

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Introduction

The last 36 months have been one of the most challenging periods in the past three decades of post-transition central banking in Poland. Narodowy Bank Polski (NBP) has repeatedly entered uncharted territory for Polish central banking: addressing the economic repercussions of the Covid-19 outbreak in Poland, providing the backdrop for the financial system during several waves of the pandemic and fighting accelerating inflation following the surge in energy prices that accompanied the war in Ukraine. In the span of only two years, the Polish central bank set the policy rates to (effectively) zero and started an asset purchase programme, only to then embark on a series of interest rate increases at an unprecedented pace.

The period of effectively zero interest rates – the reference rate was promptly lowered to a record 0.1% – was a response to the outbreak of Covid-19 in Poland. NBP also embarked on an asset purchase programme, with both policies concentrated on lowering the cost of borrowing and, in effect, supporting real activity and the labour market situation. The policy rate did not reach such low levels during the Great Recession of 2007–09 (it did not decrease below 3.5%) or during prolonged periods of deflation in 2014–16 (when it was not lower than 1%).

The impact of monetary policy actions on the labour market has been at the forefront of the central bank's policy decisions. While the main statutory objective of NBP is "to maintain price stability", the *Monetary Policy Guidelines* states that monetary policy "is conducted in a way that helps maintain sustainable economic growth and financial stability."[1] This was the main motivation underlying the unprecedented policy actions.

Similarly, the impact of policy actions on the real economy and, in particular, on the labour market, have heavily impacted decisions regarding interest rates. With the inflation rate levelling off, or even slightly decreasing, monetary authorities must decide how much weight to put on the real economy – with particular attention to developments in the labour market – when taking the next policy decisions.

How the policy measures affect the economy is captured by the transmission mechanism of monetary policy. With the growing availability of micro data, many of the results related to these channels have been revisited to include and capture the heterogeneity of responses of economic agents to monetary policy actions and shocks. In the last 20 years, economists have found that traditional transmission channels – including the interest rate, credit and asset price channels, as well as new channels connected to risk-taking behaviour or expectations – are heavily influenced by the presence of heterogeneity. The exogenous and endogenous differences across households and firms, and their access to financial markets, were shown, both theoretically and empirically, to matter for the transmission channel of monetary policy. Examples of such recent studies include Gertler and Gilchrist (1994), Bernanke and Gertler (1995), Ottonello and Winberry (2020), Cloyne et al (2021) for investment, and Kaplan et al (2018), Auclert (2019) and Bielecki et al (2022) for consumption, among others. For example, investments and expenditure on durable goods are more

[1] This statement is present in every annual Monetary Policy Guidelines, see for example Narodowy Bank Polski (NBP) (2020) *Monetary Policy Guidelines for 2020*.

sensitive to monetary policy relative to that on non-durable goods (Erceg and Levin (2006)), and hand-to-mouth households are the most responsive households to the income channel of monetary policy (Kaplan et al (2018)). Analysis based only on aggregate data, which effectively hide the heterogeneity, could lead to biased conclusions. That is to say, if heterogeneity translates into differences in impulse responses, the analysis of aggregate responses could exclusively cover individual effects and, as a result, distort the actual transmission mechanism.

While a considerable body of research related to consumption or investment that incorporates and stresses the importance of heterogeneity exists, there are very few studies analysing the impact of monetary policy and the heterogeneity of responses in the labour market. The importance of the labour market for monetary policy cannot be overstated. On the one hand, the level of aggregate employment translates into the volume of production and the aggregate output. Therefore, slack in the labour market is a key indicator of slack in the economy. On the other hand, labour income is the largest component of total income for most households. This directly affects consumption. Changes in employment or wage income can translate into variation of aggregate demand.[2]

The extent to which monetary policy can affect employment, unemployment and wages has important economic and sociological implications. Moreover, it does matter whether monetary policy impacts the labour market and wage income *via* extensive (ie employment) or intensive (ie wages) margins. While aggregate data provide some information about the monetary policy transmission channel, labour market analysis with disaggregated data can account for firms' and/or households' heterogeneity, and uncover the actual transmission mechanism.

Furthermore, empirical evidence on the mechanisms through which different firms react to economic policies and economic shocks may provide indirect evidence of rigidities and frictions that affect firms and their decision-making processes.

Finally, from the broader policy perspective, more detailed accounts of the reactions of the labour market to economic policy shocks yield important implications for the design and implementation (including timing) of policies aimed at sustaining employment.

In a recent NBP working paper, Singh et al (2023) examine the impact of monetary policy surprises on the growth rates of hiring, employment and wages in the US. They find that the impulse responses of these labour market variables to monetary policy shocks are highly heterogenous with respect to firms' sizes.[3] The paper examines changes in hiring and employment, and the level of remuneration of newly hired employees in small (fewer than 25 employees) and large (more than 500 employees) enterprises in response to monetary policy shocks. The results indicate that an unexpected tightening of monetary policy causes a reduction in the level of employment and in the number of newly hired employees in all firms, but this effect is stronger for large than for small firms. Moreover, the analysis of the employment

[2] Additionally, the job loss related fall of labour income was found to have a direct implication for personal well-being.

[3] Singh et al (2022) show that the firms' responses to a monetary policy shock are also industry-specific eg firms in manufacturing or construction sectors respond qualitatively and quantitatively differently to firms in the services sector.

response to positive and negative monetary policy shocks shows that the response to monetary policy tightening is faster than the response to expansionary monetary policy.

Singh et al (2023) show that monetary policy also affects the level of wages. An unexpected (or stronger than expected) tightening of monetary policy limits the growth of the wages of newly hired employees, and the scale of the decrease in the growth rate is similar in the case of small and large enterprises.

Given the structural differences in labour markets across the United States and Europe, it is important to ask and examine whether these differences also occur in European labour markets. From the Polish central bank perspective, it is vital to know whether such patterns also emerge in Poland, and to what extent small and large firms react to monetary policy actions with respect to employment.

The impact of monetary policy shocks on employment in Poland

We rely on disaggregated data to examine the responses of employment to monetary policy shocks in Poland considering heterogeneity with respect to firms' size.

The econometric analysis is based on quarterly data on employment growth and wage growth, taking into account information on the size and industry classification of enterprises in Poland during the period Q4 1999–Q2 2022. The labour data are taken from the labour force survey (LFS) and cover the entire population of Poland. The LFS reports four size categories; size one is one to nine employees, size two is between 10 and 19 employees, size three between 20 and 29 employees, size four is more than 50 employees. In our analysis, we compare the responses of the smallest firms (up to nine employees) with the largest firms (more than 50 employees) in our sample.

To construct monetary policy shocks for Poland, we employ the high-frequency identification method of Kuttner (2001), Gürkaynaka et al (2005) and Campbell et al (2012). We use daily data on changes to interest rates on forward rate agreement (FRA) contracts (expiring in one year or earlier) on Polish interest rates – WIBOR 3M – around the time of Monetary Policy Council (MPC) decisions.[4] The announcement of the Monetary Policy Council decision includes not only the levels of policy rates following the meeting, but also the press release. The latter presents NBP's economic assessment of the current situation in Poland and indications about the expected inflation and GDP paths over the next year. It may also provide some indication of the current and future monetary policy stance, and contain some additional forward guidance.

To isolate this information effect of the MPC decisions, we follow Gürkaynaka et al (2005) and Campbell et al (2012) and extract two orthogonal monetary policy shocks from the high-frequency data. This allows us to distinguish the change in the

[4] With this definition of a monetary policy shock, a positive shock – corresponding to monetary policy tightening – may be the result of both a larger than expected reduction in interest rates and a smaller than expected reduction in interest rates.

current short-term rate – the target shock – from the change in the expected path of future short rates, the path or forward guidance shock. Additionally, following Singh et al (2023), we take into account the possible asymmetry of the monetary policy stance by separately examining the effects of positive (contractionary) and negative (expansionary) monetary policy shocks. To compute the monetary policy shocks, we use data from the period of January 2005–June 2022.[5]

Table 1 presents the summary statistics of both monetary policy shocks: the target and the path. Interestingly, the standard deviation of the negative target shock is approximately 30% larger than in the case of the positive target shock, while the negative forward guidance shock has a standard deviation twice as large as the positive shock.

Summary statistics of monetary policy shocks (basis points) Table 1

	Target shock	Path shock
Positive (rate increase)		
Mean	5.9	11.9
Standard deviation	12.7	12.1
Negative (rate decrease)		
Mean	–13.1	–13.3
Standard deviation	16.7	22.5

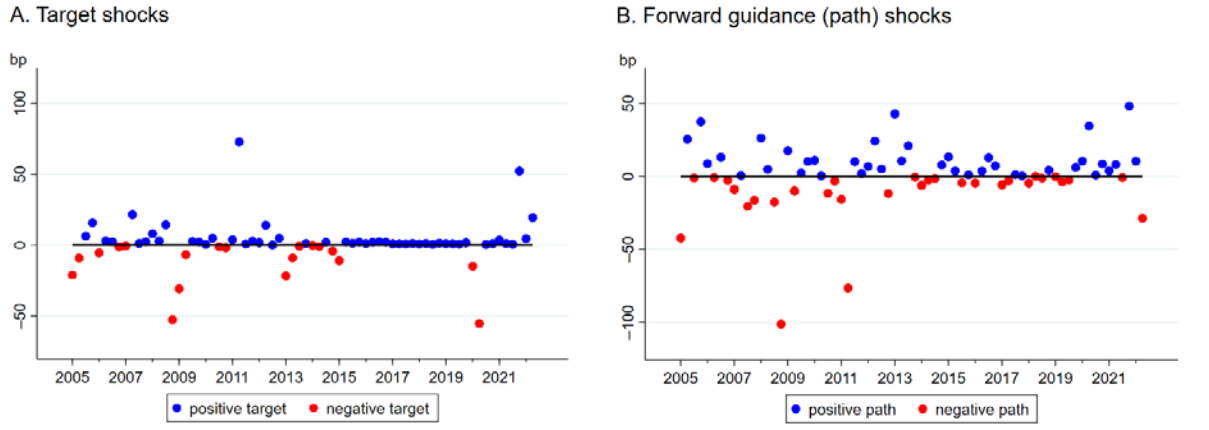
The table reports mean and standard deviation (in basis points) of the positive and negative high-frequency target and path shocks for the period Q1 2005–Q2 2022.

Sources: Bloomberg; authors' calculations.

This can also be seen from Graph 1, which plots the realisations of target (Graph 1.A) and path (Graph 1.B) shocks. Given that the positive and negative shocks have distinct characteristics, they are likely to impact the labour market variables differently. We address this in our empirical analysis by studying the effects of positive and negative shocks separately.

[5] From 2004 onwards, the inflation target was at 2.5% with a symmetric band for deviations of +/–1 percentage point.

Positive and negative target and forward guidance shocks Graph 1



The graph plots the positive (blue) and negative (red) high-frequency target shocks (A) and forward guidance (path) shocks (B).

Sources: Bloomberg; authors' calculations.

To determine the reaction function of the labour market to monetary policy shocks, we employ the local projection in the panel data approach introduced by Jordà et al (2015).[6] The equation below describes our baseline empirical specification:

$$\Delta_h n_{is,t+h} = \alpha_i^h + \alpha_s^h + \beta_{s,Target^+}^h \epsilon_t^{Target^+} \mathbb{I}_s + \beta_{s,Target^-}^h \epsilon_t^{Target^-} \mathbb{I}_s + \beta_{s,Path^+}^h \epsilon_t^{Path^+} \mathbb{I}_s + \beta_{s,Path^-}^h \epsilon_t^{Path^-} \mathbb{I}_s + \Gamma^h Z_t + u_{is,t+h}^h \quad (1)$$

where $\Delta_h n_{is,t+h} \equiv \ln N_{is,t+h} - \ln N_{is,t}$ is the cumulative growth rate between t and $t+h$ of the labour market variable, N, in industry i, for firm-size s, h periods after the monetary policy shock in period t. In our analysis, the dependent variable, $\Delta_h n_{is,t+h}$, is the cumulative growth rate of seasonally adjusted employment.[7] The key independent variables of interests are the positive and negative target, $\epsilon_t^{Target^+}$, $\epsilon_t^{Target^-}$, and path , $\epsilon_t^{Path^+}$, $\epsilon_t^{Path^-}$, shocks interacted with the firms' size, $\mathbb{I}_s$, $s = 1,2,3,4$. To control for the overall economic condition and the tightness of the labour market, we include in Z_t four lags of policy (reference) rate, four lags of the unemployment rate; as well as industry and firm size fixed effects, α_i^h *and* α_s^h respectively. Such specification allows us to construct the size-specific impulse response functions of employment to asymmetric (positive or negative) monetary policy shocks, $\{\beta_{s,MP\ shock}^h\}_{h=1,\dots,H}$.

To assess the impact of the heterogeneity of the monetary transmission channel on employment, we also consider a simplified specification that abstracts from any form of heterogeneity. The associated equation with this specification is as follows:

[6] In our specification the cross-sectional dimension of the panel is two dimensional and includes firm size and industry.

[7] We also estimate impulse responses to monetary policy shocks for the (size- and industry-specific) real wage, but find that they are not statistically significant. Given the quantity of missing data and the reliability of self-reported wage data, we choose not to draw conclusions from these results.

$$\Delta_h n_{t+h} = \alpha^h + \beta^h_{Target^+}\epsilon_t^{Target^+} + \beta^h_{Target^-}\epsilon_t^{Target^-} + \beta^h_{Path^+}\epsilon_t^{Path^+} + \beta^h_{Path^-}\epsilon_t^{Path^-} + \Gamma^h Z_t + u^h_{t+h} \quad (2)$$

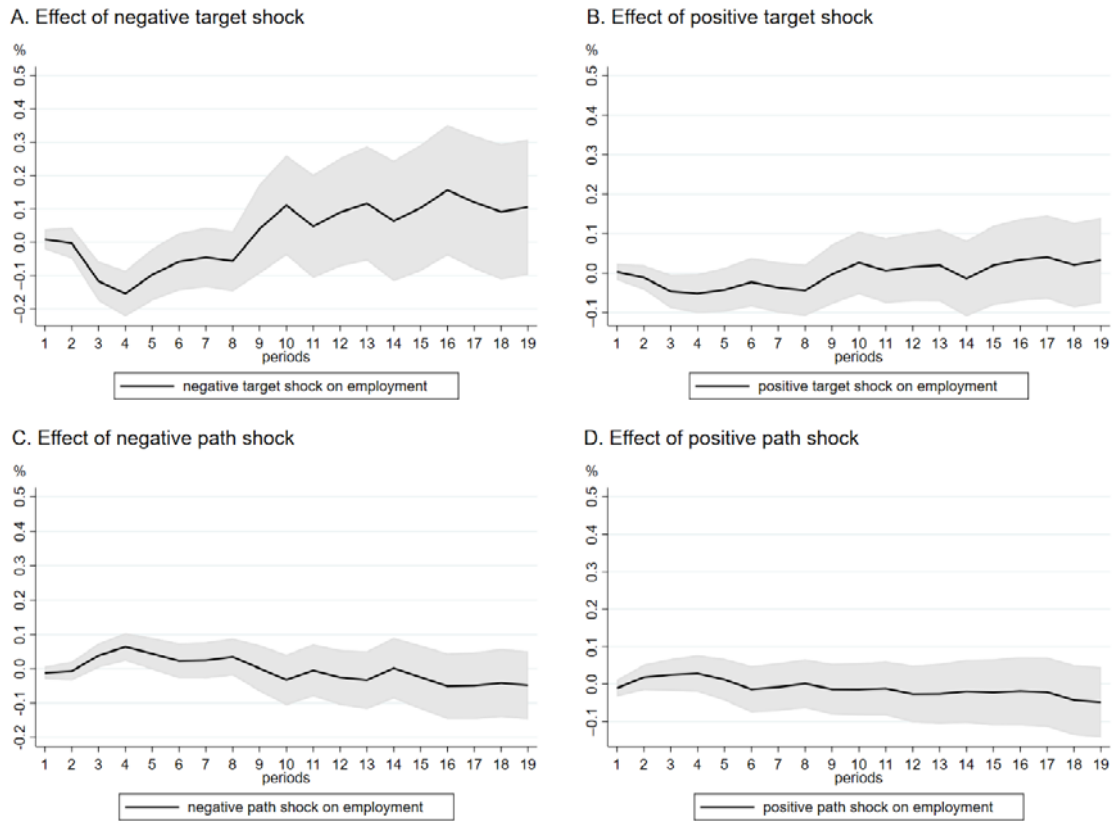
where, now, the dependent variable, $\Delta_h n_{t+h}$, is the cumulative growth rate of seasonally adjusted aggregate employment.

Results

To illustrate the importance of accounting for firms' heterogeneity, we first present the impulse responses of aggregate employment from a monetary policy shock. Graph 2 depicts the series of estimated $\beta^h_{Target^+}$, $\beta^h_{Target^-}$, $\beta^h_{Path^+}$, $\beta^h_{Path^-}$ from equation (2).

Responses of aggregate employment growth to positive and negative path and target shock

Graph 2



The graph plots the impulse response functions of aggregate employment growth to a negative (expansionary) target shock (Graph 2.A), positive (contractionary) target shock (Graph 2.B), negative path shock (Graph 2.C) and positive path shock (Graph 2.D). The horizontal line measures time (in quarters) and the vertical axis measures the response in percentage points. The shaded area is the 68% confidence band.

Source: Bloomberg; authors' calculations.

Graphs 2.A and 2.C show that while surprising monetary policy expansion – both in terms of the lower than expected policy rate taking the form of a target shock and the form of a path shock – increases employment in the short term (in the case of the

path shock) and in the medium term (in the case of the target shock), the statistical significance of this reaction is marginal at best. The estimated responses to the tightening of monetary policy (positive target and path shocks in Graphs 2.B and 2.D) yield a statistically insignificant reaction.

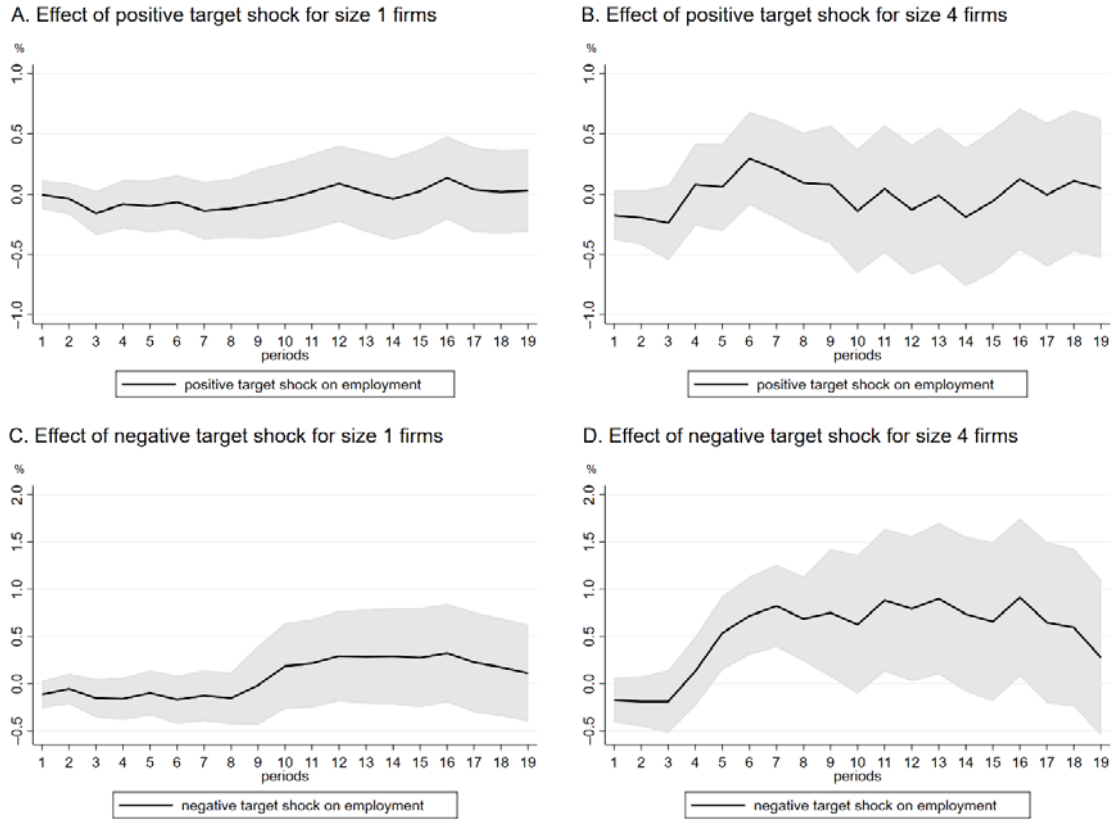
This lack of statistical significance coupled with an overall quantitatively low magnitude of responses would lead to the conclusion that monetary policy shocks have little to no effect on the behaviour of aggregate employment. While the policy rate could still be an important factor for the labour market, the impact of "policy surprises" or forward guidance could be very limited.

To verify the validity of the results presented in Graph 2 in a more disaggregated setting, we estimate equation (1) and allow the effects of policy shocks to be specific to the firm size. While the interest rate channel of monetary transmission assumes that higher interest rates imply a higher cost of borrowing, the credit channel relies on the tightening of credit conditions. Early empirical evidence for the United States indicated that small firms usually respond more to changes in the cost of financing (see Gertler and Gilchrist (1994) for an early exposition). This implies that higher costs of lending and tighter credit requirements with respect to collateral would make small firms more responsive to monetary policy shocks.[8] At the same time, Kudlyak and Sanchez (2017) show that it was the large firms that contracted more than small firms during the Great Financial Crisis. Meanwhile, theoretical models have been presented, Ottonello and Winberry (2020) with respect to investment and Singh et al (2023) with respect to employment, in which it is the unconstrained (large) firms that respond more to monetary policy. By taking into account firm size when estimating the reaction of employment to monetary policy shocks in equation (1), we can verify whether these two channels (with respect to policy surprises) affect the labour market.

First, consider the reaction of small and large firms to positive and negative target shocks. We find that contractionary (positive) target shocks lead to a decrease of employment within one year after the shock in both small (size one: fewer than 10 employees) and large (size four: more than 50 employees) firms. These impulse responses are presented in Graphs 3.A and 3.B. Importantly, and in contrast with the results in Singh et al (2023), the impact of the positive target shock is statistically insignificant, and quantitatively the same for small and large firms. Note that these results are consistent with our results for aggregate employment in Graph 2.B.

[8] See Bernanke and Gertler (1989) for an early exposition of the financial accelerator mechanism.

Response of employment growth to a positive and negative target shock Graph 3



The top row plots the impulse response functions for the employment growth to a positive (contractionary) target shock for small (size 1 – Graph 3.A and Graph 3.C) and large (size 4 – Graph 3.B and Graph 3.D) firms. The bottom row plots the impulse response functions for the employment growth to a negative (expansionary) target shock for small (size 1 – Graph 3.A and Graph 3.C) and large (size 4 – Graph 3.B and Graph 3.D) firms. The horizontal axis measures time (in quarters) and the vertical axis measures the response in percentage points. The shaded area is the 68% confidence band.

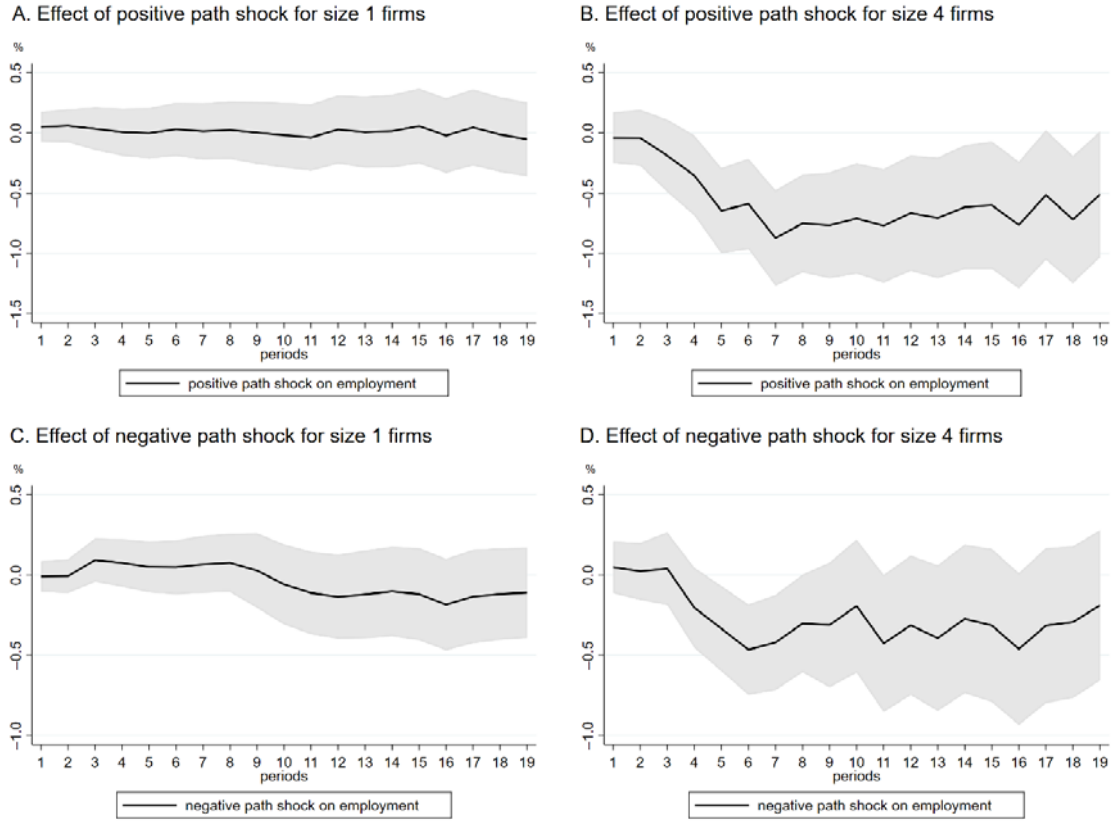
Source: Bloomberg; authors' calculations.

The expansionary (negative) target shock, however, impacts small and large firms differently (see Graph 3.C and Graph 3.D). While the response of small firms is not statistically different from zero (Graph 3.C), employment in large firms increases (Graph 3.D). Not only is the reaction of large firms statistically significant, but its magnitude is also quantitatively important. We find that a negative target shock of one standard deviation increases employment in large firms by over 0.8% six quarters after the shock.

We also find that the difference between small and large firms' impulse responses is statistically significant.

Response of employment growth to a positive and negative path (forward guidance) shock

Graph 4



The top row plots the impulse response functions for the employment growth to a positive (contractionary) target shock for small (size 1 – Graphs 4.A and 4.C) and large (size 4 – Graphs 4.B and 4.D) firms. The bottom row plots the impulse response functions for the employment growth to a negative (expansionary) target shock for small (size 1 –Graph 4.C) and large (size 4 – Graph 4.D) firms. The horizontal axis measures time (in quarters) and the vertical axis measures the response in percentage points. The shaded area is the 68% confidence band.

Source: Bloomberg; authors' calculations.

We turn next to an analysis of the impact of the path shock on employment growth in small and large firms. Given the recent experience of the effectively zero interest rate in Poland and the usage of "forward guidance'' as a monetary policy tool, understanding how it affects employment is of the utmost interest for the central bank. As presented in the top row of Graph 4, while a contractionary path shock does not affect the employment of small firms (Graph 4.A) it does significantly decrease the employment growth in large firms (Graph 4.B). According to our estimates, within two years, employment in large firms decreases by almost 1%. With respect to the overall effect of the negative path shock, the firm-size specific employment responses match the aggregate results. While the expansionary (negative) forward guidance shock increases employment in small firms and large firms in the first years following the shock, these impulse responses are not statistically different from zero.

The results depicted in Graphs 3 and 4 suggest that firms do respond to monetary policy shocks, contrary to what one may conclude from a cursory glance at Graph 2, and that the extent to which firms react depends on characteristics that can

be proxied by their size.[9] In the discussion below we link these results to the form of "financial exclusion" that small firms can experience.

Discussion

The analysis of disaggregated data shows that monetary policy surprises do affect the labour market in general via their impact on larger firms. Neither the unexpected component of the policy rate changes (captured by the target shock) nor the revision of expectations about future policy rates (measured by the path shock) affect employment in small firms in a quantitatively significant way.[10] While these results seem to go against the financial accelerator mechanism, they could, however, be symptomatic of difficulties experienced by micro-enterprises in Poland in gaining access to financial markets.

Such "financial exclusion" was particularly visible during the Covid-19 pandemic. The data presented in the quarterly survey of Polish enterprises – see NBP (2023) for the details – indicated that while close to 20% of medium-sized firms applied for a business loan, only 10% of micro-enterprises decided to apply for such a loan.[11] The difference in access to external financing was then increased by the reported outcome of these loan applications. In the case of medium-sized firms, almost 92% of applications were granted. At the same time, only 65% of loan applications by small firms were accepted by banks due to the greater degree of risk associated with these applications. Graph 5 shows that these differences in the effective access to bank loans and financial markets, as reported by firms and measured both in terms of filed loan applications (Graph 5.A) and approved loan applications (Graph 5.B), are persistent.

This difference in effective access to financial markets impedes the transmission of monetary policy. Although the record low nominal interest rate should, in principle, lower the cost of business credit and, in turn, support and stimulate economic activity, the exogenous (from the central bank perspective) variation in access to external financing counteracts such actions. Our results indicate that while larger firms may not be greatly affected by such friction in the functioning of the financial markets, smaller firms could see these problems affecting not only their investments, but also their labour market decisions. From the policymaking perspective, this shows not only possible distributional effects of policy "surprises", but could also provide some input into possible regulatory changes related to the functioning of financial markets.

[9] We verified that adding firm-size and industry-fixed effects into our specification, equation (2), does not alter the results.

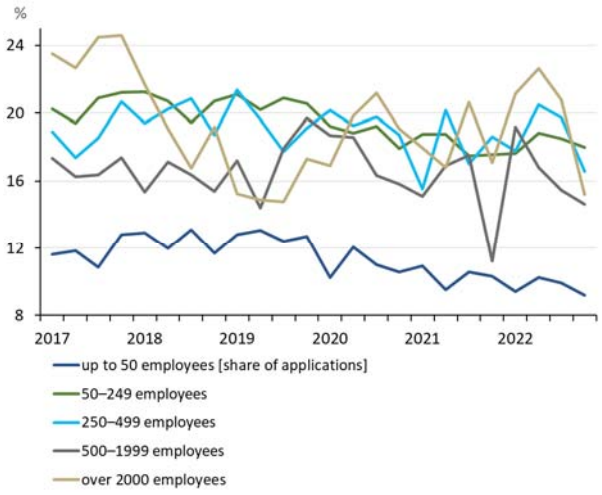
[10] We want to stress that these results pertain to the unexpected part of policy actions.

[11] Note that this could also be the result of extensive fiscal policy interventions (in the form of anti-crisis shields) that provided an alternative source of funding for companies during the Covid-19 pandemic.

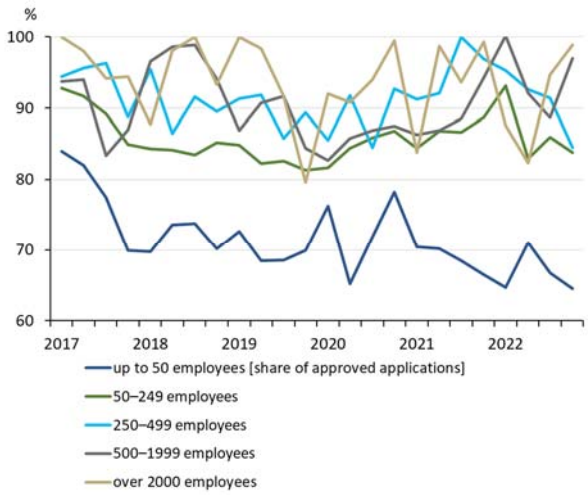
Response of employment growth to a positive and negative path (forward guidance) shock

Graph 5

A. Filed applications(%)



B. Approved loan applications (%)



Percentage of filed (Graph 5.A) and approved loan applications (Graph 5.B) in enterprise size classes (seasonally adjusted) reported by small, medium and large enterprises.

Source: NBP (2023).

Additionally, our results stress the existence of labour market rigidities and indicate that these rigidities are more pronounced for the smallest firms. For many of them, hiring or firing even a single employee implies a significant change. Additionally, the lack of flexibility on the extensive margin is often met by inflexibility in the intensive margin. Given the difficulties in accessing the credit market, it is wages that could provide the necessary buffer for transitory shocks.

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