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The pass-through of monetary policy rate to lending rates: The role of macro-financial factors $^{\diamond}$

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ABSTRACT

This paper assesses how changes in the monetary policy rate affect the lending rates for the small and medium enterprise (SME), consumer, mortgage, and corporate loans in the Czech Republic—a high-income, OECD country. It further examines whether such interest rate pass-through is stable or could vary at different levels of bank competition, leverage, non-performing loans, and foreign exchange (FX) interventions. Using the co-integration approach, we find a significant and complete pass-through for SME lending rates. For consumer lending rates, we estimate the pass-through as unreliable. For both the mortgage and corporate rates, the pass-through shows significant structural shifts that can be entirely and largely explained by bank deleveraging. The markup for all lending rates, except for the corporate rates, increases with a growing spread between the government bond and monetary policy rates. FX interventions mostly affect the markups for corporate and SME rates.

1. Introduction

The interest rate channel of monetary policy is one important channel through which the changes in the monetary policy rate affect the cost and volume of lending to the real economy, and thus the credit cycle, business cycle, and inflation. How effective this channel can be in each economy is an empirical question that is of great interest to central bankers (Praet, 2016; Shafik, 2016, Dudley, 2017).

This paper assesses how the monetary policy rate affects the lending rates for the consumer, mortgage, small and medium enterprises (SME), and corporate loans in the Czech Republic. It further examines the stability of this interest rate pass-through, and whether it can vary at different levels of bank competition, bank leverage, borrower credit risk, and foreign exchange interventions. We also examine whether factors such as bank credit risk, bank competition, or foreign exchange interventions significantly influence the markup for lending rates over and above the monetary policy rate. Another possible determinant of the markup that we consider is the spread between the government bond yield and the monetary policy rate as a proxy for changes in the term premium and sovereign risk. We are not interested in modelling the term structure of interest rates and the term premium in a greater detail as in Mallick et al. (2017), Brand et al. (2010), or Piazzesi (2002), among others. We are simply interested in estimating a reduced form model describing how the monetary policy rate transmits to lending rates in different market segments, while controlling for macrofinancial variables that could determine the lending rate markup and the strength of the pass-through itself. The spread between the government bond yield and the monetary policy rate, which controls for the effects of the term

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premium and sovereign risk, is one such macrofinancial variables.

In 2008, the Czech Republic joined the club of high-income OECD countries.¹ It is an open economy with exports amounting to 83 percent of GDP and one of the most industrialized countries in the EU.^{2,3} The country is not part of the Eurozone yet and maintains its own currency, the Czech koruna. The Czech National Bank (CNB) uses inflation targeting as the operational monetary policy regime, and the main monetary policy tool is the two-week repurchase rate (repo rate). The Czech financial sector is dominated by banks, largely foreign-owned subsidiaries of Western European banking groups. In 2017, the Czech banking system comprised 47 banks. The 4 largest banks accounted for 62 percent of total banking sector assets (about US\$ 350 billion). By ownership, there were 9 domestic and 38 foreign banks, including the 4 biggest ones. Although the global financial crisis (GFC) hit several EU countries, the Czech Republic was affected by the GFC only indirectly and did not experience a systemic border-line or full-blown banking crisis (Laeven and Valencia, 2012). The GFC's indirect effect worked mainly through reduced export demand, and through the adjustment of Western European banking groups to the post GFC environment. Faced with the challenging low interest rate environment, the CNB complemented its traditional monetary policy by foreign exchange (FX) interventions as of 2013.⁴ Namely, the CNB announced a public commitment to intervene in the FX market against appreciation of the Czech koruna as necessary to keep the Czech koruna above 27 CZK for one euro. This one-sided exchange rate commitment helped the CNB in achieving its stated inflation target. The CNB abandoned the exchange rate commitment in April 2017.

Using the autoregressive distributed lag modelling approach and a baseline linear model, we find that, over 2004–17, the pass-through from the monetary policy rate to mortgage, SME, and corporate lending rates appeared overall significant and complete. We cannot confirm long-term relationship (cointegration) between consumer lending rates and the monetary policy rate. Banks in the Czech Republic may thus set their consumer lending rates considering factors other than the monetary policy rate. Testing the stability of the baseline model specification reveals structural shifts in the estimated relationship for mortgage and corporate rates. For the mortgage rate, these structural shifts recede when we allow for a non-linearity in the monetary policy rate at different levels of the bank capital to asset ratio (an interaction term)-the passthrough to mortgage rate can thus change with the degree of bank leverage. For corporate rates, allowing for a similar nonlinearity helps lower the importance of the identified structural shifts (in 2007 and 2011) but they do not recede completely and stay significant. Nevertheless, the two structural shifts end up affecting only the markup over the monetary policy rate not the pass-through of the monetary policy rate to the corporate lending rate. Specifically, the average markup for corporate lending rates shifted up about 54 basis points with the onset of the GFC, and then down about 57 basis points in early 2011-around the time when the new Capital Requirement Directive (CRD III) for the European Union was adopted and helped decrease the uncertainty about future bank capital requirements.⁵

As for the macro-financial determinants of the lending rate markups,

⁵ https://web.archive.org/web/20130627202127/http://ec.europa.eu/ internal_market/bank/regcapital/legislation_in_force_en. httm#maincontentSec5.

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the spread between the government bond yield and the monetary policy rate is the most prominent. The spread increases most the mortgage and consumer rates—for instance, a one percentage point increase in the spread increases mortgage rates by about 70 basis points depending on the model specification. The SME and corporate markups respond also positively to the growth in CNB's deposits at foreign banks (a proxy for FX interventions). However, this result is puzzling. It may suggest that funds that would normally be invested in the Czech economy were invested in the Czech korunas in the international markets shortening the supply of funds flowing into the Czech economy. This puzzling result needs to be confirmed and further examined by future research.⁶ In addition, as banks were deleveraging they were systematically increasing the markup for SME lending rates.

Our paper contributes to the interest rate pass-through literature in three ways: (i) To our knowledge we are the first, who test the efficiency of the pass-through in the Czech Republic during the zero lower bound period. (ii) We test the effect of unconventional monetary policy in the form of FX interventions on the pass-through. (iii) We examine how stable the pass-through is considering possible structural shifts, as well as a possible variation in the pass-through with the changing macrofinancial environment.

The rest of the paper is organized as follows. Section 2 reviews the literature. Section 3 presents the theoretical underpinning for the interest rate pass-through. Section 4 describes the data and basic statistics. Section 5 describes the employed co-integration model and estimation method. Section 6 discusses the baseline estimation results. Section 7 tests for possible multiple structural breaks. Section 8 examines non-linear dependence of the estimated pass-through on varying macro-financial conditions. Section 9 performs additional tests of stability. Section 10 concludes.

2. Literature review

The empirical literature estimating the interest rate pass-through typically uses either the cost of funds approach (Bondt, 2005; Hofmann, 2006; Bernhofer and van Treeck, 2013; Havránek et al., 2016) or the monetary policy approach (Becker et al. (2012); Mojon, 2000; Espinosa-Vega and Rebucci, 2004; Becker et al. (2012); Blot and Labondance, 2013; Holton and d'Acri, 2015). The choice of the reference rate differentiates both methods. The cost of fund approach follows the term structure of interest rates assigning each lending rate a market rate with comparable maturity. In contrast, the monetary policy approach uses the main monetary policy rate (sometimes approximated by the short-term money market rate) as the reference rate for the pass-through to all lending rates. In this paper, we follow the monetary policy approach because we are interested in how both the short- and long-term lending rates respond to changes in the monetary policy rate.

Rousseas (1985) proposed a simple theoretical model for interest rate pass-through based on the marginal cost theory. Assuming perfect competitive markets, bank lending rates would change one-to-one with the monetary policy rate (the cost of funding) and one would speak about a complete pass-through. However, this assumption is often violated in practice because the banking and financial market structures show rather monopolistically competitive or even oligopolistic behaviors. Therefore, an incomplete pass-through could be expected. Considering the modelling approach, numerous papers examine interest rate pass-through using just a reference rate as an explanatory variable (Jobst and Kwapil, 2008; Holmes et al., 2015; Bernhofer and van Treeck, 2013). In contrast, numerous other papers acknowledge that the lending rate markup and interest rate pass-through depend on various market conditions and not just on the monetary policy stance. Hence, they include more control variables (Gambacorta et al., 2015; Sander and Kleimier, 2006; Eller and

¹ OECD - Country Classification for aid and repayment terms. http://www. oecd.org/tad/xcred/country-classification.htm.

² World Bank statistics (2015) - Exports of goods and services. http://data. worldbank.org/indicator/NE.EXP.GNFS.ZS?locations=CZ.

³ According to OECD industrial production index (2015), the Czech Republic is 7th most industrialized EU country. https://data.oecd.org/industry/ industrial-production.htm.

⁴ Czech National Bank - The exchange rate as a monetary policy instrument – FAQs. https://www.cnb.cz/en/faq/the_exchange_rate_as_monetary_policy_instrument.html.

⁶ Using percentage or log-log growth rates or normalizing the CNB deposits by prices did not change the result.

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