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THE IMPACT OF LIQUIDITY CONSTRAINTS ON THE EFFECTIVENESS OF FISCAL POLICY: EVIDENCE FROM POLAND

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Abstract. The aim of the paper is to estimate the impact of the rapid worsening of households' access to credit in Poland on the effects of fiscal policy. The novelty of our study is that it extends the analysis of liquidity constrained households' impact on fiscal multipliers to Central and Eastern European country, where households access to credit is relatively limited and therefore the potential impact of liquidity constrained households on fiscal multipliers is stronger than the existing literature for highly developed economies indicates. The empirical analysis is based on the theoretical model with heterogenous households. We found that the increase in the percentage of liquidity constrained households led to the substantial rise in fiscal multipliers, and thus the increase of effectiveness of Polish fiscal policy. The study indicates that before the worsening of households' access to loans, the contemporaneous government spending multiplier was relatively low, whereas after a sharp increase in interest rates, contemporaneous government multiplier exceeded one. What is more, our study shows that a sharp increase in interest rates also strengthens medium term fiscal policy impact on GDP in Central and Eastern European economy.

Keywords: fiscal policy, liquidity constraints, government spending, fiscal multipliers, access to loans, CEE economy, Poland.

JEL Classification: E62, G50, H31.

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1. Introduction

After a period of zero interest rates and easy access to credit in the United States, the Eurozone, as well as many non-eurozone European countries, nominal interest rates have risen significantly since 2022. Thus, there occurred a shift in policy conducted by central banks. At the same time, the Great Recession of 2008 showed that the level of interest rates translates strongly into fiscal policy effectiveness. Numerous studies, including among others Christiano et al. (2011), Schmidt (2017) or Klein and Winkler (2021), indicate that when interest rate is at or near zero, that is when zero lower bound occurs, fiscal policy is much more effective. Therefore, a recent surge in interest rates in the Eurozone or the United States could significantly weaken the effectiveness of fiscal policy in the US or Eurozone countries. However, the rise in interest rate has also another impact on the effectiveness of fiscal policy. As recently shown by McManus et al. (2021) liquidity constraints caused by higher interest rates result in the rise in government spending multiplier. The theoretical explanation of this phenomena

is that expansionary fiscal policy, which leads to higher current disposable income rather than permanent income, gives households facing liquidity constraints an opportunity to rise current consumption, whereas households not facing liquidity constraints base their consumption path mostly on permanent income (Galí et al., 2007).

The fiscal effects of zero lower bound are very well investigated, whereas the impact of households' liquidity constraints is much less explored. Moreover, the analysis of the impact of households' access to credit on fiscal multipliers is mainly focused on the US and Eurozone, that is very high developed economics. At the same time, it should be noted that an analysis of the nexus between liquidity constraints and fiscal policy is particularly valid for less developed economies, like Central and Easter European countries, because the lower the households' income, the higher the share of households facing constraints to credit, and generally making decisions not on permanent but on current income (Mankiw, 2000).

Thus, the objective of the paper is to estimate the impact of liquidity constraints on the effectiveness of fiscal policy in Central and Easter European economy. The main research question in the study is whether, in the Central and Easter European economy, an increase in liquidity constraints rises fiscal multipliers.

The study examines the case of Poland. Such analysis is particularly justified for the following reasons:

- an increase in interest rates in Poland was one of the highest in the European Union and led to a severe restriction of households' access to credit (see Figure 1);
- due to relatively low level of access to credit in Poland, compared to most of European Union countries, the increase in liquidity constraints is potentially a more relevant factor influencing fiscal multipliers;
- in Poland, contrary to the US and most of European countries, interest rates after the Great Recession did not reach the zero interest rate bound, which unable to analyse the effects of interest rate rise on fiscal policy effects without the formal separating the zero lower bound regime.

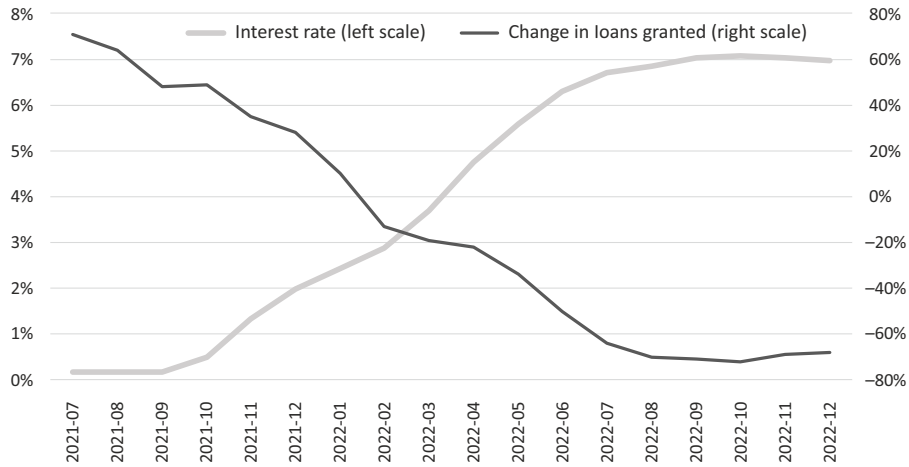

Figure 1. Interest rates vs. loans granted in Poland
(source: Eurostat, n.d.; BIK Group, n.d.)

The empirical analysis is founded on the theoretical model with two groups of households – those optimising and not optimizing. The first group of household has access to credit, whereas the second group faces liquidity constraints. Parameters are estimated using Bayesian methodology, with the use of quarterly Eurostat data for Polish economy covering the period 2000q1–2022q4.

The novelty of our study is that it extends the analysis of liquidity constrained households' impact on fiscal multipliers to Central and Eastern European country and takes into account the recent period of rapid increase of interest rates in Europe. It should be noted that, as mentioned earlier, the results of previous studies for the US and eurozone cannot be adopted for countries with relatively lower income, like Central and Eastern European economies.

The value added of our empirical research is that we analyse the economy where households' access to credit is relatively low and thus the potential impact of liquidity constrained households on fiscal multipliers is stronger than the literature for highly developed countries indicates.

The paper proceeds as follows. The first section presents literature review. The second part shows the assumptions of theoretical model. Next, the empirical results are analysed. The last section of the paper concludes.

2. Literature review

Our paper belongs to the burgeoning literature on heterogeneity of government spending effectiveness. State-dependency of fiscal policy effects has become an especially important strand of research after the Great Recession. Auerbach and Gorodnichenko (2012) indicate that fiscal multipliers are heterogeneous – significantly bigger during recessions than expansions. The same conclusions emerge from later studies, among others Caggiano et al. (2015), Afonso et al. (2018) and Barnichon et al. (2021). However, it should be noted that some studies, including Ramey and Zubairy (2018), do not confirm that fiscal multipliers differ significantly during recessions and expansions.

Theoretical explanations of the heterogeneity of government spending effects focus on the impact of financial market on fiscal multipliers, and our paper belongs to this strand of literature. It is worth noting that this nexus between effects of fiscal policy and banking sector has become particularly significant after Global Financial Crisis.

First of all, numerous studies indicate that when nominal interest rate is at or near zero, that is when zero lower bound occurs, fiscal policy is much more effective (Cogan et al., 2010; Eggertsson, 2011; Woodford, 2011; Coenen et al., 2012b; Erceg & Lindé, 2014; Olivier & Takongmo, 2017; Klein & Winkler, 2021; Ngo, 2021). Zero lower bound substantially increases the effectiveness of expansionary fiscal policy, because of the lack of a crowding out effect (Coenen et al., 2012a; Miyamoto et al., 2018).

The heterogeneity of fiscal multipliers has also been analyzed on the basis of household leverage cycle (Eggertsson & Krugman, 2012; Mian et al., 2013; Jordà et al., 2016; Jones et al., 2022). Eggertsson and Krugman (2012) shows that deleveraging shock translates into liquidity trap. It leads to substantial impact of private debt on increase in fiscal multipliers (Bernardini & Peersman, 2018). Also, later empirical studies show that government spending multipliers are higher if household leverage rises (Demyanyk et al., 2019; Bernardini et al., 2020; Klein et al., 2022).

The third strand of research on the nexus between banking sector and fiscal multipliers concerns liquidity constraints, which form one of sources of heterogeneity of households' propensity to consume. The literature concerning the impact of heterogenous households on fiscal multipliers often emphasizes the role of differences in marginal propensities to consume (Cantore & Freund, 2021; Auclert et al., 2023). In models with homogeneous households, it is typically assumed that all households make optimization decisions – maximize utility for given intertemporal budget constraint (see, among others, Smets & Wouters, 2003; Christiano et al., 2005). Such an assumption means that households, as postulated by Brumberg and Modigliani (1954) and Friedman (1957), make decision based on the level of permanent income and their propensity to consume is much lower than one. Such households behave according to Ricardian equivalence, so are often called Ricardians (Barro, 1974). However, the numerous results of empirical analyses suggest that current income has much greater impact on household consumption than the permanent income hypothesis would suggest (Deaton, 1992; Fisher et al., 2020; Kaplan & Violante, 2022). As shown by Galí et al. (2007) including households with higher propensity to consume leads to substantially higher fiscal multipliers. They present that the more households make decisions on the basis of their current income, that is have high propensity to consume, the stronger is the fiscal policy impact on GDP. Also, Coenen and Straub (2005) estimated that the increase in non-Ricardian households to some extent raises government spending multipliers.

The rationale for the non-Ricardian behaviour is, among others, liquidity constraints, a finite planning horizon, myopia, and practical rules (Galí et al., 2004; Andersson, 2010; Havranek & Sokolova, 2020; Guo et al., 2023). Our study belongs to the strand of literature analyzing the non-Ricardian behavior on the basis of liquidity constraints, because of a crucial role of this mechanism under a rapid growth of interest rates leading to difficulties in households' access to loans. Such a liquidity constraint means that expansionary fiscal policy resulting in an increase in households' current income, even for unchanged permanent income, creates an opportunity for households to rise temporary consumption (Hubbard et al., 1986).

The share of households facing liquidity constraint, and more generally non-Ricardian households, is state-dependent and usually increases during recessions (Furceri & Mourougane, 2010). For example, Corsetti et al. (2012) point out that the boost in the government spending multipliers was caused by the rise in credit constrained households. The significant nexus between liquidity constraints and the effects of fiscal policy is also confirmed by Marto (2014), Anderson et al. (2016), Canzoneri et al. (2016) and Kara and Sin (2018). More recently McManus et al. (2021) and Andrés et al. (2022) show that financial frictions substantially affect state-dependence of government spending multipliers.

Thus, there is strong empirical evidence, that the effectiveness of fiscal policy depends positively on the share of liquidity constrained households. However, the above-mentioned studies were conducted only for highly developed countries (mainly for US, Eurozone and Japan), where the percentage of non-Ricardians is relatively low (Coenen & Straub, 2005). As Mankiw (2000) points out, the lower the income, the higher the percentage of non-Ricardians, including liquidity constrained households.

Our study extends the analysis of liquidity constrained households' impact on fiscal multipliers to Central and Eastern European country, where households access to credit is relatively low and therefore the potential impact of liquidity constrained households on fiscal multipliers is stronger than the literature for highly developed countries indicates.

3. Model

The research is based on the model with heterogeneous households. Two groups are taken into consideration.

One group of households faces liquidity constraints. These households are non-Ricardian households, because Ricardian equivalence is not valid in this case (Barro, 1974; Boor, 2021). Budget constraint for households with no access to loans is as follows:

$$P_t c_t^{NR} + T_t^{NR} = P_t w_t^{NR} l_t^{NR}, \tag{1}$$

where: c_t^{NR}, l_t^{NR} – consumption and labour of households facing liquidity constraints (non-Ricardians), w_t^{NR} – real wage received by non-Ricardian households, T_t^{NR} – taxes paid by non-Ricardians, P_t – price.

Households facing liquidity constraints are not able to reallocate consumption over time, so they make decisions only on the level of current consumption. That is, non-Ricardians do not face intertemporal trade-off concerning consumption, but only choose between leisure and current consumption. As a consequence, they just maximize the current utility function, which takes the form:

$$u_t = \ln c_t^{NR} - \left(1+\gamma\right)^{-1}\left(l_t^{NR}\right)^{1+\gamma}, \tag{2}$$

where $\gamma \in (0, 1)$. Thus, labour supply of liquidity constrained households is defined by the following formula:

$$w_t^{NR} = c_t^{NR}\left(l_t^{NR}\right)^{\gamma}. \tag{3}$$

Hence, γ is the inverse of the wage elasticity of labour.

The second group of households does not face liquidity constraints and has access to credit. These optimizing households (Ricardians) have an access to loans, which enables them to reallocate consumption over time. As a result, they make decisions so as to maximize the sum of discounted utility, not just current utility. It means that households with an access to baking sector maximise the following formula:

$$E_t \sum_{t=0}^{\infty} \beta^t \left(\ln c_t^R - \left(1+\gamma\right)^{-1}\left(l_t^R\right)^{1+\gamma} \right), \tag{4}$$

where: c_t^R, l_t^R – consumption and labour of households not facing liquidity constraints (Ricardians), $\beta \in (0, 1)$.

Unlike Ricardian households, Ricardian households' budget constraint is intertemporal in nature – their constraint is permanent income, not a current one. Thus, the budget constraint of Ricardians is as follows:

$$\sum_{t=1}^{\infty} \frac{P_t\, c_t}{(1+r_1\left(1+r_2\right)\ldots\left(1+r_t\right)} = k_0 + \sum_{t=1}^{\infty} \frac{P_t\, w_t^R - T_t^R}{(1+r_1\left(1+r_2\right)\ldots\left(1+r_t\right)}, \tag{5}$$

where: k_t – capital owned by Ricardian households, w_t^R – real wage received by Ricardians, T_t^R – taxes paid by Ricardians, r_t – interest rate.

The capital owned by optimizing households is given by the standard capital accumulation formula:

$$k_t^R = \left(1-\delta\right)k_{t-1}^R + i_t^R, \tag{6}$$

where: i_t – investments of Ricardians, $\delta \in (0, 1)$.

Only households with an access to banking sector are able to accumulate capital, so aggregation results in (Galí et al., 2007):

$$c_t^R + c_t^{NR} = c_t; \tag{7}$$

$$l_t^R + l_t^{NR} = l_t; \tag{8}$$

$$k_t^R = k_t; \tag{9}$$

$$T_t^R + T_t^{NR} = T_t; \tag{10}$$

$$\varphi w_t^R + (\varphi - 1) w_t^{NR}, \tag{11}$$

where: c_t, l_t, k_t, T_t – respectively aggregate level of consumption, labour, capital and taxes paid by households, w_t – average real wage, φ – share of Ricardian households, φ ∈ (0, 1).

The labour and capital are heterogeneous. Levels of aggregate capital and aggregate labour are defined by the following equations:

$$k_t = \int_0^1 k_t(i)\, di; \tag{12}$$

$$l_t = \int_0^1 l_t(i)\, di, \tag{13}$$

where: $k_t(i)$, $l_t(i)$ – respectively capital and labour used to manufacture intermediate goods.

Production function in case of intermediate good i is given by the following formula:

$$y_t(i) = A_t k_t^{\alpha}(i) l_t^{1-\alpha}(i) - FC, \tag{14}$$

where: $y_t(i)$ – good i, A_t – total factor productivity, FC – fixed costs, α ∈ (0, 1). The total factor productivity is described by the following process:

$$A_t = (1 - \rho_A)\bar{A} + \rho_A A_{t-1} + \zeta_{A,t}, \tag{15}$$

where: $\bar{A}$ – average level of total factor productivity, $\zeta_{A,t}$ – productivity shocks, $\rho_A \in (0, 1)$, $\bar{A} > 0$, $\zeta_{A,t} \sim N(0, \sigma_A{}^2)$.

The final good is produced according to aggregator of Dixit and Stiglitz (1977):

$$y_t = \left(\int_0^1 y_t(i)^{\frac{1}{1+\lambda_p}} di \right)^{1+\lambda_p}, \tag{16}$$

where: y_t – final good, $\lambda_p > 0$.

Prices are not flexible. The price stickiness is described by Calvo (1983) scheme. It means that:

$$P_t = \left((1 - \xi_p) P_{IND,t}^{-\frac{1}{\lambda_p}} + \xi_p P_{OPT,t}^{-\frac{1}{\lambda_p}} \right)^{-\lambda_p}, \tag{17}$$

where: $P_{IND,t}$, $P_{OPT,t}$ – indexed and optimized price level respectively, $\xi_p \in (0, 1)$.

The important part of the model is government behaviour.

Fiscal policy influences economy by changes in spending. Government spending follows autoregressive process:

$$g_t = (1 - \rho_g)\bar{g} + \rho_g g_{t-1} + \zeta_{g,t}, \tag{18}$$

where: $\bar{g}$ – average level of government spending, $\zeta_{g,t}$ – shocks concerning government spending, $\rho_g \in (0,1)$, $\bar{g} > 0$, $\zeta_{g,t} \sim N(0, \sigma_g^2)$.

The government is constrained by the equation:

$$\sum_{t=1}^{\infty} \frac{P_t\, g_t}{(1+r_1\,\left(1+r_2\right)\ldots\left(1+r_t\right)} = \sum_{t=1}^{\infty} \frac{T_t}{(1+r_1\,\left(1+r_2\right)\ldots\left(1+r_t\right)}, \tag{19}$$

whereas taxes are set to fulfil the rule described by Chung et al. (2007):

$$T_t - T^* = \vartheta_B\left(B_t - B^*\right) + \vartheta_g P_t\left(g_t - g^*\right), \tag{20}$$

where: B_t – nominal bonds, T^*, B^*, g^* – steady state levels of nominal taxes, bonds and government spending respectively, $\vartheta_B, \vartheta_g > 0$.

Although monetary policy is not central point of the analysis in the paper, it affects the impact of fiscal policy on economy. In case of monetary policy, Taylor (1993) rule is assumed. Moreover, we assume that interest rate shocks, similarly as in case of fiscal policy, follow an autoregressive process. Consequently, the level of an interest rate is defined by the following formula:

$$r_t = r^* + \alpha_\pi\left(\pi_t - \pi^*\right) + \alpha_y\left(y_t - y^*\right) + \rho_r r_{t-1} + \zeta_{r,t}, \tag{21}$$

where: π_t – inflation, r^*, π^* – steady state levels of interest rate and inflation, $\zeta_{g,t}$ – shocks concerning monetary policy, $\alpha_\pi > 0$, $\alpha_y > 0$, $\rho_r \in (0,1)$, $\zeta_{r,t} \sim N\left(0, \sigma_r{}^2\right)$.

4. Results

We estimated the parameters using quarterly data for Polish economy. The Bayesian methodology was applied, which within estimation takes into account not only data but also a priori knowledge of the model parameters. The Bayesian approach is one of the more frequently used methods for estimating the dynamic parameters of stochastic general equilibrium models (An & Schorfheide, 2007; Ruge-Murcia, 2007), including fiscal policy models (Kormilitsina & Zubairy, 2018). One of the most relevant advantages of this approach is the low sensitivity of the results to economic model specification errors (Fernández-Villaverde, 2010).

Most of the parameters were estimated on the basis of a priori distributions, as is usually assumed in literature (Rotemberg & Woodford, 1999; Woodford, 2001; Smets & Wouters, 2003; Coenen & Straub, 2005; Galí et al., 2007; Davig & Leeper, 2011). The percentage of households facing liquidity constraint was calculated on the basis of the data on households unable to cope with unexpected financial expenses (Eurostat data), whereas discount factor and depreciation rate were calibrated. We fixed the parameter β at 0.99 and the parameter δ at 0.025.

A priori distributions are shown in Table 1. In most cases we follow prior distributions assumed by Smets and Wouters (2003) and Coenen and Straub (2005).

The a posteriori estimates were calculated using quarterly Eurostat data from 2000q1–2022q4. We used the following observable variables within the Bayesian estimation of parameters: gross domestic product, employment and consumption. We used logarithmic forms, seasonally adjusted with TRAMO/SEATS and detrended with Hodrick-Prescott. Dynare software was applied (Griffoli, 2007; Adjemian et al., 2022). A posteriori estimates of means of the parameters are shown in Table 2.

Table 1. Prior distributions of the parameters of the model

Parameter	Type	Mean	Standard deviation
γ	normal	1	0.375
α	normal	0.3	0.1
ρ_A	beta	0.85	0.01
σ_A	inverse gamma	0.4	2
ξ_p	beta	0.75	0.05
ρ_g	beta	0.85	0.01
σ_g	inverse gamma	0.3	2
ϑ_B	inverse gamma	0.1	2
ϑ_G	normal	0.1	0.05
α_π	normal	1.7	0.1
α_y	normal	0.125	0.05
ρ_r	beta	0.85	0.01
σ_r	inverse gamma	0.1	2

Table 2. A posteriori estimates of means of the parameters of the model

Parameter	A posteriori estimate
γ	1.183
α	0.352
ρ_A	0.866
σ_A	0.550
ξ_p	0.728
ρ_g	0.854
σ_g	0.502
ϑ_B	0.140
ϑ_G	0.091
α_π	1.603
α_y	0.157
ρ_r	0.841
σ_r	0.089

We compared the fiscal multipliers before and after the sharp upturn in interest rate in Poland and the following decrease in households' access to loans since 2022q1. The decrease in access to loans is defined as a rise in the parameter φ describing the share of households facing liquidity constraint. The upward shift in the parameter φ in 2022 was computed using the data concerning households unable to cope with unexpected expenses.

The comparison of the effects of fiscal policy in Poland before worsening households' access to loans (till 2021q4) and after worsening households' access to loans caused by higher interest rates (since 2022q1) is shown in Figure 2. The figure shows the impact of a growth in government spending by 1% of GDP on the percentage deviation of GDP from the baseline.

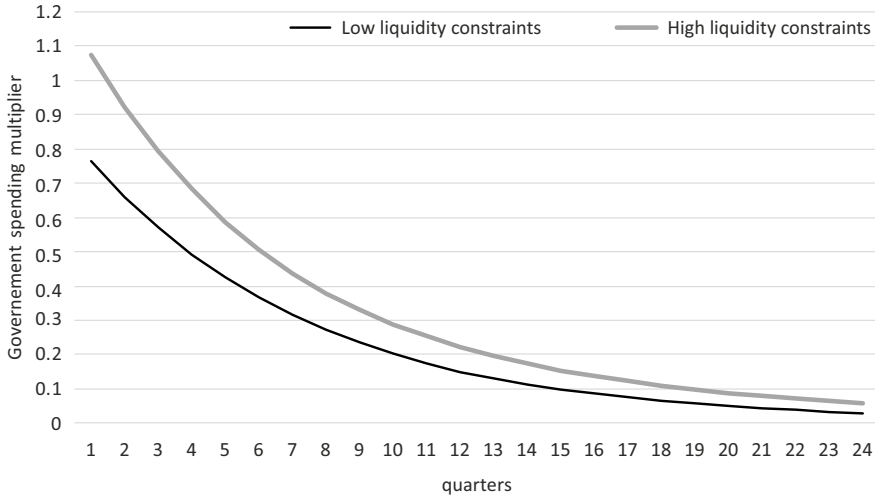

Figure 2. The impact of increase in government spending on GDP in Poland

Our results indicate that a rise in households with liquidity constraints has a significant impact on effects of fiscal policy in Polish economy. Before the limiting households' access to loan the government spending multiplier was substantially lower than after a rise in interest rates leading to high liquidity constraints of households. What's more, our study shows that sharp increase in interest rates, which resulted in higher liquidity constraints, caused contemporaneous fiscal multiplier to exceed one (we define fiscal multipliers in the paper as the percentage changes in GDP caused by a 1% GDP increase in government spending). Also, four-year aggregate government spending multiplier is much bigger in case of higher liquidity constraints than before the sharp increase in interest rates in Poland (see Table 3). Thus, the deterioration in households' access to credit has made fiscal policy much more effective tool for stimulating Polish economy.

Interestingly, Haug et al. (2019) in a study on macroeconomic policy in Poland for the period before the increase in liquidity constraints, conducted on the basis of a different methodology, obtained a very similar value of the initial fiscal multiplier (0.70). Also, the bucket approach confirms that the short-term fiscal multiplier in the Polish economy is on a moderate level – ranges between 0.4 and 0.6 (Batini et al., 2014). More detailed survey of papers on multipliers in Poland, which include among others Łaski et al. (2012), Bencik (2014), Baranowski et al. (2016) and Szymańska (2019), is presented by Haug et al. (2022).

Table 3. Contemporaneous and for-year aggregate government fiscal multipliers before and after worsening households' access to loans in Poland

	Contemporaneous multiplier	Four-year aggregate multiplier
Low households' liquidity constraints (till 2021q4)	0.76	1.26
High households' liquidity constraints (since 2022q1)	1.07	1.78

Haug et al. (2022) show moreover that fiscal multipliers in Poland depended strongly on the stance of monetary policy. However, fiscal multipliers for recent period of increased liquidity constraints have not been studied to date, making it impossible to conduct a comparative analysis for this period.

Within the robustness checks we also calculated government multipliers for two different fiscal rules, that is in case of taxes adjusting only to: 1) public debt, 2) government spending. In both cases we received the results very similar to that based on fiscal rule described by equation (20) and presented in Table 2. Fiscal multipliers for various versions of fiscal rule are presented in Appendix (1 and 2). Moreover, within the sensitivity analysis, we show results for more sophisticated Taylor rule, that is rule taking into account also changes in inflation and output gap. However, also in this case the obtained results, presented in Appendix (3), are very similar to these shown in Table 2 (that is based on monetary rule described by equation (21)).

The effects of government spending are stronger in case of higher share of liquidity constrained households because in case of non-Ricardians, an increase in the aggregate demand translates into higher increase in consumption than in case of Ricardians not facing liquidity constrains. Firstly, non-Ricardian households facing liquidity constrains make decisions solely based on current disposable income, which means that they ignore future consequences of fiscal expansion – for example higher future taxes lowering permanent disposable income. Secondly, fiscal stimulus boosting current households' income, gives liquidity constrained households opportunity to rise current consumption. Differences in private consumption response to upturn in public spending in case of low and high liquidity constraints are shown in the Figure 3. The figure shows the effect of a 1% GDP increase in government spending on the deviation of consumption from baseline (measured in percentage points of GDP).

Thus, our study shows that after the rapid boost of interest rates in Poland, when the percentage of liquidity constrained households increased, the fiscal stimulus influences private consumption more effectively than before the worsening of households' access to loans.

Our empirical results are in line with results obtained for US and Eurozone (Coenen & Straub, 2005; Kara & Sin, 2018; Andrés et al., 2022). They confirm that liquidity constraints lead to higher fiscal multipliers and lower crowding-out effect concerning private consump-

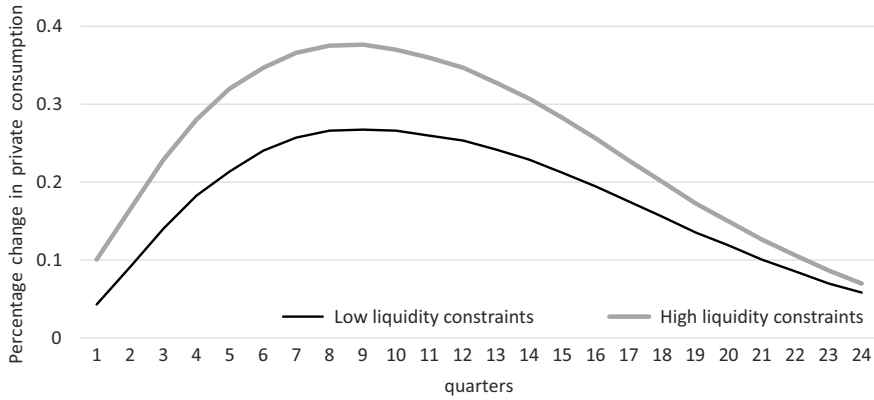

Figure 3. The impact of increase in government spending on private consumption in Poland

tion. However, the novelty of our study is that it shows that the fiscal multiplier in CEE country with relatively less-developed banking sector is more sensitive to liquidity constraints than in highly developed economies.

However, the impact of government spending on output in Poland, similarly as in highly developed economies, is transitory. Thus, the share of liquidity constrained households does not have the significant impact on long-term effects of fiscal stimulus.

5. Conclusions

The study shows that liquidity constraints have a significant impact on the effects of fiscal policy in Poland. On the basis of model with heterogeneous households estimated for Polish economy we found that the upturn in the percentage of households with liquidity constraints caused the substantial rise in fiscal multipliers, and thus the increase of effectiveness of Polish fiscal policy.

The impulse-response functions indicate that before the worsening of households' access to loan, the contemporaneous government spending multiplier was relatively low, whereas after sharp increase in interest rates contemporaneous government multiplier exceeded one. Thus, high interest rates in Poland leading to high liquidity constraints of households caused that expansionary fiscal policy became an effective method of short-term boosting economy. We also verified the impact of government spending on consumption, and got that fiscal stimulus influences private consumption more effectively than before the worsening of households' access to loans, similarly as in case of GDP.

What is more, our study shows that the sharp increase in interest rates in Poland also improved medium term effectiveness of fiscal policy. The four-year aggregate government spending multiplier is higher in case of stronger liquidity constraints of households than before the sharp increase in interest rates in Poland. However, the effects of expansionary fiscal policy, even in times of liquidity constraints, expire over time. It means that although the liquidity constrained households influences the short- and medium-term effectiveness of fiscal policy in Poland, it does not significantly affect the long-term effects of the fiscal stimulus.

To sum up, our study, on the basis of the relevant case of sharp rise in interest rates in Poland, clearly shows that there is a trade-off between households' access to banking sector and the short- and medium-term effectiveness of fiscal policy. However, the main limitation of the research is that it does not capture the potential interdependence between liquidity constraints and monetary policy. Investigating this relationship is a potential area for further studies. Moreover, an interesting field for further research is to compare the costs of the limited households' access to credit with the benefits of more effective government spending and also to verify how the impact of taxes on GDP (studied among others by Simionescu & Albu, 2016, Taha et al., 2018) depends on liquidity constraints.

Author contributions

Piotr Krajewski – model design, data analysis, writing part of the article.
Katarzyna Piłat – literature review, collecting statistical data, formulating conclusions, writing part of the article.

Disclosure statement

We have not any competing financial, professional, or personal interests from other parties.

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APPENDIX

1. Fiscal multipliers in case of taxes adjusting to public debt – fiscal rule defined by the formula:

$$T_t - T^* = \vartheta_B \left(B_t - B^* \right)$$

	Contemporaneous multiplier	Four-year aggregate multiplier
Low households' liquidity constraints (till 2021q4)	0.77	1.24
High households' liquidity constraints (since 2022q1)	1.09	1.75

2. Fiscal multipliers in case of taxes adjusting to government spending – fiscal rule defined by the formula:

$$T_t - T^* = \vartheta_g P_t \left(g_t - g^* \right)$$

	Contemporaneous multiplier	Four-year aggregate multiplier
Low households' liquidity constraints (till 2021q4)	0.74	1.27
High households' liquidity constraints (since 2022q1)	1.05	1.80

3. Fiscal multipliers in case of monetary rule described by formula:

$$r_t = r^* + \alpha_\pi \left(\pi_t - \pi^* \right) + \alpha_y \left(y_t - y^* \right) + \alpha_{d\pi} \left(\pi_t - \pi_{t-1} \right) + \alpha_{dy} \left(y_t - y_{t-1} \right) + \rho_r r_{t-1} + \zeta_{r,t}$$

	Contemporaneous multiplier	Four-year aggregate multiplier
Low households' liquidity constraints (till 2021q4)	0.75	1.26
High households' liquidity constraints (since 2022q1)	1.06	1.77