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Summary

Czech Republic is a small open economy with strong trade and financial links with the Eurozone. Share of credit in euro from the domestic banks to the non-financial corporations in Czechia has grown over the last decade, constituting now more than the half of all credit. Such a composition of credit may pose a challenge for monetary policy transmission through banks' lending and firms' costs of financing. This policy paper examines the impact of foreign currency loans (FCL) on monetary policy transmission in a small open economy, calibrated for Czechia using a two-country Dynamic Stochastic General Equilibrium (DSGE) model inspired by Smets and Wouters (2003) and de Walque et al. (2017). The model incorporates firms' working capital and their decisions regarding FCL, which are influenced by interest rate differentials and anticipated exchange rate movements. The study explores how FCL holdings affect the transmission of various shocks and monetary policy, highlighting the role of exchange rate movements and the nature of shocks in determining the effectiveness of domestic monetary policy.

Main Findings and Monetary Policy Implications

The presence of FCLs in Czechia modifies the working capital channel, affecting the transmission of monetary policy. Domestic monetary policy becomes more effective in response to domestic shocks but less effective in response to foreign and exchange rate shocks. Economies with a larger share of FCL are more vulnerable to foreign and exchange rate shocks, requiring a stronger monetary policy response. When the economy is hit by the global demand and supply shocks the impact of FCL on monetary policy transmission is shock-dependent. For the demand shock accompanied by the exchange rate appreciation (a stronger currency relative to euro), monetary policy response to the shock can be somewhat weaker in the highly euroized economy as a stronger currency reduces financing costs for euro-indebted firms. For a global supply shock accompanied by the depreciation (weakening) of the domestic currency, a desirable response of a monetary policy institution should be stronger. Thus ignoring the role of FCL in monetary policy may result in suboptimal policy responses.

Introduction

Foreign currency loans (FCL) have become increasingly significant in Central and Eastern Europe (CEE), driven by economic integration with the Euro area, see Figure 1.

While FCL can be attractive for individual firms, they alter the transmission of monetary policy and exchange rate shocks. This policy paper examines the impact of FCL on monetary policy transmission and trade-offs in a two-country DSGE model. The model extends the framework by Smets and Wouters (2003) to include firms' working capital

and FCL decisions, where FCL shares respond to interest rate differentials and anticipated exchange rate movements. In the New Keynesian open economy framework, we think about the transmission mechanism of monetary policy through standard intertemporal substitution and exchange rate channels. A policy rate increase motivates consumers to save more and delay consumption, thus, it suppresses aggregate demand. Larger domestic interest rate leads to exchange rate appreciation. As a result, an increase in the policy rate is expected to lower inflation as illustrated in Figure 2. The working capital channel introduces an additional layer, marked as red elements in the Figure 2. A policy hike raises' firms financing costs, creating an upward pressure on prices, even if the hike is intended to reduce inflation.
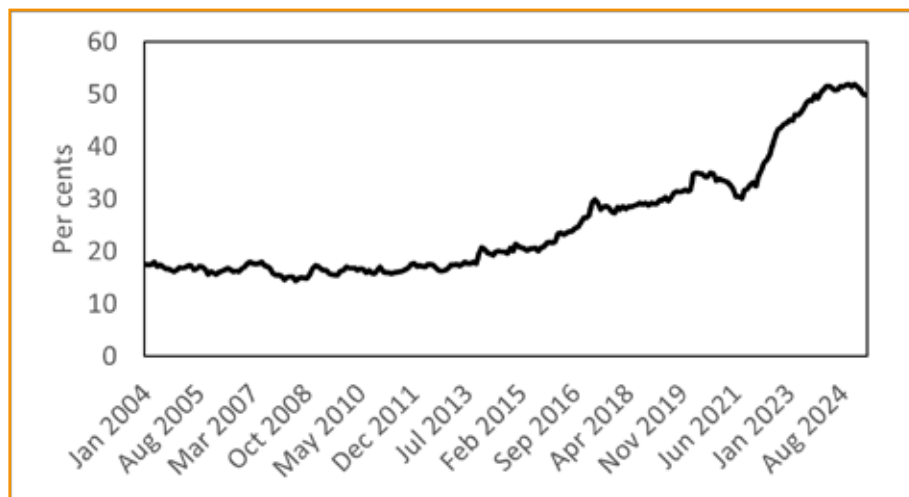

Figure 1: Composition of nonfinancial corporation loans vis-a-vis domestic banks.

Note: Time series for share of EUR-denominated loans of Czech nonfinancial corporations with respect to domestic banks. Source: CNB ARAD.
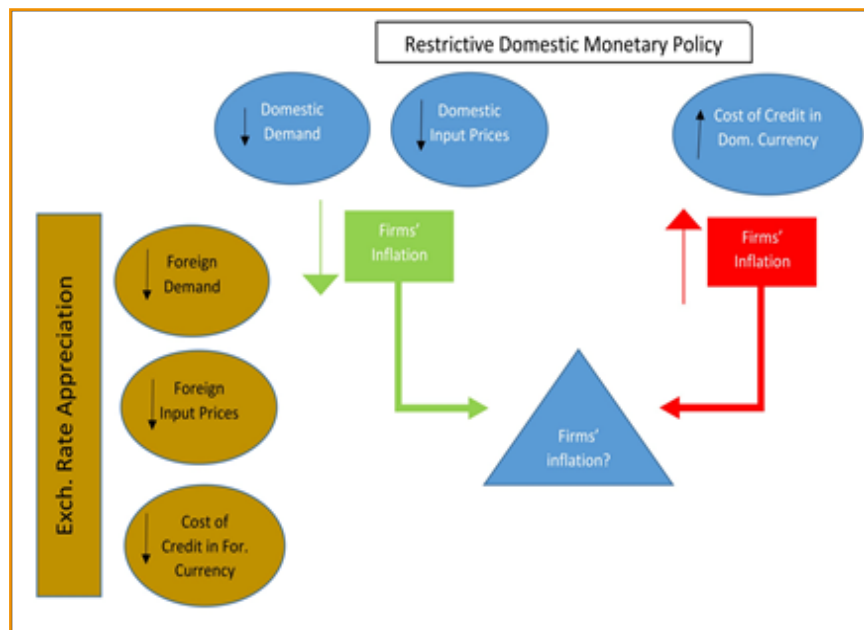
Figure 2: Monetary policy transmission with a cost channel

The paper explores the effects of foreign, domestic, and exchange rate shocks on a small open economy for different levels of FCL holdings. It also considers the impact of global demand and supply shocks and analyzes deviations from policy rules, highlighting the role of FCL in amplifying the costs of inflation and the importance of distinguishing between types of shocks. The findings suggest that FCL impacts domestic policy effectiveness depending on the shock type, strengthening monetary policy transmission in response to domestic shocks and weakening it in response to foreign and exchange rate shocks. The paper also discusses the implications of these findings for policymakers and the importance of considering the role of FCL in monetary policy design.

Model

The model consists of two economies: a small open economy (e.g., the Czech Republic) and a larger neighboring economy (e.g., the Euro area). Each economy is modeled as in Smets and Wouters (2003), extended to include foreign goods, oil products, and a set of frictions standard to New Keynesian models. The economies are linked through trade in intermediate goods and international bonds.

Households. Households are risk-averse and maximize an infinite sum of expected discounted utility, deriving utility from the consumption of domestic and foreign goods and oil products, and experiencing disutility from labor. They have access to a complete set of securities and can invest in domestic and foreign investment goods. Households can issue and buy international bonds, with the exchange rate determined by the Uncovered Interest Rate Parity (UIRP) condition.

Intermediate Good Producers and Their Financing Decisions. Intermediate goods producers use a Cobb-Douglas production function to combine domestic labor and capital with oil and foreign production goods. They set prices in the destination currency

and face Calvo-type price rigidities. Producers need external financing to pay for the factors of production in line with Ravenna and Walsh (2006) and Christiano et al. (2005). Producers borrow in domestic and foreign currency and deciding on the share of FCL based on interest rate differentials and expected exchange rate movements.

Financial Intermediaries. Financial intermediaries are risk-neutral firms owned by households. They provide credit in domestic and foreign currency, using their net wealth and foreign funds. Intermediaries can exchange between currencies without a wedge or costs and transfer profits to households or save them as net wealth.

Rest of the Model. The model includes assemblers of homogeneous goods, a distributional sector, international trade, and a central bank that sets the nominal interest rate using a Taylor-like rule.

Simulation

We do impulse response analysis to various shocks, including foreign interest rate shocks, real exchange rate shocks, domestic monetary policy shocks, and cost-push shocks. The simulations consider four different FCL regimes: economies with different shares of FCL in firms' portfolio. We study an economy with the credit in domestic currency only (FCL=0), with the credit only in foreign currency (FCL=1), and with moderate (FCL=0.3) and large (FCL=0.7) shares of credit in a foreign currency.

Foreign Interest Rate Shock. A foreign interest rate shock affects the domestic economy through the trade channel, leading to a decline in domestic output and a depreciation of the domestic currency. Weaker domestic currency results in larger costs of credit service for the firms with high FCLs. The presence of FCL amplifies the impact of the shock on firms' financing costs, requiring a stronger monetary policy response.

Real Exchange Rate Shock. A real exchange rate shock increases the prices of imported inputs and oil, affecting the demand for domestic goods and the costs of production. The impact of the shock depends on the share of FCL, with a larger share leading to higher financing costs and a stronger monetary policy response.

Domestic Monetary Policy Shock. A restrictive domestic monetary policy shock suppresses domestic output, investment, and inflation, and appreciates the domestic currency. Yet, the presence of FCL lowers the impact of the shock on firms' financing costs, eliminating an upward pressure on inflation from the cost channel depicted in Figure 2.

Foreign Cost-Push Shock. A foreign cost-push shock leads to higher foreign inflation and a rise in the foreign policy rate. Rising foreign rate results in weakening of the domestic currency, increasing firms financing costs and inflation in the presence of FCL, and amplifying the impact of the shock on domestic inflation and output. In the economy with larger FCL holdings, a stronger monetary policy response is required to slow down inflation.

Domestic Cost-Push Shock. A domestic cost-push shock results in higher domestic inflation and a rise in the domestic policy rate. While larger domestic rates have smaller effect on firms' financing costs with larger FCLs, domestic monetary authority stabilizes inflation with somewhat lower policy rates.

Global Inflation Shocks

We further study the impacts of global inflationary shocks on the domestic economy. The presence of large FCLs affects the transmission of these shocks. Below we consider several stylized experiments. We analyze two types of global inflationary shocks: a supply shock – a symmetric domestic producer mark-up shock, which moves output and inflation in the opposite directions and a demand shock – a negative symmetric risk-premium shock – that moves the two variables in the same direction. We provide the simulations with a large presence of FCL = 0.7 and domestic currency credit only FCL = 0. In Figure 3 these shocks are normalized so that in the first quarter they increase domestic consumer prices inflation under scenario with FCL = 0 by 1 p.p. (in annualized terms).
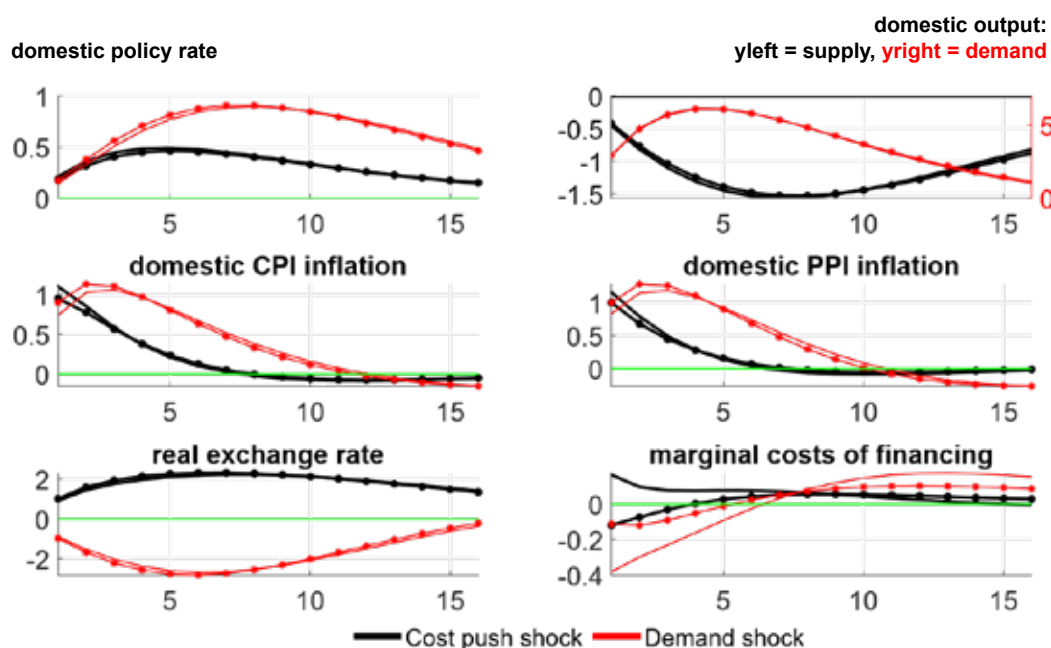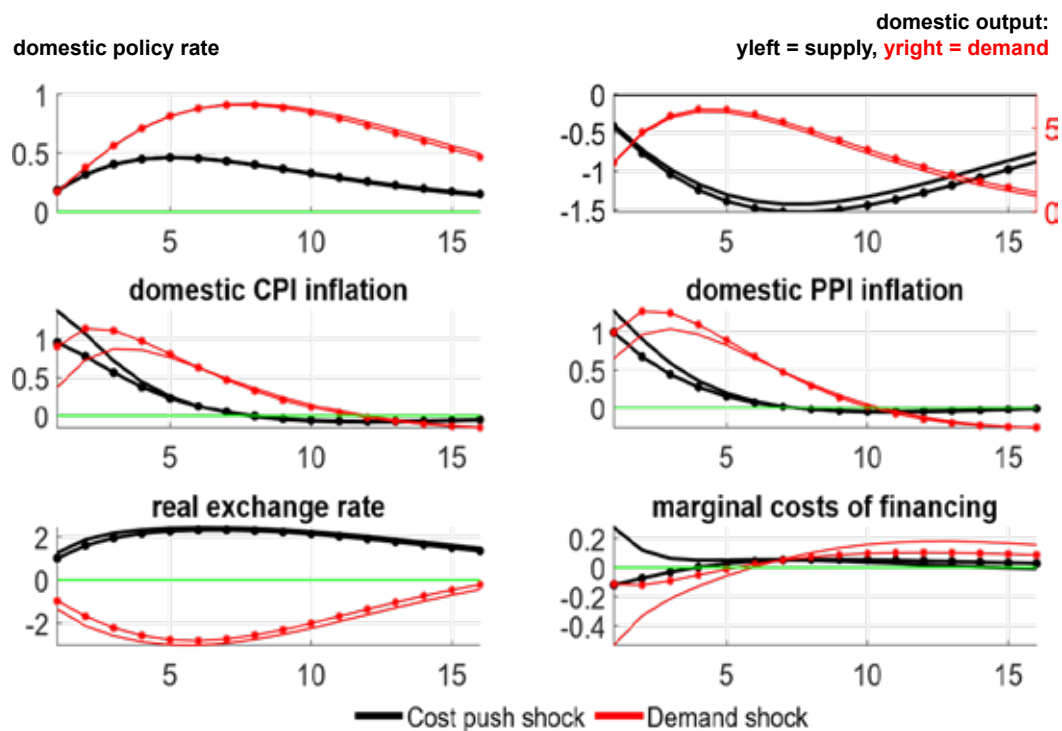

All responses are reported as percentage deviations from the steady state. Inflation and interest rate are annualized percentage points deviations. Rising exchange rate corresponds to domestic currency depreciation. The straight lines correspond to scenario with "FCL = 0.7", the lines with asterisk "*" correspond to "FCL = 0".

*Figure 3: **Effect of the FCL channel under global inflation shocks.***

A global cost push shock leads to an increase in producer prices inflation and a decrease in output in both countries. The rise in producer prices leads to an increase in consumer prices inflation. The global cost shock impacts the foreign economy through foreign producer costs, but it affects the domestic economy through both domestic and foreign producer costs as well as import consumer goods prices. Both domestic and foreign central banks raise their policy rates, but lower real rates in the domestic economy put

depreciation pressure on the domestic currency. The domestic economy with higher FCL holdings—represented by a straight line— experiences larger inflation and higher policy rate is needed compared to the situation with no FCL—represented by a line with an asterisk. As the transmission of policy to inflation takes time, real interest rates initially fall, leading to initially lower real firm costs in economies without FCL. In the economy with FCL, higher interest rates and a weaker currency push firms' financing costs up, contributing to higher inflation.

A symmetric demand shock increases both inflation and output in both the domestic and foreign economies. Additionally, the domestic economy experiences further effects from spillovers from the foreign economy, leading to an increased demand for its exports. In response, both domestic and foreign monetary authorities rise interest rates, but the real interest rates are higher in the domestic economy, causing its currency to appreciate. Firms in the economy holding foreign currency liabilities (FCL) benefit from lower financing costs due to the stronger domestic currency. Consequently, an economy with FCL holdings benefits from the reduced firms' costs of financing and lower inflation compared to an economy without FCL.
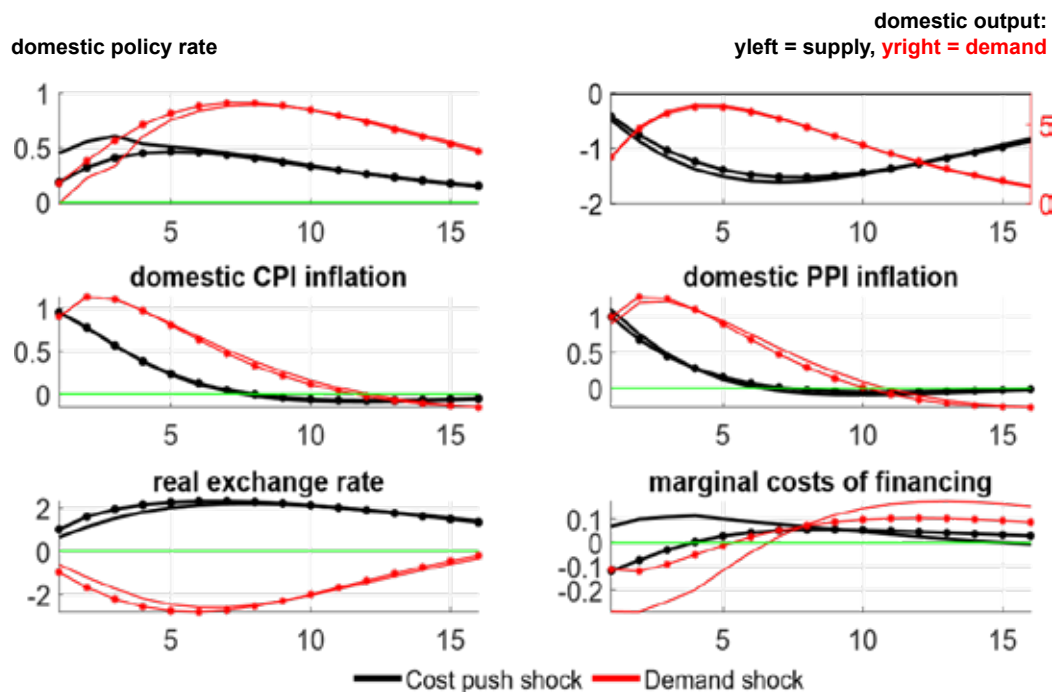

All responses are reported as percentage deviations from the steady state. Inflation and interest rate are annualized percentage points deviations. Rising exchange rate corresponds to domestic currency depreciation. The straight lines correspond to scenario with "FCL = 0.7", the lines with asterisk "*" correspond to "FCL = 0".

Figure 4: Partial effect of the FCL channel under global inflation shocks and policy experiment.

Next, we outline two sets of policy experiments. We first explore the hypothetical situation when the domestic policymaker overlooks the FCL channel, which could be considered a policy oversight. The results are illustrated in Figure 4. Specifically, we design a series of expected monetary policy shocks such that, over the first four periods, the policy rates with FCL remain identical to those suggested by the model without FCL. In response to a global supply shock, domestic rates do not rise compared to the scenario without FCL,

leading to even higher inflation rates than depicted in Figure 3, with slight variations in output responses. For a global demand shock, the policy rate with FCL is now higher than that indicated by the Taylor rule. By fixing the policy response at the level of the economy without FCL, we observe an even stronger currency appreciation and lower inflation, which results in a relative, albeit small, output loss.

We further examine a scenario in which the policymaker aims to maintain the same CONSUMER PRICES inflation response as in the scenario without the FCL channel. To achieve this, we design a sequence of expected monetary policy shocks such that the inflation response in the FCL scenario matches that of the model without FCL for the first four quarters. The results are presented in Figure 5. In the case of a global supply shock, the simulations suggest a higher policy rate than that indicated by the Taylor rule, which significantly increases costs for firms with some FCL share, leading to small but noticeable output losses. For a global demand shock, the domestic policy response is now weaker than that suggested by the Taylor rule. This results in weaker currency appreciation and a smaller reduction in financing costs for firms with FCL compared to Figure 3.

All responses are reported as percentage deviations from the steady state. Inflation and interest rate are annualized percentage points deviations. Rising exchange rate corresponds to domestic currency depreciation. The straight lines correspond to scenario with "FCL = 0.7", the lines with asterisk "*" correspond to "FCL = 0".

Figure 5: *Partial effect of the FCL channel under global inflation shocks and strong/weak policy reaction.*

The sets of experiments with global inflationary shocks show that the FCL channel weakens the transmission mechanism of the domestic policy for global supply inflationary shocks: to achieve the same level of inflation with high levels of FCL, a central bank must increase rates more and tolerate somewhat larger output losses. The effect of FCL on monetary transmission for global demand shocks is reversed. Due to appreciation of domestic currency, a weaker monetary policy response is needed as stronger currency puts downward pressure on firms' financing costs.

Conclusions

In this policy paper we describe the challenges faced by a small open economy with the strong credit euroization on the example of Czech Republic. The paper concludes that the presence of FCL affects the transmission of monetary policy and the impact of various shocks on the domestic economy. The transmission of domestic monetary policy is weaker in response to foreign originated and exchange rate shocks. The foreign shocks are further amplified by the exchange rate fluctuations, which affect firms' financing costs. However, the credit in foreign currency reduces the feedback from domestic monetary policy to firms' financing costs, making domestic monetary policy somewhat more efficient in fighting inflation. The monetary policy transmission in response to the global inflationary shocks - which hit both Czechia and Euro zone, depends on the nature of the shocks and exchange rate movements. The findings highlight the importance of considering the role of FCL in monetary policy design and the need for policymakers to carefully identify the source and nature of shocks to calibrate their responses effectively.

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