The Impact of Monetary Conditions
on Bank Lending to Households

Győző Gyöngyösi
Kiel Institute for the World Economy

Kiellinie 66, Kiel 24105, Germany
E-mail: gyozo.gyoengyoesi@ifw-kiel.de

Steven Ongena
University of Zurich, Swiss Finance Institute, *KU Leuven* and *CEPR*

Plattenstrasse 14, 8032 Zürich, Switzerland
Telephone: +41 44 6342951
Fax: +41 44 6344903
E-mail: steven.ongena@bf.uzh.ch

Ibolya Schindele*
National Bank of Hungary

Szabadság tér 8-9, 1054 Budapest, Hungary
E-mail: schindelei@mnb.hu

This Draft: October 2, 2018

The Impact of Monetary Conditions
on Bank Lending to Households

Abstract

We study the impact of monetary conditions on the supply of mortgage credit by banks to households. Using comprehensive credit register data from Hungary, we first establish a "bank-lending-to-households" channel by showing that monetary conditions affect the supply of mortgage credit in volume. We then study the impact of monetary conditions on the composition of mortgage credit along its currency denomination and borrower risk. We find that expansionary domestic monetary conditions increase the supply of mortgage credit to all households in the domestic currency and to risky households in the foreign currency. Because most households are unhedged, bank lending in multiple currencies may involve additional risk taking. Changes in foreign monetary conditions affect lending in the foreign currency more than in the domestic currency, but do not trigger compositional changes in the risk exposures of the banks.

(137 words)

1.   Introduction

Although prominent academic writings have long emphasized the crucial role played by households' balance-sheets in monetary transmission, extant empirical work is scant and almost exclusively focused on the impact of monetary policy on the <u>demand</u> for mortgages by households.[1] Aladangady (2015) for example finds that expansionary monetary policy increases house prices and thus stimulates household spending and home equity-based borrowing, while Mian and Sufi (2009) further show that households are heterogeneous in their marginal propensity to borrow and spend out following a positive change in housing wealth. Di Maggio, Kermani, Keys, Piskorski, Ramcharan, Seru and Yao (2017) find that, following expansionary monetary policy, households carrying adjustable rate mortgages (originated between 2005 and 2007 featuring an automatic reset of the interest rate after five years) accelerate debt repayment (see also Garriga, Kydland and Sustek (2016)).

However − to the best of our knowledge − there is little or no empirical research with micro data on the equally important question if and how monetary policy has an impact on the <u>supply</u> of mortgages via the bank-lending channel of monetary transmission.[2] This is surprising in the light of for example recent evidence on US household leverage prior to the financial crisis suggesting that the rapid increase in the quantity of mortgages supplied to low income (subprime) borrowers between 2002 and 2005 was an important factor in causing the financial crisis (e.g., Mian and Sufi (2014)).

---

[1] Bernanke and Gertler (1995) stated that "an important goal of future research should be to give the role of consumers' balance sheets in monetary policy transmission the same attention that has been paid to the balance sheets of corporations" (*op. cit.,* page 45), while more recently Sufi (2015) surmised that "perhaps the most important effect of monetary policy on credit availability happens through the housing market" (*op. cit.*, page 4).
[2] Studying bank level data *à la* Kashyap and Stein (2000), Black, Hancock and Passmore (2010) find that only a few banks reduce mortgage lending in response to monetary contractions. Albertazzi, Fringuellotti and Ongena (2018) study how bank group funding conditions affect the share of new mortgages with a fixed (versus adjustable) rate but find that country level demand factors dominate such conditions. More closely related to our paper, Epure, Mihai, Minoiu and Peydró (2017) study the impact of macroprudential policies on household credit supply using register data from Romania and show that macroprudential policies are effective in mitigating risky household lending over local and global credit cycles.

To fill this gap in the literature, we investigate the impact of monetary policy on the supply by banks of mortgages to households, in volume and composition. First, we examine the potency of the bank lending channel of domestic monetary policy as pertaining to household mortgages by testing whether changes in domestic monetary conditions have a differential impact on the amount of mortgages granted by banks according to their capital ratios. Second, we investigate whether this effect is differentiated by the currency in which the mortgage is granted and whether therefore monetary conditions abroad also matter. And third, we investigate whether these effects are differentiated by borrower risk.

Hence, we estimate the potency of a bank-lending channel running through the supply of mortgages granted to households and investigate whether this effect is differentiated by mortgage currency as well as borrower risk. The interaction of credit currency and risk composition may worsen the impact of expansionary monetary policy on banks' risk-taking (e.g., Jiménez, Ongena, Peydró and Saurina (2014), Ioannidou, Ongena and Peydró (2015), Dell'Ariccia, Laeven and Suarez (2017)) when riskier households are those that are offered mortgages in the foreign currency. Therefore, understanding the intertwining effects of macroeconomic policies on mortgage lending is also important from a financial stability perspective.

Hungary provides an almost ideal setting to identify the potency of a "bank-lending-to-household" channel. The comprehensive credit register at the National Bank of Hungary (*Magyar Nemzeti Bank*) contains granular information on, essentially, all loans extended by all credit institutions operating in Hungary, including – and necessary for our purposes – mortgages granted to households. With an economic system dominated by banks, we can identify the causal impact of monetary policy on the supply of bank credit to households.

Our identification strategy exploits the extent to which banks' lending in Hungary is denominated in foreign currency. When applying for a loan, households face a choice

whether to borrow in domestic or foreign currency. As most households are unlikely to have an inherent currency-specific demand for credit (exceptions could be the very few households with income in foreign currency), their currency choice is driven by differences in domestic and foreign loan conditions, their expectations on future exchange rates, and the banks' supply of foreign currency credit. We identify the effect of monetary policy on the volume and composition of the supply of mortgages by banks to households accounting for all household-level time-varying heterogeneity in credit demand by including individual borrower-time fixed effects (as mortgage lending is differentiated at the individual borrower-level by the loan currency). In sum, we will focus on the set of mortgages in various currencies granted in the same month to the same borrower by banks of varying balance-sheet strengths. Within this set of mortgages, for which the (observed and unobserved) quality of potential borrowers is constant, we study how monetary conditions affect the granting of mortgages in different currencies depending on bank capital.[3] To estimate supply effects we exploit theoretically motivated interactions between changes in monetary conditions on the one hand and a key bank balance sheet strength variable, i.e., the bank capital-to-total-assets ratio, on the other hand (Bernanke, Gertler and Gilchrist (1996), Kashyap and Stein (2000)).[4]

In this way, our identification strategy follows the most recent empirical literature assessing the effects of monetary policy on banks' supply of corporate credit. Jiménez, Ongena, Peydró and Saurina (2012) and Jiménez, Ongena, Peydró and Saurina (2014) for example explore a dataset of firms' loan applications to multiple banks and control for firm-

---

[3] What we require for the identification of supply effects is that the changes in the domestic (or foreign) interest rate do not affect borrowers' demand for domestic versus foreign currency mortgages in a way that is somehow correlated with banks' capitalization ratios.

[4] The definition of the bank capital-to-total-assets ratio we employ closely follows the theoretical literature that attributes a prominent role to net worth in determining the ability of banks to obtain financing from their own financiers (Holmstrom and Tirole (1997), Holmstrom and Tirole (1998), Bernanke, Gertler and Gilchrist (1999), Gertler and Kiyotaki (2011)).

level time-varying heterogeneity in credit demand by including firm-time fixed effects.[5] Their identification of the impact of monetary policy on the volume and composition of credit supply, respectively, rests on the differential responses (to changes in the monetary policy rate) by banks of different balance-sheet strengths.

As common in the literature, we account for the stance of monetary policy with changes in representative short-term interest rates. We further comprehensively account for changes in domestic GDP growth and inflation (Taylor (1993)), at all levels of interaction where the domestic interest rate is also featured. We also investigate the currency compositional effect since, although the Hungarian economy is not "dollarized" or "francized",[6] many mortgages were denominated in Swiss Franc (in some sample years more than half of the mortgages were issued in that currency).

Given these ingredients we first identify the impact of domestic monetary conditions on the supply of mortgages by local banks. We find the *bank-lending-to-household* channel is operational and potent, especially for mortgage granting in Hungarian Forint, the domestic currency. Specifically, we find that following a one standard deviation decrease in the domestic interest rate, lowly capitalized banks increase their mortgage credit supply by 0.1 percentage point more than highly capitalized banks. Given that the unconditional probability of granting mortgage credit in our sample is 0.92 percent, this differential impact is equivalent to a semi-elasticity of 11 percent, representing an economically significant volume effect.

---

[5] Using fixed effects is a standard way to control for demand side heterogeneity also in other strands of the literature. Paravisini, Rappoport, Schnabl and Wolfenzon (2015) for example analyze the effect of credit supply on trade and include various sets of fixed effects to account for all non-credit determinants of corporate credit demand.

[6] The amount of foreign cash held has traditionally been very low in Hungary. Based on survey data from the Austrian National Bank, Feige (2003) for example estimates that the fraction of total currency held as foreign currency was only 6 percent in Hungary in 2001. Hence regular households are not naturally hedged.

Focusing on the effect of monetary policy changes on the currency composition of loan supply, we find that when credit is granted in the domestic currency (Hungarian Forint), a one standard deviation decrease in the Forint interest rate increases the supply of mortgages by lowly capitalized banks by 0.19 percentage point <u>more</u> than by highly capitalized banks. When credit is granted in Swiss Franc, the same change in the Forint interest rate increases mortgage credit supply by lowly capitalized banks by 0.09 percentage point <u>less</u> than by highly capitalized banks. These numbers are economically significant, representing 20 and - 10 percent of the unconditional probability of granting mortgage credit in the sample. The difference in the differential reaction of lowly and highly capitalized banks suggests that monetary policy changes trigger compositional shifts in banks' household lending decisions along the loan currency dimension.

Next, we investigate whether compositional changes triggered by monetary policy shocks in banks' mortgage granting are also discernible along the borrower risk dimension. We find that expansionary domestic monetary conditions increase lending – primarily by lowly capitalized banks – to all borrowers in Hungarian Forint, and to risky borrowers in Swiss Franc. Notably, our findings suggest that domestic monetary expansion stimulates bank risk-taking through enhancing lending to *risky borrowers* in the *foreign currency*.

Specifically, we find that the difference in the differential impact of a one standard deviation decrease in the interest rate on the supply of mortgages to less risky households, by low versus high capital-to-asset ratio banks, in the domestic versus the foreign currency, amounts to -36 percent of the unconditional probability of granting mortgage credit in our sample. When banks lend to risky households, this difference in the differential reaction of lowly versus highly capitalized banks to a similar change in the interest rate is -3 percent, a significantly smaller number in absolute terms. Therefore, currency compositional changes triggered by monetary policy shocks seem to be less prevalent when banks lend to risky

households. This finding suggests that expansionary domestic monetary policy spurs mortgage granting to risky borrowers primarily in the foreign currency. Expansionary monetary policy may thus generate risk-taking by stimulating banks to lend to unhedged households in the foreign currency.

We also assess the impact of foreign monetary conditions on the volume and composition of domestic mortgage loan supply. We find that expansionary monetary policy in Switzerland has a differential impact on mortgage lending denominated in the domestic and foreign currencies, but differential effects on the supply of mortgages along the borrower risk dimension are not identifiable.

Our paper makes three contributions. First, our paper contributes to the literature that identifies the impact of domestic monetary policy shocks on the supply of credit (Bernanke and Blinder (1992), Kashyap and Stein (2000), Jiménez, Ongena, Peydró and Saurina (2012), Becker and Ivashina (2014)),[7] by investigating the impact on the *volume of mortgages* granted by banks to *households*. Our paper is the first to document the potency of a bank-lending-to-household channel of monetary policy transmission. Second, our paper contributes to an incipient literature which investigates the international transmission of monetary policy shocks (Cetorelli and Goldberg (2012), Cerutti, Claessens and Ratnovski (2017), Morais, Peydró and Ruiz (2017), Temesvary (2017), Temesvary, Ongena and Owen (2018)), that may possibly occur along loan currency denomination (Ongena, Schindele and Vonnák (2018)). Third, our paper also contributes to the literature on the impact of the monetary policy rate on the *composition* of the supply of credit which has so far focused on direct credit risk taken (Dell'Ariccia, Laeven and Marquez (2014), Jiménez, Ongena, Peydró and Saurina (2014),

---

[7]Matousek and Sarantis (2009), Beņkovskis (2008) and Kujundžić and Otašević (2013) for example assess the potency of a domestic bank lending channel in Central and Eastern European countries using bank-level or aggregate credit information while Brzoza-Brzezina, Chmielewski and Niedźwiedzińska (2010) and Brown, De Haas and Sokolov (2017) study the effectiveness of macroeconomic policies including monetary policy in the presence of financial dollarization.

Ioannidou, Ongena and Peydró (2015), and references therein). In this paper we focus on its impact on the supply of credit along both currency denomination and household risk.[8] We find that changes in domestic monetary policy alter the composition of the granted mortgages along currency denomination and household risk and that the interplay of the two compositional channels amplifies bank risk-taking.

The rest of the paper is organized as follows. Section 2 describes bank lending to households in Hungary, the country's credit register, and the resultant sample. Section 3 discusses the identification strategy. Section 4 introduces the methodology and the variables. Section 5 contains the results assessing the potency of the bank-lending-to-household channel, both in volume and in composition. Section 6 discusses our robustness estimations and Section 7 concludes.

2. Bank Lending to Households in Hungary and Data Sources

A. Household Lending in Hungary

Hungary's transition from a centrally planned to a market economy started at the end of the 1980s, but banks did not lend all that much to households until after the turn of the millennium. Although economic transition and subsequent consolidation went hand in hand with foreign banks' entry and resulted in intense competition in the banking market, newly established foreign banks focused initially on corporate lending. Household customers were mainly served by a handful of domestic credit institutions.

---

[8] In this respect our paper also relates to the large empirical literature on financial dollarization that studies the determinants of banks' domestic lending in foreign currency in Latin American and transition economies (Nagy, Jeffrey and Zettelmeyer (2011)). This literature finds that in general the lack of macroeconomic policy credibility, inflation volatility, low institutional quality, interest rate differentials, financial market development, and foreign funding of bank credit all contribute to a high level of foreign currency bank loans in these economies (e.g., Barajas and Méndez Morales (2003), De Nicolo, Honohan and Ize (2005), Rajan and Tokatlidis (2005), Rosenberg and Tirpák (2009), Basso, Calvo-Gonzalez and Jurgilas (2011), Neanidis and Savva (2015)).

In 2001, the Hungarian government introduced an interest rate subsidy on housing loans, which eased households' borrowing constraints and spurred mortgage lending. Because of fiscal considerations, the program was restricted at the end of 2003, and subsequently in 2005, by tightened eligibility rules and a reduction of the interest rate subsidy. From 2004 onwards, loans denominated in foreign currencies appeared and their share increased rapidly, especially in household lending. Due to the lower interest rates, foreign currency mortgages became a substitute of state-subsidized domestic currency loans and, within a short period, developed into a major retail product.

The mortgage loans issued were adjustable interest rate loans. While the most popular denomination was the Swiss Franc, mortgages and consumer loans denominated in other currencies, like the Euro and the Japanese Yen, were also issued. The share of new loan originations issued in foreign currency to households increased from 5 percent at the end of 2003 to 70 percent by the third quarter of 2008, and this ratio is 50 percent for mortgages.

Several factors contributed to the increase in the share of foreign currency loans in Hungary. On the demand side, lower interest rates, households' low awareness of exchange rate risk, borrowers' herding behavior and expectations of joining the euro-zone may all have contributed substantially to the massive spread of foreign currency loans. On the supply side, the major reason to offer foreign currency loans was banks' intense competition for new retail customers accompanied by foreign bank ownership and the consequent availability of foreign funding.

Although the Central Bank was aware of potential risks associated with banks' lending in foreign currencies (MNB Financial Stability Report (2006)), no regulatory measures were taken to curb such practices before the outburst of the financial crisis in 2008. In addition, some government measures might have even encouraged those lending practices (Banai, Király and Nagy (2012)).

When the financial crisis hit Hungary, the Hungarian forint suffered a major depreciation losing about 30 percent of its value *vis-à-vis* the Swiss Franc between September 2008 and January 2009. The depreciation of the domestic currency, the shortage of liquidity in currency markets, and the freeze of the international swap markets, led to a pragmatic cease of Swiss Franc lending to households. Although subsequent regulatory measures curtailed lending to households in other foreign currencies too, Euro denominated mortgages continued to exist until foreign currency lending to the household sector was entirely banned in August 2010 by the government.

B. The Household Registry of the Hungarian Credit Information System

The Household Registry of the Hungarian Central Credit Information System (KHR) contains information on, essentially, all loans extended to individuals by credit institutions in Hungary. As such this credit register contains detailed information on mortgage-backed housing loans. Credit institutions in Hungary include commercial banks, branch offices of foreign banks, saving cooperatives, credit unions, specialized credit institutions, financial enterprises and other financial companies. Our initial sample encompasses all mortgage-backed housing loans recorded in the Household Registry of the Credit Information System in April 2012.

First, we restrict our sample to Swiss Franc and Hungarian Forint denominated housing loans. Though some Euro and Japanese Yen denominated mortgages were also issued, they were much less frequent than Swiss Franc or Hungarian Forint denominated mortgages. The

first two denominations constitute only 3 percent of all mortgage loans issued during our sample period.[9]

We include in the sample mortgages originated by commercial banks, branch offices of foreign banks, and saving cooperatives. Saving cooperatives are inherently different from commercial banks: their lending is focused on loans denominated in domestic currency. Nevertheless, saving cooperatives also offered foreign currency loans and their lending is likely to respond to changes in monetary policy. Therefore, besides commercial banks, these institutions are relevant from the perspective of our analysis. Hereinafter we refer to all credit institutions in our sample as "banks".

We include in our sample all mortgage-backed housing loans that appear in the registry and have a minimum maturity of eight and a half years.[10] The Household Registry of the KHR was established in April 2012, therefore we are able to observe loans that were outstanding at or originated after that month. Under the restriction, we observe the entire population of mortgages originated between December 2003 and April 2012 and not repaid before April 2012. Since foreign currency lending in Hungary started early 2004, our choice of the beginning of the sample period allows us to focus on the composition of housing loan supply along the currency dimension. To keep our analysis free from the effects of the financial crisis, we choose August 2008 as the last month of the sample period. We therefore focus on the population of mortgage-backed housing loans of eight and a half year or longer maturity, originated between January 2004 and August 2008.

---

[9] Euro loans were more common in the beginning of the foreign currency credit boom. Japanese yen lending started only in late 2007, and the Central Bank warned the commercial banks to stop lending in yen because of the volatile JPY/HUF exchange rate.

[10] The condition of 8.5 years minimum maturity is a technical condition. Currency denominated loans started to become popular in Hungary from 2004. Since we want to include in our sample loans with domestic as well as foreign currency denomination, our sample period starts in 2004. Mortgages issued in 2004 with a maturity shorter than 8.5 years will not appear in the registry in April 2012. Monetary policy might affect the maturity of mortgage loans as well, and restricting our sample based on maturity would result in endogenous sample selection. There are only a few mortgages with shorter than 8.5 years of maturity as mortgages most often tend to have longer maturities of 10 to 25 years in Hungary. This data restriction does therefore not affect our results.

In addition to detailed loan and borrower characteristics, such as the date of origination, loan amount, loan maturity, borrower's date of birth and address, and whether the borrower has a guarantor, the credit register also contains information on the lender's identity and the currency denomination of the loan. Using information on loan currency, we construct a balanced individual-time-currency-level panel database with monthly frequency. To obtain our final sample, we take a 20 percent random sample from the data at the individual-level.

We match the thus organized credit register data with bank and regional characteristics. We obtain data on banks' financial statements from regulatory reports available at the National Bank of Hungary. We have information on regional characteristics including population, unemployment, and tax base per capita, at the settlement level of the borrowers' area of location from the T-STAR database.

We drop individuals with loans from multiple banks from the sample. The credit register contains the individual-bank relationship only for the month April 2012 (date of the creation of the registry). For each loan, we assume that origination was accomplished by the bank recorded in the registry. For individuals with loans from multiple banks, the individual-bank relationship will not be unambiguously defined for the months without loan originations. Since we focus on the impact of monetary conditions on banks' loan supply decisions, information on bank relationships during those months is relevant and needed for our analysis. We therefore focus on individuals whose bank relationship is unambiguously defined during the entire sample period. Individuals with single bank relationship constitute 99.1 percent of the population of individuals receiving a housing loan during the sample period.

Our sample may suffer from a selection problem. Following massive depreciation of the Hungarian forint during the crisis period, the Hungarian government initiated a large-scale loan repayment program to ease the increased debt burden of borrowers with currency loans. This Early Repayment Program allowed for the repayment of loans denominated in foreign

currency at preferential exchange rate. Since the repayment possibility preceded the creation of the registry in April 2012, mortgages that participated in the program could not be recorded in the registry. We complete robustness estimations to address this problem in Section 6 and show that our main results are not driven by this potential selection bias.

3.   Identification Strategy

Does expansionary monetary policy at home and/or abroad generate changes in the volume and risk composition of the supply of mortgages by banks to households when mortgage lending takes place in domestic as well as foreign currencies? Do compositional effects along the risk and currency dimensions intertwine reinforcing the impact of loose monetary policy on risk taking? To address these questions, one needs to disentangle the impact of the changes in the interest rate on the volume and composition of mortgage credit supply from changes in the quality and volume of the demand for loans− while accounting for the impact of other key macro variables. This bank lending channel involves volume as well as compositional changes in the supply of mortgages at the *bank-borrower-currency denomination* level.

Given most banks may have little capital at stake, net worth has a prominent role in determining banks' capacity to borrow from their own financiers. Therefore, we identify the impact of monetary policy shocks on the volume of bank loan supply, from the differential responses of banks with different net worth characteristics as Kashyap and Stein (2000), while accounting for heterogeneity in credit demand through the use of location-time and borrower-time fixed effects as proposed by state-of-the-art methodology in the recent

literature (Jiménez, Ongena, Peydró and Saurina (2012), Jiménez, Ongena, Peydró and Saurina (2014)).[11]

Consistent with the above, our identification strategy consists of two crucial ingredients: (1) Interacting the change in the interest rate with bank capital, loan currency denomination, and a measure of borrower risk, while saturating the specification with borrower-time fixed effects and locality-time-currency fixed effects to control for unobserved demand; (2) horseracing the interest rate, in its interaction with bank capital, currency denomination, and borrower risk, with the corresponding triple and quadruple interactions of other key macro variables, in particular GDP growth and inflation.

Next, we discuss the two afore-mentioned components of our identification strategy and our measures of credit granting in detail.

A. Saturation with Fixed Effects and Interaction Terms

Our benchmark specification focuses on the intensive margin of mortgage granting to individual borrowers in a given currency.

1. Borrower-Time Fixed Effects and Locality-Time-Currency Fixed Effects

Expansionary monetary policy by the central bank managing one currency may spur banks into lending in this respective currency but − given imperfect hedging opportunities for either the bank and/or its financiers − not necessarily (or at least not to an equal degree) in

---

[11]As we are assessing the within-borrower credit composition (along loan currency and risk), first-stage borrower-level loan application information as traditionally used in the literature on the firm-bank-lending channel Puri, Rocholl and Steffen (2011), Jiménez, Ongena, Peydró and Saurina (2012), Berg and Kirschenmann (2015) and Jiménez, Ongena, Peydró and Saurina (2014) would be potentially less informative for our purposes. Given that we focus on the currency denomination and risk of mortgages granted to an individual borrower in a certain month, knowing the currency requested by the borrower would be helpful. However, as far as we are aware, no credit register in the world records this type of information (Miller (2003)).

other currencies.[12] In addition, expansionary monetary policy by the central bank may cause risk-shifting by increasing lending to risky households in the respective currency.

Recent evidence suggests that these testable predictions may also be consistent with demand channels. Monetary policy shocks may affect credit demand through their impact on house prices and home-equity based borrowing (Aladangady (2015)). Therefore, to suppress concurrent changes in households' credit demand, we saturate our benchmark specifications with borrower-time fixed effects. Observed and unobserved time-varying borrower characteristics that we account for this way include the individual's income, employment status, collateral, marital status, and household characteristics. Our saturated specifications also account for the endogeneity of bank loan supply when changes in macroeconomic conditions affect banks' lending decisions indirectly, by altering borrowers' capacity to repay mortgage debt as long as changes in repayment capacity are not currency specific.

In our saturated specifications, identification comes from comparing changes in lending by the *same* bank in the *same* month to the *same* individual in different currencies.[13] Essentially, our identification relies on the assumption that household credit demand is not currency specific. On the condition that households take into account borrowing costs and potential risks associated with taking on debt, the actual currency of the granted mortgage will depend on bank's loan supply in the different currencies.

Expansionary monetary policy may also affect the level of competition in the banking industry by spurring banks' entry into new geographical areas through an expansion of their

---

[12] Hungarian regulation does not require banks to hold a differential level of reserves for deposits in different currencies. Nor does foreign currency lending require banks to maintain different bank capital levels as long as the foreign currency loan position is hedged through foreign currency funding (on-balance) or through the foreign exchange swap market (off-balance sheet).

[13] Note that we need a third panel dimension for the inclusion of borrower-time fixed effects. In our data this is the currency dimension. Unlike recent research analyzing loan applications made by firms to different banks (Jiménez, Ongena, Peydró and Saurina (2012)), Jiménez, Ongena, Peydró and Saurina (2014)), we do not rely on the multiplicity in the borrower-bank relationship dimension.

branch networks.[14] Supply effects generated by changes in banks' market structure are, however, unrelated to monetary policy changes. We control for such effects by using locality-time fixed effects. In addition, the availability of a low interest rate foreign currency may allow banks to engage in new market segments, by extending loans to households ineligible for credit in the high interest rate domestic currency. To control for such region-specific time-variation in aggregate lending in a given currency, we saturate our specifications with locality-time-currency fixed effects. Time-varying region-specific characteristics that we capture this way also include the locality level aggregate demand for loans by households rationed from credit in the domestic currency. We account for borrowers' locality at the subregion as well as the settlement (city or zip-code) level.[15]

2. Interaction of Interest Rate Change, Bank Capital Ratio, Currency Denomination, and Borrower Risk

Given the set of fixed effects, identification of a bank lending channel comes from exploiting the testable prediction that when the monetary policy rate decreases for one particular currency, banks with lower net worth will react more by lending more in this currency than banks with higher net worth. In addition to the change in the volume of lending in a specific currency, interest rate decreases may spur banks with lower net worth to engage in lending to riskier households in the respective currency. Compositional changes along the currency and risk dimensions may thus interact, reinforcing the impact of loose monetary policy on bank risk-taking. Our measure for net worth and thus the intensity of the agency conflict that besets banks own borrowing from their financiers is the bank capital-to-assets

---

[14] In the early 2000s, a significant number of foreign banks entered the Hungarian market and established new branch networks.

[15] In 2010, there were 3,152 settlements in Hungary. The average population per settlement was equal to 3,168.

ratio (Holmstrom and Tirole (1997)). The ratio is particularly meaningful in Hungary because off-balance sheet activity by banks has been almost non-existent.[16]

To identify the "currency composition channel" of monetary policy, we interact, in the spirit of Kashyap and Stein (2000), the change in the interest rate with the lagged bank capital ratio and a dummy variable taking the value of one if the mortgage is denominated in the foreign currency. We expect a negative sign for the estimated coefficient on this triple interaction term: When the domestic interest rate decreases, banks with lower capital ratio are more likely to grant a mortgage in the domestic currency than in the foreign currency. To isolate the "risk-taking channel" with respect to lending in the specific currency, we create a quadruple interaction term adding borrower risk as a fourth interacting variable. Since foreign currency loans expose borrowers to exchange rate risk, the currency compositional channel may also shift the risk composition of loan supply. If the currency and risk compositional channels reinforce one another thereby boosting bank risk taking, riskier borrowers will be more likely to receive a mortgage in the foreign currency and the coefficient of the estimated quadruple interaction term will have a positive sign.[17]

B. Horseracing Triple and Quadruple Interaction Terms

1. Interest Rate

Most banks are funded by short-term debt, the interest rates of which will likely respond to changes in the monetary policy rate. As in Angeloni, Kashyap and Mojon (2003), we employ the yearly change in a three-month interest rate for each currency. For Hungarian Forint mortgages, we employ the Hungarian government bond rate. For Swiss Franc lending

---

[16] Total bank assets cover most of the banks' business in Hungary. Banks did not develop conduits or Structured Investment Vehicles (SIVs) and securitization was not practiced either.

[17] In a related vein, Ongena, Popov and Udell (2013) provide evidence that foreign banks may engage in risky lending in domestic markets, especially when entry barriers and restrictions on non-core bank activities in domestic markets are low. At the same time, Dell'Ariccia, Laeven and Marquez (2016) point out that lending in a foreign currency does not necessarily involve more risk-taking.

we use the annual change in the Swiss 3-month LIBOR interest rate.[18] The Hungarian interest rate spans a full cycle over the sample period, while the Swiss interest rate increases during the entire period (see Figure 1).

[Insert Figure 1]

Assuaging concerns of reverse causality (e.g., future foreign currency lending by banks may imply current domestic monetary contraction) and omitted variables (variables correlated with the stance of monetary policy that can also influence bank lending) are the comprehensive sets of borrower-time and locality-time-currency fixed effects which absorb any observed and unobserved time-varying heterogeneity across *all* individuals and localities in our sample. For monetary policy changes in Switzerland omitted variable and reverse causality concerns are less likely to be of any significance.

2. Other Key Macro Variables

Besides short-term interest rates, banks' loan supply decisions could also be affected by other key macroeconomic variables. Hence, the third component in our identification strategy is to concurrently account for the effects of changes in GDP growth and prices as the main determinants of the monetary policy rate as well as other aggregate variables including changes in exchange rate, foreign direct investment, and the term structure of interest rates. To identify the currency compositional channel, we therefore horserace the triple interaction terms of the changes in GDP growth, prices and other macro variables, with bank capital, currency denomination, with the equivalent triple interaction with the monetary policy rate. In addition, to identify the effect of monetary policy on bank risk-taking when granting mortgages in the domestic or foreign currency, we horserace the quadruple interaction terms

---

[18] We use a three-month interbank rate because there is no three-month Swiss Treasury bill or government bond.

17

of each respective macro variable, with bank capital, currency denomination, and borrower risk, with the quadruple interaction of the same variables and the interest rate.

Given their correlation with the monetary policy rate, the macro variables in triples and quadruples also feature as controls, to the extent that the individual-time and locality-time-currency fixed effects did not already soak up the relevant macroeconomic variation.

4. Empirical Model and Variables

This Section discusses the empirical models we estimate and our dependent and independent variables.

The sample period runs from January 2004 to August 2008. The total number of observations (i.e., individual – year:month– credit in currency) equals 21,893,298 but given computing constraints the regressions in Tables II to VI employ a 20 percent random sample of individuals. We thus end up with a sample of 4,378,430 observations in total.

Table I presents the summary statistics. Summary statistics for banks and subregions are based on the average values of the bank and subregion characteristics over the sample period. Borrower risk characteristics are based on ex-ante information gathered at the time the individual takes the loan as well as lending outcome information obtained a number of years subsequent to loan taking. The number of banks in our sample is 141 and the number of individuals is 39,344.

A. Empirical Model Line-Up

Next, we present our basic as well as complete empirical specifications for the lending channels we attempt to identify. Our dependent variable is a mortgage loan origination dummy and we estimate linear probability models with standard errors clustered at the locality (subregion or settlement) level. To estimate the effect of monetary policy on changes

in the volume of credit supply, we use a collapsed panel of individual-month level observations (excluding the loan currency dimension) and test whether interest rate changes impact the likelihood of mortgage granting (in any currency). The estimated model, i.e., Model 3 in Table II, also serves as the basis for our more complete specifications applied to address compositional changes along the loan currency and risk dimensions:

$$(1) \qquad MORTGAGE\ LOAN_{it} = \alpha_i + \alpha_{jt} + \beta\ \Delta INTEREST\ RATE_{t-1}$$

$$+ \gamma\ \Delta INTEREST\ RATE_{t-1} * BANK\ CAPITAL_{bt-1} + Controls + \varepsilon_{it}$$

The dependent variable, MORTGAGE LOAN$_{it,}$ is a dummy variable that equals one if individual i is granted a mortgage in month t.[19] The main independent variables are ΔINTEREST RATE$_{t-1}$ which is the annual change in the (domestic) three-month interest rate at t-1, and BANK CAPITAL$_{bt-1}$ which is the capital ratio at time t-1 defined as the ratio of bank equity and retained earnings over total assets of bank b granting the credit to individual i. These latter two variables are discussed more at length in the next section.

We are interested in the coefficient on the interaction term of the interest rate change and bank capital, γ. The specification further loads in individual borrower and subregion-quarter fixed effects (represented by α_i and α_{jt}), and as controls includes the following sets of variables: (1) the interactions of the change in GDP and inflation, respectively, with bank capital; (2) bank capital ratio, bank size, liquidity, profitability and non-performing loans; (3) in specifications without subregion-quarter fixed effects the income, population, and unemployment in the subregion (or settlement) where the borrower lives; (4) in specifications

---

[19] Analyzing the granting of credit in a binary manner has many advantages for our empirical analysis. Such an analysis is comprehensive, comparable, and directly interpretable across all loan conditions, it avoids having to adjust for exchange rate changes (which could create spurious correlations in our estimations), and it is least affected by the continuous decrease in the individual's exposure according to the contracted repayment schedule.

with no time fixed effects the changes in the exchange rate, foreign direct investment, sovereign credit default swap spread and yield curve.

The complete model we use to address the currency and risk compositional channels before saturation with borrower-time fixed effects, e.g., Model (4) in Table V, equals (in abridged form):

$$
\begin{aligned}
\text{(2)} \qquad \text{MORTGAGE LOAN}_{itk} = {} & \alpha_i + \alpha_{jtk} + \beta IN\,FX_{itk} + \gamma RISK_i \\
& + \delta\,\Delta INTEREST\,RATE_{t-1} * IN\,FX_{itk} + \theta\,\Delta INTEREST\,RATE_{t-1} * RISK_i \\
& + \eta\,\Delta INTEREST\,RATE_{t-1} * BANK\,CAPITAL_{bt-1} * IN\,FX_{itk} \\
& + \kappa\,\Delta INTEREST\,RATE_{t-1} * BANK\,CAPITAL_{bt-1} * RISK_i \\
& + \mu\,\Delta INTEREST\,RATE_{t-1} * BANK\,CAPITAL_{bt-1} * IN\,FX_{itk} * RISK_i \\
& + Controls + \varepsilon_{itk}
\end{aligned}
$$

The main independent variables in this second specification are IN FX$_{itk}$,[20] the abridged label for *Credit Is Granted in Foreign Currency*, which equals one if the mortgage granted to individual *i* in month *t* is in currency *k* which is a foreign currency, and equals zero otherwise, RISK$_i$, which is a dummy variable equal to one if individual *i* is a high risk borrower, and equals zero otherwise, ΔINTEREST RATE$_{t-1}$, which as before is the annual change in the relevant three month interest rate at *t-1*, and BANK CAPITAL$_{bt-1}$, which as before is the capital ratio at time *t-1* defined as the ratio of bank equity and retained earnings over total assets of bank *b* granting the mortgage.

We are interested in the coefficients, i.e. *β, δ, η*, and *μ,* the coefficient on currency denomination and its double, triple and quadruple interactions with the interest rate; interest rate and bank capital; and interest rate, bank capital, and borrower risk; respectively. In

---

[20] An alternative notation would be to use α_k instead of β IN FX$_k$ and interpret it as a currency dummy or currency fixed effect.

addition, we are interested in the coefficients γ, θ and κ, the coefficients on borrower risk and its interactions with the interest rate, and interest rate and bank capital, respectively. The specification further loads in individual- and locality-time-currency fixed effects (represented by α_i and α_{jtk}), and as controls we include the same sets of variables as in specification (1)).

B. Main Independent Variables

1. Short-Term Interest Rate and Other Macro Variables

Our first main variable of interest is the annual change in the three-month Forint interest rate that we measure by the yield on the three-month Hungarian government bond rate. The average change in the three-month Hungarian government bond rate during the sample period is -0.03 percentage points and the change varies between -5.08 percentage points and 6.98 percentage points. To proxy for monetary policy by the Swiss central bank that issues the foreign currency, we use the annual change in the Swiss three-month LIBOR interbank rate. The average change in the Swiss three-month interest rate in the sample period is 0.5 percentage point and it varies between -0.42 percentage point and 1.19 percentage point. Table I presents the definitions and summary statistics of all variables used in our analysis.

[Insert Table I here]

We account for changes in domestic GDP growth and inflation (Taylor (1993)), including both variables at all levels of interaction where the domestic interest rate is also featured. The average GDP growth rate in Hungary during the sample period was 3.3 percent ranging between 0 percent and 5.1 percent, while average inflation was 5.7 percent, ranging between 2.3 and 9 percent.

Additional macro controls are the annual change in the Hungarian Forint/Swiss Franc exchange rate, the annual change in the stock of foreign direct investment in Hungary, the annual change in the CDS rate on 5-year Hungarian sovereign bonds, and the annual change in the difference between 10-year and 1-year government bond yields. The macro variables are available monthly, except for GDP growth and the stock of foreign direct investment, which are measured quarterly. For interim months, we use the end-of-quarter GDP growth rate and currency reserve values.

2. Bank Capital Ratio and Other Bank Characteristics

Our key bank balance-sheet variable is the *Bank Capital Ratio* defined as the ratio of bank equity over total assets.[21] This ratio is a measure of the bank's ability to obtain funding from its financiers (Holmstrom and Tirole (1997)) and lend in the currency of the interest rate change ("bank balance sheet channel"). At the same time the bank capital ratio may also serve as a proxy for bank moral hazard (i.e., more "skin in the game" may deter lending in the 'other' (riskier) currency). The average bank capital ratio during the sample period is 8.39 percent.

To capture the time-variation in banks' loan supply decisions, we include a number of bank characteristics as control variables. We use the natural logarithm of total assets (*Bank Total Assets*) to proxy for bank size and the ratio of liquid to total assets (*Bank Liquidity Ratio*) to measure bank liquidity. We also include the *Bank Return on Assets* to measure profitability and the *Bank Doubtful Loan Ratio* to proxy for the current non-performance and riskiness of the bank's portfolio. We note that the individual fixed effects we include also control for the average time-invariant characteristics of the banks the individuals borrow from.

---

[21] Consistent with the literature, for bank subsidiaries we use local subsidiary rather than bank-group-level capital ratios (see, for example, Kashyap and Stein (2000)).

All bank balance-sheet and bank performance variables are available at monthly frequency. Their values for month *t* are proxied by their values at the end of month *t-1*.

3. Borrower Risk Measures

We use the event of ex-post default to proxy for ex-ante borrower risk. Specifically, our borrower risk measure is a dummy variable that takes the value of one if the individual defaults within a six-year period after having received the mortgage.[22] Defaults on foreign currency loans may, however, happen for reasons other than the borrower's inherent riskiness. In robustness exercises we address this issue by varying sample period and definition of the borrower risk measure.

C. Control Variables, Including Fixed Effects

To control for the variation in the amount and quality of loan demand faced by the banks, we also include characteristics of the borrower's locality as well as individual and individual-time fixed effects in our specifications (with time referring to year:month).[23] In particular, in all regressions without locality-time-currency fixed effects, we include the *Income in the Subregion* measured by the logarithm of the annual tax base per number of taxpayers in the borrower's region, the *Unemployment in the Subregion*, measured by the proportion of unemployed within the active population of the subregion where the borrower lives, and *Population in the Subregion*, the logarithm of the population of the subregion where the borrower lives.

---

[22] The Hungarian credit registry does not use the classical 90-day delay in payment as the definition of default. A Hungarian borrower is in default if he owes the bank an amount exceeding the minimum wage for at least 90 consecutive days. Since for most mortgages the monthly payment does not exceed the minimum wage, the event of default will be underrepresented in our sample.

[23] Since all individuals in the sample have only one bank, the individual-time fixed effects also account for all observed and unobserved heterogeneity at the bank-time level, e.g., changes over time in technology and business model in each individual bank.

Region characteristics are available at yearly frequency. In our estimations, we use the average values of the variables over the sample period.

5.   Results

A. Effect of Monetary Policy on the Volume of Mortgage Loan Supply

We start analysing the effect of domestic monetary policy on banks' mortgage lending decisions by focusing on the effect of interest rate changes on the likelihood of mortgage granting either in the domestic or foreign currency. Table II presents our first results. The estimations are based on a panel of individual-month level observations on borrowers granted a mortgage between January 2004 and August 2008. Since all individuals in our sample take a mortgage at least once, we essentially estimate the intensive margin of granting mortgage credit.[24]

Models 1 to 3 in Table II provide a step-by-step development towards our base specification which is Model 3 and which includes all relevant interaction terms for the interest rate, GDP growth, and inflation as well as individual borrower and locality-time fixed effects. Specifically, to control for unobservable time-varying regional characteristics that might affect household borrowing, in Model 3 we include subregion-quarter fixed effects. In addition, to control for aggregate shifts in economic conditions, in Model 4, we also add month fixed effects. Finally, Model 5 uses subregion-month fixed effects.

[Insert Table II here]

The estimated coefficients of the domestic interest rate variable are highly significant in the first two models and have the expected negative sign suggesting that an interest rate

---

[24] Note that R-squares are small despite the inclusion of fixed effects in the regressions because we estimate our models using within transformation proposed by Balazsi, Matyas and Wansbeek (2018).

decrease expands lending.[25] From Model 2 onwards, we include the interaction of the interest rate with the bank capital ratio. Except from Model 2, the coefficient of this interaction term is positive and significant in all specifications suggesting that a decline in the domestic interest rate boosts credit granting more by banks with low capital-to-asset ratios than by banks with high capital-to-assets ratios. This finding is consistent with the existence of a *bank-lending-to-household* channel manifesting itself in the sensitivity, to monetary policy changes, of banks' mortgage loan supply, as suggested first by Bernanke and Gertler (1995) and more recently by Sufi (2015).

In Panel B of the table we calculate the economic effect of monetary policy easing for a one standard deviation change in the domestic interest rate, which is equal to 299 basis points in our sample.[26] Using the parameter estimates of Model 3, we find that a lowly capitalized bank increases its mortgage credit supply by 0.1 percentage point more relative to a highly capitalized bank, in response to a monetary policy easing. Given that the unconditional probability of granting a mortgage loan in our sample is 0.92 percent, the difference in the change in banks' mortgage loan supply equals to 11 percent, which implies an economically significant impact. Our conjecture concerning the existence of a bank-lending-to-household channel is therefore confirmed by the statistical and economic significance of the result.

---

[25] Note that the coefficient estimate of the interest rate change variable is insignificant in Model 3. This may be due to the fact that the specification includes subregion-quarter fixed effects and hence the estimation relies only on within-quarter variation in monetary policy conditions.

[26] To calculate the economic effect from our coefficient estimates, we compare the behaviour of highly and lowly capitalized banks, assuming a two standard-deviation difference in their capital-to-asset ratios.

B. Effect of Monetary Policy on the Currency Composition of Mortgage Loan Supply

In this subsection we analyse the effect of the domestic and foreign monetary policies on the currency composition of mortgage credit supply, hence we differentiate between foreign and domestic currency denomination of the loan.

1. Domestic Monetary Policy

Table III presents our results on the effect of domestic monetary policy changes on the currency composition of mortgage loan supply, while estimations in Table IV also account for the effects of foreign monetary policy changes.

Model 1 in Table III is our baseline specification which includes all relevant interaction terms for the interest rate, GDP growth, and inflation, as well as individual borrower fixed effects. In Model 1 we include only individual borrower fixed effects, while in Models 2 to 6 we also include *locality-time-currency* fixed effects to control for time-varying unobservable characteristics of the individuals' location, most importantly changes in currency-specific credit demand and bank market structure. In particular, in addition to individual fixed effects, Model 2 uses *subregion-quarter-currency* fixed effects, while Model 3 adds time (month) fixed effects to the specification of Model 2. Model 4 further refines our empirical approach by including *subregion-month-currency* fixed effects. Models 5 and 6 represent our most robust specifications that use, in addition, *individual-month* fixed effects to control for the time-variation in individual-specific credit demand. With regard to the inclusion of various fixed effects, we use the same structure in all subsequent tables of the paper.

All models in Table III give similar results: The coefficient estimates on the interaction between the interest rate change and the bank capital ratio are positive and significant while the coefficient estimates on the triple interaction term of the interest rate change, bank capital

ratio and loan currency denomination are negative and significant. The results thus confirm our finding in Table II on the existence of a bank-lending-to-household channel and, in addition, suggest that monetary policy changes also affect the currency composition of banks' supply of mortgage credit. The large negative coefficient on the triple interaction term implies that the differential impact, of a change in the monetary policy rate, on the supply of mortgages by banks with low and high capital-to-assets ratios, is smaller when mortgages are granted in foreign currency. Expansionary monetary policy therefore increases the supply of mortgages by lowly capitalized banks to a larger extent, than by highly capitalized banks, primarily when the mortgage is granted in the domestic currency. Therefore, our results also confirm the existence, for the household sector, of a *currency compositional* channel of monetary policy, as first proposed, for the corporate sector by Ongena, Schindele and Vonnák (2018), and subsequently confirmed using data on cross-border lending flows by Takáts and Temesváry (2018).

Panel B in Table III presents the economic significance of our results on the currency compositional effect. When credit is granted in the domestic currency (Hungarian Forint), a one standard deviation decrease in the Forint interest rate increases the supply of mortgages by lowly capitalized banks by 0.19 percentage point <u>more</u> than by highly capitalized banks. When credit is granted in the foreign currency (Swiss Franc), the same change in the Forint interest rate increases mortgage credit supply by lowly capitalized banks by 0.09 percentage point <u>less </u>than by highly capitalized banks. Although small, these numbers represent economically significant effects: The semi-elasticities being 20 and -10 percent, respectively. The result shows that at times of domestic monetary policy expansion, banks – especially those with lower capital ratios – tend to tilt their supply of household credit toward loans denominated in the domestic currency, changing the currency composition of their credit supply. Foreign currency lending might thus lower the effectiveness of domestic monetary

policy as banks respond to a domestic interest rate change by altering the currency composition of their credit supply.

2. Foreign Monetary Policy

Given that banks in Hungary lend in foreign currencies, monetary policy changes by the central bank issuing the currency may also influence their lending behaviour. We therefore examine whether changes in the Swiss interest rate affect the amount and composition of credit supplied by banks in Hungary. We complement our previous empirical specification by including the Swiss interest rate and its relevant interaction terms with the bank capital ratio and loan currency denomination in the regressions. Table IV presents our results. The coefficient estimates confirm our findings on the impact of domestic monetary changes on the volume and composition of banks' mortgage loan supply. The estimated coefficients of the Swiss interest rate and its interaction terms are all significant and have opposite signs than the coefficient estimates of the domestic interest rate and its respective interaction terms implying that foreign monetary policy changes do affect the volume and composition of credit supplied by banks in Hungary. Specifically, the negative sign of the coefficient of the interaction between the interest rate change and bank capitalization suggests that a decrease in the Swiss interest rate contracts credit supply in Hungary, especially by banks with low capitalization. In addition, the positive sign of the coefficient estimate of the triple interaction term reflects that a decrease in the Swiss interest rate decreases mortgage lending by low capitalization banks, more in the domestic than in the foreign currency, i.e., we conjecture a relative expansion of credit supplied primarily by low capitalization banks in the foreign currency.

Panel B Table IV presents the economic significance of the results. For domestic interest rate changes, we find an economic effect similar to that implied by our earlier findings in

Table III. With respect to foreign interest rate changes, we find that as a response to a one standard deviation (i.e., 41 basis points) decrease in the Swiss interest rate, a lowly capitalized bank decreases its supply of mortgage credit in the domestic currency by 0.26 percentage points more than a highly capitalized bank. This number equals only to 0.16 percentage points if the mortgage is offered in the foreign currency. Taking the unconditional probability of mortgage granting in the sample into account, the numbers imply an 11 percent difference in the differential reactions of lowly and highly capitalized banks across the domestic and foreign currencies.

We therefore conclude that changes in the foreign interest rate also alter the currency composition of banks' domestic credit supply: Expansionary monetary policy in Switzerland generates a relative contraction in mortgage lending in Hungary primarily in the domestic currency.

C. Effect of Monetary Policy on the Risk Composition of Mortgage Loan Supply

In previous sections, we documented that domestic and foreign monetary policies have an impact on the volume and currency composition of the supply of mortgages by banks. In Table V, we further investigate whether monetary policy influences banks' risk-taking in the mortgage lending segment. We therefore complement our previous specifications by interacting the interest rate change, the bank capital ratio, the loan currency denomination, and their triple interaction term with our risk measure. To proxy for borrower risk, we use a dummy variable taking the value of one if the individual defaults within a six-year period after having received the mortgage. With regard to the use of various fixed effects, the table follows the structure of Tables III and IV.

Table V confirms our previous findings on the impact of monetary policy on the volume and currency composition of mortgage loan supply: The coefficient estimates of the respective double and triple interaction terms are significant and have the same estimated signs as in our earlier, simpler specifications. Our variable of interest in the table is the quadruple interaction of the domestic interest rate, bank capital ratio, foreign currency denomination and borrower risk. Coefficient estimates on this quadruple interaction term are significantly positive in all estimations, suggesting that monetary policy changes affect the risk composition of banks' loan supply when banks lend in the foreign currency. The point estimates of the quadruple interaction term are very similar across Models 2 to 6.

To assess the economic relevance of the result, we calculate the impact of a one standard deviation change in the monetary policy rate on the difference in credit supply by lowly versus highly capitalized banks by currency denomination and riskiness, using estimates of Model 4, our main specification including both individual and subregion-month-currency fixed effects.

We find that, when mortgages are granted in the domestic currency, as a response to a one standard deviation decrease in the Hungarian interest rate, lowly capitalized banks increase their mortgage lending to non-risky borrowers by 0.20 percentage point more than highly capitalized banks. When mortgages are granted in the foreign currency, a decrease of the same magnitude in the interest rate generates 0.13 percentage point less lending, to non-risky borrowers, by lowly capitalized banks than by highly capitalized banks. Given that the unconditional probability of granting a mortgage is 0.92 percent, this difference across the two currencies in the differential impact of the interest rate change on the supply of mortgages to non-risky borrowers, by low versus high capital-to-asset ratio banks amounts to -36 percent (see Panel B of Table V). When banks lend to risky borrowers, the difference in

the differential reaction of lowly versus highly capitalized banks as a response to a decrease in the interest rate is only -4 percent, a significantly smaller number.[27]

This implies that currency compositional changes triggered by monetary policy shocks are less prevalent when banks lend to riskier clients and, at the same time, suggests that expansionary domestic monetary policy may generate bank risk-taking by stimulating banks to lend to riskier clients in the "riskier" foreign currency.

In Table VI we also add to our specifications the foreign monetary policy rate and all its interaction terms with the relevant variables. The inclusion of the Swiss interest rate and its interaction terms reinforces our results on the risk-taking channel of domestic monetary policy. When banks lend to risky borrowers, the difference across the two currencies, in the differential reaction of lowly versus highly capitalized banks as a response to a decrease in the domestic interest rate is estimated to be 1 percent, implying a higher likelihood of granting a loan in the foreign than in the domestic currency.[28]

Similar to the results in Table V, the coefficient of the interaction between the interest rate change and bank capitalization has a negative sign suggesting that a decrease in the Swiss interest rate contracts credit supply in Hungary, especially by banks with low capitalization. Moreover, the positive sign of the coefficient estimates of the triple interaction term, in Models 2 to 6, reflects that a decrease in the Swiss interest rate decreases mortgage lending by lowly capitalized banks more in the domestic than in the foreign currency.

The coefficient estimates on the quadruple interaction term of the Swiss monetary policy rate, bank capitalization, foreign currency denomination and borrower risk are negative and

---

[27]When banks lend to risky clients in the domestic currency, a one standard deviation decrease in the interest rate results in 0.20 percentage point larger increase in mortgage lending by lowly capitalized banks than by highly capitalized banks. When banks lend to risky clients in the foreign currency, this differential effect is not significantly smaller: its magnitude is above 0.16 percentage point.

[28]When banks lend to risky clients in the domestic currency, a one standard deviation decrease in the interest rate results in 0.065 percentage point larger increase in mortgage lending by lowly capitalized banks than by highly capitalized banks. When banks lend to risky clients in the foreign currency, the magnitude of this differential effect is 0.07 percentage point.

highly significant, suggesting that when loans are granted to risky households the currency compositional channel of foreign monetary policy does not prevail. Specifically, we find that when banks lend to risky households, the differential reaction of lowly versus highly capitalized banks to a one standard deviation decrease in the Swiss interest rate does not depend on the currency denomination of the loan (see Table 6, Panel B).

6.   Robustness: Samples and Risk of Borrowers

A. Borrower Risk Measures

Our borrower risk measure so far relied on future individual defaults within a six-year period after having received the mortgage. But as we noted before defaults on foreign currency loans may, however, happen for reasons other than the borrower's inherent riskiness.

The September 2008 exchange rate shock to the Hungarian currency for example substantially increased households' monthly payments and their probability of default (Verner and Gyöngyösi (2017)). Therefore, some households might have defaulted on their mortgage as a consequence of the exchange rate shock rather than their ex-ante riskiness.

To account for the impact of the exchange rate shock, we also estimate, in Table 1 in the Appendix, our regressions on a sample that excludes individuals defaulting on their mortgage in the period between October 2008 and October 2009. Our results are robust to this modification of the sample.

We also present, in the Appendix, robustness estimations using a second risk measure: A dummy variable that equals one if the borrower is required to have a guarantor or co-debtor at the time of taking the mortgage, and zero otherwise.[29] We build on the idea that even though

---

[29] In the loan market in Hungary, a mortgage loan guarantor is essentially a co-debtor: He is fully responsible for the repayment of the loan.

making more than one borrower responsible for the mortgage lowers the riskiness of the loan from the bank's point of view (i.e., such loans are reimbursed from the income stream of more than one individual), that on net such loans may still remain riskier than those granted to households that are less risky to start with. Although employing a guarantor somewhat lowers loan delinquency in US data for example (Jiang, Nelson and Vytlacil (2014)), Mayordomo, Moreno, Ongena and Rodríguez-Moreno (2017) also document in their study of 477,209 loan contracts granted to firms between 2006 and 2014 by a Spanish bank that the overuse of personal guarantees can blunt their effectiveness. Overall, Tables 2 and 3 in the Appendix confirm our earlier findings also for this alternative borrower risk measure, i.e., expansionary domestic monetary conditions increase the supply of mortgage credit to all households in the domestic currency but only to risky households in the foreign currency.

B. Sample Selection

All loan contract samples face potential borrower discouragement and loan application approval biases (e.g., Cole (1998), Brown, Ongena, Popov and Yeşin (2011)). Our sample may suffer from one additional selection issue. Foreign currency loans issued during our sample period may be missing from the population of loans we rely on because of the Early Repayment Program that allowed for repayment of currency denominated mortgages at a preferential exchange rate. The debt restructuring program was initiated by the Hungarian government in November 2011 because of households' increasing monthly due payments and the consequent high number of defaults. The program concerned foreign currency loans and entitled all households to repay their mortgage and home equity debt denominated in foreign currency at an exchange rate about 25 percent below the market rate of that time at the expense of banks. As the gains from such an early repayment opportunity were high, many borrowers chose to participate and about 170,000 mortgage-backed housing loans were

repaid at the favorable exchange rate, which accounted for 23 percent of foreign currency denominated debt. Since the debt restructuring program took place before the Household Registry was established, we are not able to observe the loans that had been originated during our sample period and repaid in 2011. In addition, such missing loans are likely to be non-random. Wealthier households were more likely to opt for early repayment and, at the same time, they might have been more likely to have borrowed from specific banks. Loans that were originated early might have also been more likely to be repaid as these loans may have been associated with lower nominal amounts.

To assess how the resulting sample selection bias might affect our analysis, we exploit a second dataset. The data covers all mortgage loans from three of the largest commercial banks in Hungary. These banks had a combined market share of more than 20% before the crisis. Moreover, they lent mostly in foreign currencies, hence this kind of sample selection is likely to be more serious for these banks. The dataset has panel structure and follows loans from origination until termination. This allows us to identify the loans that participated in the Repayment Program. We consider a loan participating in the program if it was terminated during the program, between October 2011 and February 2012. We add the participating loans issued by the three banks to our primary dataset and re-estimate our main specifications.

Correcting for the missing loans does not alter our main results. Table 4 in the Appendix presents coefficient estimates based on the specifications established in Table III. The estimated coefficients are very similar to our earlier estimates. We recalculate the economic effect of a unit change in the monetary policy rate using these coefficients and find an effect of similar size as in our main specifications. We conclude that our results are robust to the inclusion of loans repaid before the establishment of the credit registry in April 2012.

7.   Conclusion

How do monetary conditions affect the supply of mortgage credit by banks to households? To answer this question we use a comprehensive supervisory dataset from Hungary.

We establish three major findings. First, we document the existence and potency of a "bank-lending-to-households" channel by showing that monetary conditions affect the supply of mortgage credit in volume. Second, we show that expansionary domestic monetary conditions increase the supply of mortgage credit to all households in the domestic currency but only to risky households in the foreign currency. This is a salient finding because as most households are unhedged, bank lending in multiple currencies may involve additional risk taking for banks, both in terms of currency risk and in terms of credit risk. Finally, we show that changes in foreign monetary conditions affect lending in the foreign currency more than in the domestic currency, but that such changes do not trigger corresponding compositional shifts in the credit risk exposures of the banks, though as before the currency risk incurred if left unhedged by households may still turn in credit risk for banks if the domestic currency depreciates.

In sum, domestic and foreign monetary policies alter the supply of mortgages to households in volume and in composition confirming for the first time in the literature that both bank lending and risk-taking channels are operational in residential mortgage markets as well.

References

Aladangady, A., 2015, Homeowner Balance Sheets and Monetary Policy, Federal Reserve Board, Washington DC, Mimeo.

Albertazzi, U., F. Fringuellotti, and S. Ongena, 2018, Fixed Rate versus Adjustable Rate Mortgages: Evidence from Euro Area Banks, Bank of Italy, Rome, Mimeo.

Angeloni, I., A. K. Kashyap, and B. Mojon, 2003, *Monetary Policy Transmission in the Euro Area*, Cambridge University Press, Cambridge.

Balazsi, L., L. Matyas, and T. Wansbeek, 2018, "The Estimation of Multidimensional Fixed Effects Panel Data Models," *Econometric Reviews* 37, 212-227.

Banai, Á., J. Király, and M. Nagy, 2012, „Home High above and Home Deep down Below?" Lending in Hungary, University Library of Munich, Munich, MPRA Paper 40333.

Barajas, A., and A. Méndez Morales, 2003, Dollarization of Liabilities: Beyond the Usual Suspects, International Monetary Fund, Washington DC, Working Paper 11.

Basso, H. S., O. Calvo-Gonzalez, and M. Jurgilas, 2011, "Financial Dollarization: The Role of Foreign-Owned Banks and Interest Rates," *Journal of Banking and Finance* 35, 794-806.

Becker, B., and V. Ivashina, 2014, "Cyclicality of Credit Supply: Firm Level Evidence," *Journal of Monetary Economics* 62, 76-93.

Beņkovskis, K., 2008, Is there a Bank Lending Channel of Monetary Policy in Latvia? Evidence from Bank Level Data, Latvijas Banka, Riga, Working Paper 1.

Berg, G., and K. Kirschenmann, 2015, "Funding vs. Real Economy Shock: The Impact of the 2007-2009 Crisis on Small Firms' Credit Availability," *Review of Finance* 19, 951-990.

Bernanke, B. S., and A. S. Blinder, 1992, "The Federal Funds Rate and the Channels of Monetary Transmission," *American Economic Review* 82, 901-921.

Bernanke, B. S., and M. Gertler, 1995, "Inside the Black Box: The Credit Channel of Monetary Policy Transmission," *Journal of Economic Perspectives* 9, 27-48.

Bernanke, B. S., M. Gertler, and S. Gilchrist, 1996, "The Financial Accelerator and the Flight to Quality," *Review of Economics and Statistics* 78, 1-15.

—, 1999, "The Financial Accelerator in a Quantitative Business Cycle Framework," in J. Taylor and M. Woodford, eds, *Handbook of Macroeconomics*, Elsevier, Amsterdam.

Black, L. K., D. Hancock, and W. Passmore, 2010, The Bank Lending Channel of Monetary Policy and Its Effect on Mortgage Lending, Board of Governors of the Federal Reserve System, Washington DC, Mimeo.

Brown, M., R. De Haas, and V. Sokolov, 2017, "Regional Inflation, Financial Integration and Dollarization," *Review of Finance* Forthcoming.

Brown, M., S. Ongena, A. Popov, and P. Yeşin, 2011, "Who Needs Credit and Who Gets Credit in Eastern Europe?," *Economic Policy* 65, 93-130.

Brzoza-Brzezina, M., T. Chmielewski, and J. Niedźwiedzińska, 2010, Substitution between Domestic and Foreign Currency Loans in Central Europe: Do Central Banks Matter?, European Central Bank, Frankfurt, Working Paper 1187.

Cerutti, E., S. Claessens, and L. Ratnovski, 2017, "Global Liquidity and Cross-Border Banking Flows," *Economic Policy* 32, 81-125.

Cetorelli, N., and L. S. Goldberg, 2012, "Banking Globalization and Monetary Transmission," *Journal of Finance* 67, 1811-1843.

Cole, R. A., 1998, "The Importance of Relationships to the Availability of Credit," *Journal of Banking and Finance* 22, 959-977.

De Nicolo, G., P. Honohan, and A. Ize, 2005, "Dollarization of Bank Deposits: Causes and Consequences," *Journal of Banking and Finance* 29, 1697-1727.

Dell'Ariccia, G., L. Laeven, and G. A. Suarez, 2017, "Bank Leverage and Monetary Policy's Risk-Taking Channel: Evidence from the United States," *Journal of Finance* 72, 613-654.

Dell'Ariccia, G., L. Laeven, and R. Marquez, 2016, Financial Frictions, Foreign Currency Borrowing, and Systemic Risk, International Monetary Fund, Washington DC, Mimeo.

Dell'Ariccia, G., L. Laeven, and R. Marquez, 2014, "Real Interest Rates, Leverage, and Bank Risk-Taking," *Journal of Economic Theory* 149, 65-99.

Di Maggio, M., A. Kermani, B. J. Keys, T. Piskorski, R. Ramcharan, A. Seru, and V. Yao, 2017, "Interest Rate Pass-Through: Mortgage Rates, Household Consumption, and Voluntary Deleveraging," *American Economic Review* 107, 3550-3588.

Epure, M., I. Mihai, C. Minoiu, and J.-L. Peydró, 2017, Household Credit, Global Financial Cycle, and Macroprudential Policies: Credit Register Evidence from an Emerging Country, Barcelona Graduate School of Economics, Barcelona, Working Paper 1006.

Feige, E. L., 2003, "The Dynamics of Currency Substitution, Asset Substitution and De Facto Dollarization and Euroization in Transition Countries," *Comparative Economic Studies* 45, 358-383.

Garriga, C., F. E. Kydland, and R. Sustek, 2016, Mortgages and Monetary Policy, Federal Reserve Bank of St. Louis, St. Louis, Working Paper 037B.

Gertler, M., and N. Kiyotaki, 2011, "Financial Intermediation and Credit Policy in Business Cycle Analysis," in B. M. Friedman and M. Woodford, eds, *Handbook of Monetary Economics 3A*, Elsevier, New York NY.

Holmstrom, B., and J. Tirole, 1997, "Financial Intermediation, Loanable Funds, and the Real Sector," *Quarterly Journal of Economics* 112, 663-691.

—, 1998, "Private and Public Supply of Liquidity," *Journal of Political Economy* 106, 1-40.

Ioannidou, V. P., S. Ongena, and J.-L. Peydró, 2015, "Monetary Policy, Risk-Taking and Pricing: Evidence from a Quasi-Natural Experiment," *Review of Finance* 19, 95-144.

Jiang, W., A. A. Nelson, and E. Vytlacil, 2014, "Liar's Loan? Effects of Origination Channel and Information Falsification on Mortgage Delinquency," *Review of Economics and Statistics* 96, 1-18.

Jiménez, G., S. Ongena, J.-L. Peydró, and J. Saurina, 2012, "Credit Supply and Monetary Policy: Identifying the Bank Balance-Sheet Channel with Loan Applications," *American Economic Review* 102, 2301-2326.

—, 2014, "Hazardous Times for Monetary Policy: What Do Twenty-Three Million Bank Loans Say about the Effects of Monetary Policy on Credit Risk-Taking?," *Econometrica* 82 463-505.

Kashyap, A. K., and J. C. Stein, 2000, "What Do A Million Observations on Banks Say About the Transmission of Monetary Policy?," *American Economic Review* 90, 407-428.

Kujundžić, S., and D. Otašević, 2013, "The Bank Lending Channel in an Euroised Economy: The Case of Serbia," *International Journal of Economic Policy in Emerging Economies* 6, 1-28.

Matousek, R., and N. Sarantis, 2009, "The Bank Lending Channel and Monetary Transmission in Central and Eastern European Countries," *Journal of Comparative Economics* 37, 321-334.

Mayordomo, S., A. Moreno, S. Ongena, and M. Rodríguez-Moreno, 2017, "Keeping It Personal" or "Getting Real"? On the Drivers and Effectiveness of Personal versus Real Loan Guarantees Bank of Spain, Madrid, Mimeo.

Mian, A., and A. Sufi, 2009, "The Consequences of Mortgage Credit Expansion: Evidence from the U.S. Mortgage Default Crisis," *Quarterly Journal of Economics* 124, 1449-1496.

Mian, A. R., and A. Sufi, 2014, *House of Debt: How They (and You) Caused the Great Recession, and How We Can Prevent It from Happening Again*, University of Chicago Press, Chicago.

Miller, M. J., 2003, *Credit Reporting Systems and the International Economy*, MIT Press, Cambridge MA.

Morais, B., J.-L. Peydró, and C. Ruiz, 2017, "The International Bank Lending Channel of Monetary Policy Rates and QE: Credit Supply, Reach-for-Yield, and Real Effects," *Journal of Finance* Forthcoming.

Nagy, P. M., S. Jeffrey, and J. Zettelmeyer, 2011, "Addressing Private Sector Currency Mismatches in Emerging Europe," in E. Prasad and M. Kawai, eds, *Financial Market Regulation and Reforms in Emerging Markets*, Brookings Institution Press, Washington DC.

Neanidis, K. C., and C. S. Savva, 2015, Is Loan Dollarization Contagious across Countries? Evidence from Transition Economies, University of Manchester, Manchester, Mimeo.

Ongena, S., A. A. Popov, and G. F. Udell, 2013, ""When the Cat's Away the Mice Will Play": Does Regulation at Home Affect Bank Risk-taking Abroad?," *Journal of Financial Economics* 108, 727-750.

Ongena, S., I. Schindele, and D. Vonnák, 2018, In Lands of Foreign Currency Credit, Bank Lending Channels Run Through?, University of Zurich, Zurich, Mimeo.

Paravisini, D., V. Rappoport, P. Schnabl, and D. Wolfenzon, 2015, "Dissecting the Effect of Credit Supply on Trade: Evidence from Matched Credit-Export Data," *Review of Economic Studies* 82, 333-359.

Puri, M., J. Rocholl, and S. Steffen, 2011, "Global Retail Lending in the Aftermath of the US Financial Crisis: Distinguishing between Supply and Demand Effects," *Journal of Financial Economics* 100, 556-578.

Rajan, R. G., and I. Tokatlidis, 2005, "Dollar Shortages and Crises," *International Journal of Central Banking* 2, 177-219.

Rosenberg, C. B., and M. Tirpák, 2009, "Determinants of Foreign Currency Borrowing in the New Member States of the EU," *Czech Journal of Economics and Finance* 59, 216-228.

Sufi, A., 2015, Out of Many, One? Household Debt, Redistribution, and Monetary Policy during the Economic Slump, Andrew Crockett Memorial Lecture

Takáts, E., and J. Temesváry, 2018, The Currency Dimension of the Bank Lending Channel in International Monetary Transmission, Bank for International Settlements, Basel, Working Paper 600.

Taylor, J. B., 1993, "Discretion versus Policy Rules in Practice," *Carnegie-Rochester Conference Series on Public Policy* 39, 195-214.

Temesvary, J., 2017, The Transmission of Foreign Monetary Policy Shocks into the United States through Foreign Banks, Cornell University, Ithaca NY, Mimeo.

Temesvary, J., S. Ongena, and A. L. Owen, 2018, "A Global Lending Channel Unplugged? Does U.S. Monetary Policy Affect Cross-border and Affiliate Lending by Global U.S. Banks?," *Journal of International Economics* 112, 50-69.

Verner, E., and G. Gyöngyösi, 2017, Household Debt Revaluation and the Real Economy: Evidence from a Foreign Currency Debt Crisis, Princeton University, Mimeo.

TABLE I
SUMMARY STATISTICS

Variable Name	Units	Definition	Mean	Std	Min	25th Pc	Median	75th Pc	Max
Dependent variables									
Granting of Credit$_{ikt}$	0/1	=1 if borrower i receives credit in currency k in month t, conditional on having received no credit in currency k in month t-1, =0 otherwise	0.0092	0.0954	0	0	0	0	1
Independent Variables		.							
Macroeconomic Variables									
Δ Interest Rate$_{t-1m}$	-	Annual change in the Hungarian 3-month government bond rate in month t-1	-0.0003	0.0299	-0.0508	-0.0260	0.0030	0.0173	0.0698
Δ Interest Rate in Switzerland$_{t-1m}$	-	Annual change in the Swiss 3-month LIBOR interest rate in month t-1	0.0052	0.0041	-0.0042	0.0026	0.0049	0.0090	0.0119
Δ GDP$_{t-1q}$	-	Annual growth rate in Hungarian gross domestic product in quarter t-1	0.0333	0.0170	0	0.0210	0.0390	0.0470	0.0510
Δ CPI$_{t-1m}$	-	Annual change in the Hungarian consumer price index in month t-1	0.0572	0.0203	0.0230	0.0360	0.0645	0.0710	0.0900
Δ Exchange Rate$_{t-1m}$	-	Annual change in the HUF/CHF exchange rate in month t-1	-0.0006	0.0541	-0.1200	-0.0455	-0.0010	0.0325	0.1170
Foreign Direct Investment$_{t-1q}$	-	Annual change in the stock of Hungarian foreign direct investment in quarter t-1	-0.3558	5.6342	-12.5010	-1.8632	-0.0537	1.3669	12.2672
Δ Credit Default Swap Spread$_{t-1m}$	-	Annual change in the nominal effective exchange rate index of the Forint in month t-1	0.1017	0.3741	-0.2386	-0.1403	-0.0399	0.1871	1.4808
Δ Yield Curve$_{t-1m}$	-	Annual change in the difference between 10-year and 1-year government bond yields in month t-1	0.0010	0.0164	-0.0399	-0.0107	-0.0005	0.0158	0.0311
Bank Characteristics									
Bank Capital Ratio$_{t-1m}$	-	Ratio of bank equity to total bank assets in month t-1	0.0839	0.0458	0.0367	0.0592	0.0708	0.0934	0.4442
Bank Total Assets$_{t-1m}$	000 000 Forint	Total bank assets in month t-1	112,128	449,944	1,053	4,417	6,854	12,727	3,924,000
Log(Bank Total Assets)$_{t-1m}$	-	Natural logarithm of total bank assets in month t-1	9.21	1.55	6.95	8.38	8.82	9.44	15.15
Bank Liquidity Ratio$_{t-1m}$	-	Ratio of liquid assets to total bank assets in month t-1	0.3450	0.1355	0.0154	0.2776	0.3596	0.4211	0.7871
Bank Return On Assets$_{t-1m}$	-	Ratio of pretax profits to total bank assets in month t-1	0.0045	0.0037	-0.0214	0.0032	0.0045	0.0063	0.0162
Bank Doubtful Loan Ratio$_{t-1m}$		Bank doubtful loan ratio in month t-1	0.5657	0.0789	0.0386	0.5356	0.5773	0.6139	0.7448
Subregion Characteristics									
Log(Income in Subregion)	-	Logarithm of annual tax base per number of taxpayers in subregion (average over sample period)	7.11	0.16	6.77	6.99	7.07	7.22	7.63
Unemployment in Subregion	-	Proportion of unemployed in active population in subregion where borrower lives (average over sample period)	0.0534	0.0288	0.0091	0.0312	0.0482	0.0725	0.1428
Log(Population in Subregion)	-	Logarithm of population in subregion where borrower lives (average over sample period)	10.55	0.75	8.87	10.03	10.53	10.99	14.35
Borrower Risk Measures									
Risky Borrower	0/1	=1 if borrower gets into 3-month delinquency within 6 years after taking the loan, =0 otherwise	0.1407	0.3477	0	0	0	0	1
Borrower Has Guarantor	0/1	=1 if borrower is asked to name guarantor when taking loan, =0 otherwise	0.5416	0.4983	0	0	1	1	1

NOTE. -- The number of observations equals 21,893,298. Regressions in Tables I-VI are run employing a 20 percent random sample. The loan origination period is January 2004 to August 2008. Summary statistics for banks and households are based on the average values of their characteristics over the origination period. The time index on each variable indicates the timing of the variable in the main regressions with t-1 indicating a one-period lag of a month (m), quarter (q) or year (y), respectively.

TABLE II
BANK LENDING CHANNEL

Model	(1)	(2)	(3)	(4)	(5)
Δ Interest Rate	-0.1611***	-0.1287***	-0.0491		
	(-9.14)	(-5.86)	(-1.26)		
Δ Interest Rate * Bank Capital Ratio		0.1017	0.3670***	0.2768**	0.2648**
		(0.83)	(2.94)	(2.20)	(2.10)
Δ GDP	-0.1729***	-0.2692***			
	(-16.20)	(-11.67)			
Δ GDP * Bank Capital Ratio		1.3582***	1.2144***	1.5717***	1.4296***
		(6.17)	(5.72)	(6.98)	(6.51)
Δ CPI	-0.0337***	-0.0035	-0.0539*		
	(-2.69)	(-0.16)	(-1.90)		
Δ CPI * Bank Capital Ratio		-0.2924	-0.2306	0.0640	0.1049
		(-1.43)	(-1.13)	(0.30)	(0.50)
Bank Capital Ratio		-0.0877***	-0.1134***	-0.1465***	-0.1424***
		(-4.53)	(-6.00)	(-7.39)	(-7.19)
Bank Total Assets		0.0161***	0.0111***	0.0106***	0.0111***
		(23.63)	(14.51)	(13.57)	(14.42)
Bank Liquidity Ratio		-0.0025	0.0046	0.0018	0.0025
		(-0.67)	(1.19)	(0.45)	(0.63)
Bank Return On Assets		-0.0343***	-0.0205**	0.0141	0.0168
		(-4.06)	(-2.36)	(1.12)	(1.30)
Bank Doubtful Loan Ratio		-0.0658***	-0.0738***	-0.0750***	-0.0739***
		(-24.13)	(-26.52)	(-26.71)	(-26.54)
Income in Subregion	0.0035*	-0.0082***			
	(1.76)	(-3.33)			
Population in Subregion	-0.0003	0.0012			
	(-0.27)	(1.00)			
Unemployment in Subregion	-0.0295	0.0016			
	(-1.13)	(0.06)			
Δ Credit Default Swap Spread	0.0038***	0.0028***	-0.0003		
	(7.12)	(5.14)	(-0.24)		
Δ Exchange Rate	0.0259***	0.0256***	0.0067		
	(8.00)	(7.75)	(0.78)		
Δ Yield Curve	-0.3803***	-0.3288***	0.0407		
	(-12.26)	(-10.42)	(0.81)		
Foreign Direct Investment	0.0001***	0.0001***			
	(3.21)	(5.19)			
Constant	0.0000***	0.0000***	-0.0000	-0.0000	-0.0000
	(15.62)	(9.06)	(-0.00)	(-0.01)	(-0.00)
Individual Borrower Fixed Effects	Yes	Yes	Yes	Yes	Yes
Subregion-Year:Quarter Fixed Effects	No	No	Yes	Yes	--
Subregion-Year:Month Fixed Effects	No	No	No	No	Yes
Year:Month Fixed Effects	No	No	No	Yes	--
N	2,189,215	2,189,215	2,189,215	2,189,215	2,189,215
R2	0.0008	0.0015	0.0007	0.0009	0.0007

Percentage Point Difference in Impact of a One Standard Deviation (299 bps) Decrease in Interest Rate on the Likelihood of Granting a Mortgage by Lower versus Higher Capitalized Banks (Δ =2 Standard Deviations)

	-	0.0279	0.1006	0.0759	0.0726

Difference in Impact of a One Standard Deviation (299 bps) Decrease in Interest Rate on the Likelihood of Granting a Mortgage by Lower versus Higher Capitalized Banks (Δ =2 Standard Deviations) as Percent of Unconditional Probability of Granting a Mortgage in Sample (= 0.92%)

	-	3%	11%	8%	8%

NOTE. -- The table reports estimates from ordinary least squares regressions. The dependent variable in all models is Credit Granted which equals one if an individual receives a loan in given month in the domestic or foreign currency (HUF or CHF) and equals zero otherwise. All independent variables are either lagged one month or calculated over the preceding month. Timing, definition and summary statisticcs for each variable is given in Table I. The number of observations equals 4,378,430 and it is a 20 percent random sample of mortgages in the credit register data set. Coefficients are listed in the first row, t-statistics based on robust standard errors clustered at the individual level are reported in the row below in parentheses, and the corresponding significance levels are in the adjacent column. "Yes" indicates that the set of fixed effects is included. "No" indicates that the set of fixed effects is not included. "--" indicates that the set of fixed effects is comprised in the wider included set of fixed effects. *** Significant at 1%, ** significant at 5%, * significant at 10%.

Model	(1)	(2)	(3)	(4)	(5)	(6)
Δ Interest Rate	-0.0338***	-0.1360***				
	(-2.74)	(-5.66)				
Δ Interest Rate * Bank Capital Ratio	0.1921**	0.7208***	0.6746***	0.6754***		
	(2.12)	(7.38)	(6.89)	(6.87)		
Δ Interest Rate * Credit Is Granted in Foreign Currency	-0.0669***	0.2276***	0.2276***			
	(-6.24)	(9.62)	(9.62)			
Δ Interest Rate * Bank Capital Ratio * Credit Is Granted in Foreign Currency	-0.2318**	-1.0125***	-1.0125***	-1.0267***	-1.0267***	-1.0399***
	(-2.01)	(-7.79)	(-7.79)	(-7.84)	(-5.56)	(-5.14)
Δ GDP	0.1408***					
	(11.06)					
Δ GDP * Bank Capital Ratio	-0.1872	-0.1296	0.0503	-0.0341		
	(-1.42)	(-0.98)	(0.37)	(-0.25)		
Δ GDP * Credit Granted in Foreign Currency	-0.5446***					
	(-29.31)					
Δ GDP * Bank Capital Ratio * Credit Is Granted in Foreign Currency	1.6645***	1.4103***	1.4103***	1.4327***	1.4327***	1.5748***
	(8.66)	(7.14)	(7.14)	(7.24)	(5.13)	(5.20)
Δ CPI	0.0158	0.0435**				
	(1.20)	(2.34)				
Δ CPI * Bank Capital Ratio	-0.4769***	-0.6880***	-0.5384***	-0.5368***		
	(-3.69)	(-5.12)	(-3.97)	(-3.94)		
Δ CPI * Credit Is Granted in Foreign Currency	-0.0215	-0.1292***	-0.1292***			
	(-1.14)	(-4.43)	(-4.43)			
Δ CPI * Bank Capital Ratio * Credit Is Granted in Foreign Currency	0.4810**	0.9662***	0.9662***	1.0056***	1.0056***	1.0676***
	(2.53)	(4.83)	(4.83)	(4.99)	(3.54)	(3.46)
Credit Granted in Foreign Currency	0.0269***					
	(16.75)					
Bank Capital Ratio * Credit Is Granted in Foreign Currency	-0.1257***	-0.1593***	-0.1593***	-0.1628***	-0.1628***	-0.1750***
	(-7.61)	(-9.28)	(-9.28)	(-9.42)	(-6.67)	(-6.61)
Δ Credit Default Swap Spread	0.0014***	-0.0002				
	(4.90)	(-0.33)				
Δ Exchange Rate	0.0130***	0.0031				
	(7.65)	(0.70)				
Δ Yield Curve	-0.1659***	0.0246				
	(-10.29)	(0.96)				
Foreign Direct Investment	0.0001***					
	(5.02)					
Bank Capital Ratio	0.0249**	0.0280**	0.0113	0.0152		
	(2.08)	(2.30)	(0.91)	(1.22)		
Bank Total Assets	0.0084***	0.0057***	0.0055***	0.0057***		
	(24.19)	(14.64)	(13.73)	(14.58)		
Bank Liquidity Ratio	-0.0025	0.0012	-0.0002	0.0001		
	(-1.30)	(0.62)	(-0.12)	(0.05)		
Bank Return On Assets	-0.0169***	-0.0100**	0.0082	0.0097		
	(-3.89)	(-2.24)	(1.26)	(1.47)		
Bank Doubtful Loan Ratio	-0.0329***	-0.0372***	-0.0378***	-0.0372***		
	(-23.17)	(-25.62)	(-25.80)	(-25.62)		
Income in Subregion	-0.0041***					
	(-3.28)					
Population in Subregion	0.0006					
	(0.92)					
Unemployment in Subregion	-0.0015					
	(-0.11)					
Constant	0.0000***	-0.0000	-0.0000	-0.0000	0.0000***	0.0000***
	(7.67)	(-0.00)	(-0.01)	(-0.00)	(6.40)	(2.84)
Individual Borrower Fixed Effects	Yes	Yes	Yes	Yes	--	--
Subregion-Year:Quarter-Currency Fixed Effects	No	Yes	Yes	No	--	--
Subregion-Year:Month-Currency Fixed Effects	No	No	No	Yes	Yes	--
Settlement-Year:Month-Currency Fixed Effects	No	No	No	No	No	Yes
Year:Month Fixed Effects	No	No	Yes	No	--	--
Individual Borrower-Year:Month Fixed Effects	No	No	No	No	Yes	Yes
N	4,378,430	4,378,430	4,378,430	4,378,430	4,378,430	4,378,430
R2	0.0026	0.0005	0.0006	0.0005	0.0003	0.0003

Percentage Point Difference in Impact of a One Standard Deviation (299 bps) Decrease in Interest Rate on the Likelihood of Granting a Mortgage by Lower versus Higher Capitalized Banks (Δ Standard Deviations)

	(1)	(2)	(3)	(4)	(5)	(6)
in Hungarian Forint	-	0.1976	0.1849	0.1851	-	-
in Foreign Currency	-	-0.0800	-0.0926	-0.0963	-	-
Difference in Impact Between Foreign Currency and Hungarian Forint	-	-0.2775	-0.2775	-0.2814	-0.2814	-0.2850

Difference in Impact of a One Standard Deviation (299 bps) Decrease in Interest Rate on the Likelihood of Granting a Mortgage by Lower versus Higher Capitalized Banks (Δ=2 Standard Deviations) as Percent of Unconditional Probability of Granting a Mortgage in Sample (= 0.92%)

	(1)	(2)	(3)	(4)	(5)	(6)
in Hungarian Forint	-	21%	20%	20%	-	-
in Foreign Currency	-	-9%	-10%	-10%	-	-
Difference in Impact Between Foreign Currency and Hungarian Forint	-	-30%	-30%	-31%	-31%	-31%

NOTE. -- The table reports estimates from ordinary least squares regressions. The dependent variable in all models is Credit Granted which equals one if an individual receives a loan in given month in the domestic or foreign currency (HUF or CHF) and equals zero otherwise. All independent variables are either lagged one month or calculated over the preceding month. Timing, definition and summary statisticcs for each variable is given in Table I. The number of observations equals 4,378,430 and it is a 20 percent random sample of mortgages in the credit register data set. Coefficients are listed in the first row, t-statistics based on robust standard errors clustered at the firm level are reported in the row below in parentheses, and the corresponding significance levels are in the adjacent column. "Yes" indicates that the set of fixed effects is included. "No" indicates that the set of fixed effects is not included. "--" indicates that the set of fixed effects is comprised in the wider included set of fixed effects. *** Significant at 1%, ** significant at 5%, * significant at 10%.

	(1)	(2)	(3)	(4)	(5)	(6)
Δ Interest Rate	-0.0409***	-0.1174***				
	(-3.12)	(-4.76)				
Δ Interest Rate * Bank Capital Ratio	0.0368	0.2200**	0.1743	0.1741		
	(0.36)	(2.07)	(1.63)	(1.62)		
Δ Interest Rate * Credit Is Granted in Foreign Currency	0.0126	0.2090***	0.2090***			
	(1.00)	(8.67)	(8.67)			
Δ Interest Rate * Bank Capital Ratio * Credit Is Granted in Foreign Currency	-0.5974***	-0.8107***	-0.8107***	-0.8151***	-0.8151***	-0.8082***
	(-4.47)	(-5.79)	(-5.79)	(-5.77)	(-4.09)	(-3.74)
Δ Interest Rate in Switzerland	0.1399***	0.8075***				
	(2.96)	(8.47)				
Δ Interest Rate in Switzerland * Bank Capital Ratio	-4.9706***	-6.8997***	-6.9488***	-6.9169***		
	(-11.33)	(-14.28)	(-14.41)	(-14.38)		
Δ Interest Rate in Switzerland * Credit Is Granted in Swiss Franc	1.1873***	0.3881**	0.3881**			
	(18.74)	(2.24)	(2.24)			
Δ Interest Rate in Switzerland * Bank Capital Ratio * Credit Is Granted in Swiss Franc	-0.0469	2.6765***	2.6765***	2.7846***	2.7846***	3.0420***
	(-0.08)	(3.98)	(3.98)	(4.12)	(2.92)	(2.92)
Δ GDP	0.0721***					
	(5.64)					
Δ GDP * Bank Capital Ratio	-0.2722**	-0.3476***	-0.2127	-0.3066**		
	(-2.09)	(-2.64)	(-1.57)	(-2.28)		
Δ GDP * Credit Granted in Foreign Currency	-0.4121***					
	(-21.67)					
Δ GDP * Bank Capital Ratio * Credit Is Granted in Foreign Currency	1.5107***	1.5027***	1.5027***	1.5305***	1.5305***	1.6805***
	(7.85)	(7.60)	(7.60)	(7.73)	(5.48)	(5.54)
Δ CPI	-0.0216	-0.0397**				
	(-1.47)	(-2.02)				
Δ CPI * Bank Capital Ratio	0.1747	0.1880	0.3201**	0.3264**		
	(1.16)	(1.23)	(2.07)	(2.09)		
Δ CPI * Credit Is Granted in Foreign Currency	-0.0858***	-0.1050***	-0.1050***			
	(-3.91)	(-3.38)	(-3.38)			
Δ CPI * Bank Capital Ratio * Credit Is Granted in Foreign Currency	0.4688**	0.5576**	0.5576**	0.5776**	0.5776*	0.5987*
	(2.07)	(2.43)	(2.43)	(2.49)	(1.77)	(1.70)
Credit Granted in Foreign Currency	0.0204***					
	(12.53)					
Bank Capital Ratio * Credit Is Granted in Foreign Currency	-0.1239***	-0.1555***	-0.1555***	-0.1586***	-0.1586***	-0.1703***
	(-7.40)	(-9.01)	(-9.01)	(-9.13)	(-6.47)	(-6.41)
Δ Credit Default Swap Spread	0.0035***	-0.0002				
	(10.42)	(-0.33)				
Δ Exchange Rate	0.0093***	0.0085*				
	(5.42)	(1.87)				
Δ Yield Curve	-0.1838***	-0.0136				
	(-11.37)	(-0.51)				
Foreign Direct Investment	0.0001***					
	(10.09)					
Bank Capital Ratio	0.0206*	0.0334***	0.0206	0.0243*		
	(1.70)	(2.68)	(1.62)	(1.91)		
Bank Total Assets	0.0058***	0.0049***	0.0048***	0.0051***		
	(15.41)	(12.44)	(11.88)	(12.85)		
Bank Liquidity Ratio	-0.0024	-0.0010	-0.0025	-0.0021		
	(-1.23)	(-0.53)	(-1.24)	(-1.05)		
Bank Return On Assets	-0.0184***	-0.0104**	0.0101	0.0116*		
	(-4.24)	(-2.32)	(1.55)	(1.75)		
Bank Doubtful Loan Ratio	-0.0396***	-0.0418***	-0.0421***	-0.0413***		
	(-27.24)	(-28.47)	(-28.44)	(-28.21)		
Income in Micro Region	-0.0085***					
	(-6.12)					
Population in Micro Region	0.0010					
	(1.62)					
Unemployment in Micro Region	-0.0061					
	(-0.47)					
Constant	0.0000***	-0.0000	-0.0000	-0.0000	0.0000***	0.0000***
	(6.34)	(-0.00)	(-0.01)	(-0.00)	(6.35)	(2.85)
Individual Borrower Fixed Effects	Yes	Yes	Yes	Yes	--	--
Subregion-Year:Quarter-Currency Fixed Effects	No	Yes	Yes	No	--	--
Subregion-Year:Month-Currency Fixed Effects	No	No	No	Yes	Yes	--
Settlement-Year:Month-Currency Fixed Effects	No	No	No	No	No	Yes
Year:Month Fixed Effects	No	No	Yes	No	--	--
Individual Borrower-Year:Month Fixed Effects	No	No	No	No	Yes	Yes
N	4,378,430	4,378,430	4,378,430	4,378,430	4,378,430	4,378,430
R2	0.0031	0.0005	0.0006	0.0005	0.0003	0.0003

Percentage Point Difference in Impact of a One Standard Deviation (299 bps) Decrease in Domestic Interest Rate on the Likelihood of Granting a Mortgage by Lower versus Higher Capitalized Banks (Δ=2 Standard Deviations)

	(1)	(2)	(3)	(4)	(5)	(6)
in Hungarian Forint	-	0.0603	0.0478	0.0477	--	--
in Foreign Currency	-	-0.1623	-0.1744	-0.1757	--	--
Difference in Impact Between Foreign Currency and Hungarian Forint	-	-0.2226	-0.2222	-0.2234	-0.2234	-0.2215

Difference in Impact of a One Standard Deviation (299 bps) Decrease in Domestic Interest Rate on the Likelihood of Granting a Mortgage by Lower versus Higher Capitalized Banks (Δ=2 Standard Deviations) as Percent of Unconditional Probability of Granting a Mortgage in Sample (= 0.92%)

	(1)	(2)	(3)	(4)	(5)	(6)
in Hungarian Forint	-	7%	5%	5%	--	--
in Foreign Currency	-	-18%	-19%	-19%	--	--
Difference in Impact Between Foreign Currency and Hungarian Forint	-	-24%	-24%	-24%	-36%	-36%

Percentage Point Difference in Impact of a One Standard Deviation (41 bps) Decrease in Swiss Franc Interest Rate on the Likelihood of Granting a Mortgage by Lower versus Higher Capitalized Banks (Δ=2 Standard Deviations)

	(1)	(2)	(3)	(4)	(5)	(6)
in Hungarian Forint	-	-0.2593	-0.2612	-0.2600	--	--
in Foreign Currency	-	-0.1587	-0.1606	-0.1553	--	--
Difference in Impact Between Foreign Currency and Hungarian Forint	-	0.1006	0.1006	0.1047	0.1047	0.1143

Difference in Impact of a One Standard Deviation (41 bps) Decrease in Swiss Franc Interest Rate on the Likelihood of Granting a Mortgage by Lower versus Higher Capitalized Banks (Δ=2 Standard Deviations) as Percent of Unconditional Probability of Granting a Mortgage in Sample (= 0.92%)

	(1)	(2)	(3)	(4)	(5)	(6)
in Hungarian Forint	-	-28%	-28%	-28%	--	--
in Foreign Currency	-	-17%	-17%	-17%	--	--
Difference in Impact Between Foreign Currency and Hungarian Forint	-	11%	11%	11%	11%	12%

NOTE. -- The table reports estimates from ordinary least squares regressions. The dependent variable in all models is Credit Granted which equals one if an individual receives a loan in given month in the domestic or foreign currency (HUF or CHF) and equals zero otherwise. Risky Borrower equals one if there are two borrowers, i.e., if there is guarantor for the loan, and equals zero otherwise. All independent variables are either lagged one month or calculated over the preceding month. Timing, definition and summary statisticcs for each variable is in Table I. The number of observations equals 4,378,430 and it is a 20 percent random sample of mortgages in the credit register data set. Coefficients are listed in the first row, t-statistics based on robust standard errors clustered at the firm level are reported in the row below in parentheses, and the corresponding significance levels are in the adjacent column. "Yes" indicates that the set of fixed effects is included. "No" indicates that the set of fixed effects is not included. "--" indicates that the set of fixed effects is comprised in the wider included set of fixed effects. *** Significant at 1%, ** significant at 5%, * significant at 10%.

TABLE V
BANK RISK-TAKING CHANNEL IN THE DOMESTIC AND THE FOREIGN CURRENCY WITH **EX-POST DEFAULT** AS RISK MEASURE

	(1)	(2)	(3)	(4)	(5)	(6)
Δ Interest Rate	-0.0261**	-0.1302***				
	(-1.99)	(-5.33)				
Δ Interest Rate * Bank Capital Ratio	0.2256**	0.7729***	0.7211***	0.7220***		
	(2.18)	(6.99)	(6.51)	(6.49)		
Δ Interest Rate * Credit Is Granted in Foreign Currency	-0.0652***	0.2310***	0.2310***			
	(-5.49)	(9.52)	(9.52)			
Δ Interest Rate * Bank Capital Ratio * Credit Is Granted in Foreign Currency	-0.4023***	-1.1937***	-1.1941***	-1.2077***	-1.2082***	-1.2336***
	(-3.14)	(-8.25)	(-8.25)	(-8.29)	(-5.87)	(-5.48)
Δ Interest Rate * Risky Borrower	-0.0720***	-0.0537***	-0.0577***	-0.0575***		
	(-4.24)	(-3.09)	(-3.32)	(-3.30)		
Δ Interest Rate * Bank Capital Ratio * Risky Borrower	-0.0768	-0.2137	-0.1742	-0.1736		
	(-0.42)	(-1.14)	(-0.93)	(-0.93)		
Δ Interest Rate * Credit Is Granted in Foreign Currency * Risky Borrower	0.0024	-0.0108	-0.0110	-0.0113	-0.0117	-0.0209
	(0.09)	(-0.38)	(-0.39)	(-0.40)	(-0.29)	(-0.48)
Δ Interest Rate * Bank Capital Ratio * Credit Is Granted in Foreign Currency * Risky Borrower	0.9849***	1.0879***	1.0901***	1.0884***	1.0915**	1.1569**
	(3.41)	(3.57)	(3.58)	(3.56)	(2.53)	(2.45)
Δ GDP	0.1382***					
	(9.88)					
Δ GDP * Bank Capital Ratio	0.0033	0.0351	0.2362	0.1502		
	(0.02)	(0.24)	(1.56)	(1.00)		
Δ GDP * Credit Granted in Foreign Currency	-0.5473***					
	(-27.43)					
Δ GDP * Bank Capital Ratio * Credit Is Granted in Foreign Currency	1.9550***	1.6591***	1.6598***	1.6821***	1.6830***	1.8139***
	(9.47)	(7.85)	(7.85)	(7.94)	(5.63)	(5.61)
Δ GDP * Risky Borrower	-0.0072	-0.0226	-0.0079	-0.0145		
	(-0.26)	(-0.80)	(-0.28)	(-0.51)		
Δ GDP * Bank Capital Ratio * Risky Borrower	-1.0531***	-0.8922***	-1.0340***	-0.9687***		
	(-3.43)	(-2.92)	(-3.36)	(-3.15)		
Δ GDP * Credit Is Granted in Foreign Currency * Risky Borrower	-0.0188	-0.0177	-0.0173	-0.0169	-0.0162	-0.0195
	(-0.35)	(-0.33)	(-0.32)	(-0.32)	(-0.22)	(-0.24)
Δ GDP * Bank Capital Ratio * Credit Is Granted in Foreign Currency * Risky Borrower	-1.6045***	-1.5813***	-1.5854***	-1.5854***	-1.5913**	-1.5437*
	(-2.92)	(-2.88)	(-2.89)	(-2.88)	(-2.05)	(-1.85)
Δ CPI	0.0076	0.0366*				
	(0.52)	(1.87)				
Δ CPI * Bank Capital Ratio	-0.4604***	-0.6802***	-0.5167***	-0.5133***		
	(-3.12)	(-4.48)	(-3.37)	(-3.33)		
Δ CPI * Credit Granted in Foreign Currency	-0.0524**	-0.1606***	-0.1607***			
	(-2.53)	(-5.30)	(-5.30)			
Δ CPI * Bank Capital Ratio * Credit Is Granted in Foreign Currency	0.7663***	1.2456***	1.2464***	1.2865***	1.2876***	1.3495***
	(3.65)	(5.68)	(5.68)	(5.82)	(4.12)	(3.98)
Δ CPI * Risky Borrower	0.0612**	0.0455*	0.0551**	0.0567**		
	(2.26)	(1.66)	(2.01)	(2.06)		
Δ CPI * Bank Capital Ratio * Risky Borrower	-0.1574	-0.0304	-0.1255	-0.1412		
	(-0.57)	(-0.11)	(-0.45)	(-0.50)		
Δ CPI * Credit Is Granted in Foreign Currency *Risky Borrower	0.2241***	0.2370***	0.2375***	0.2388***	0.2395***	0.2487***
	(4.41)	(4.60)	(4.61)	(4.63)	(3.30)	(3.15)
Δ CPI * Bank Capital Ratio * Credit Is Granted in Foreign Currency *Risky Borrower	-2.0089***	-2.0690***	-2.0737***	-2.0791***	-2.0858***	-2.0933***
	(-3.96)	(-4.02)	(-4.03)	(-4.03)	(-2.87)	(-2.65)
Credit Granted in Foreign Currency	0.0285***					
	(16.32)					
Bank Capital Ratio * Credit Is Granted in Foreign Currency	-0.1617***	-0.1936***	-0.1936***	-0.1971***	-0.1971***	-0.2093***
	(-9.02)	(-10.43)	(-10.43)	(-10.56)	(-7.48)	(-7.32)
Credit Is Granted in Foreign Currency * Risky Borrower	-0.0084*	-0.0095**	-0.0096**	-0.0096**	-0.0097	-0.0102
	(-1.89)	(-2.13)	(-2.14)	(-2.15)	(-1.53)	(-1.49)
Credit Is Granted in Foreign Currency * Bank Capital Ratio * Risky Borrower	0.2188***	0.2249***	0.2254***	0.2255***	0.2261***	0.2269***
	(4.81)	(4.91)	(4.92)	(4.92)	(3.50)	(3.24)
Δ Credit Default Swap Spread	0.0014***	-0.0002				
	(5.03)	(-0.33)				
Δ Exchange Rate	0.0130***	0.0031				
	(7.64)	(0.70)				
Δ Yield Curve	-0.1668***	0.0246				
	(-10.35)	(0.96)				
Foreign Direct Investment	0.0001***					
	(5.04)					
Bank Capital Ratio	0.0170	0.0211	0.0027	0.0064		
	(1.26)	(1.56)	(0.20)	(0.46)		
Bank Total Assets	0.0084***	0.0056***	0.0054***	0.0056***		
	(24.17)	(14.45)	(13.54)	(14.31)		
Bank Liquidity Ratio	-0.0025	0.0012	-0.0002	0.0001		
	(-1.31)	(0.63)	(-0.12)	(0.03)		
Bank Return On Assets	-0.0168***	-0.0101**	0.0079	0.0094		
	(-3.87)	(-2.26)	(1.21)	(1.42)		
Bank Doubtful Loan Ratio	-0.0322***	-0.0364***	-0.0370***	-0.0365***		
	(-22.76)	(-25.24)	(-25.42)	(-25.29)		
Income in Subregion	-0.0043***					
	(-3.41)					
Population in Subregion	0.0005					
	(0.87)					
Unemployment in Subregion	-0.0076					
	(-0.59)					
Bank Capital Ratio * Risky Borrower	0.0530**	0.0394	0.0507*	0.0496*		
	(1.96)	(1.45)	(1.87)	(1.82)		
Constant	0.0000***	-0.0000	-0.0000	-0.0000	0.0000***	0.0000***
	(7.90)	(-0.00)	(-0.01)	(-0.00)	(6.61)	(2.74)
Individual Borrower Fixed Effects	Yes	Yes	Yes	Yes	--	--
Subregion-Year:Quarter-Currency Fixed Effects	No	Yes	Yes	No	--	--
Subregion-Year:Month-Currency Fixed Effects	No	No	No	Yes	Yes	--
Settlement-Year:Month-Currency Fixed Effects	No	No	No	No	No	Yes
Year:Month Fixed Effects	No	No	Yes	No	--	--
Individual Borrower-Year:Month Fixed Effects	No	No	No	No	Yes	Yes
N	4,378,430	4,378,430	4,378,430	4,378,430	4,378,430	4,378,430
R2	0.0032	0.0010	0.0011	0.0010	0.0009	0.0010

Percentage Point Difference in Impact of a One Standard Deviation (299 bps) Decrease in Interest Rate on the Likelihood of Granting a Mortgage by Lower versus Higher Capitalized Banks (Δ=2 Standard Deviations)

	(1)	(2)	(3)	(4)	(5)	(6)
in Hungarian Forint when Borrower is Not Risky	0.0618	0.2118	0.1976	0.1979	--	--
in Foreign Currency when Borrower is Not Risky	-0.0484	-0.1153	-0.1296	-0.1331	--	--
in Hungarian Forint when Borrower is Risky	0.0618	0.2118	0.1976	0.1979	--	--
in Foreign Currency when Borrower is Risky	0.2215	0.1828	0.1691	0.1652	--	--
Difference in Impact between Foreign Currency and Hungarian Forint, when Borrower is Not Risky	-0.1103	-0.3272	-0.3273	-0.3310	-0.3312	-0.3381
Difference in Impact between Foreign Currency and Hungarian Forint, when Borrower is Risky	0.1597	-0.0290	-0.0285	-0.0327	-0.0320	-0.0210

Difference in Impact of a One Standard Deviation (299 bps) Decrease in Interest Rate on the Likelihood of Granting a Mortgage by Lower versus Higher Capitalized Banks (Δ=2 Standard Deviations) as Percent of Unconditional Probability of Granting a Mortgage in Sample (= 0.92%)

	(1)	(2)	(3)	(4)	(5)	(6)
in Hungarian Forint when Borrower is Not Risky	7%	23%	21%	22%	--	--
in Foreign Currency when Borrower is Not Risky	-5%	-13%	-14%	-14%	--	--
in Hungarian Forint when Borrower is Risky	7%	23%	21%	22%	--	--
in Foreign Currency when Borrower is Risky	24%	20%	18%	18%	--	--
Difference in Impact between Foreign Currency and Hungarian Forint, when Borrower is Not Risky	-12%	-36%	-36%	-36%	-36%	-37%
Difference in Impact between Foreign Currency and Hungarian Forint, when Borrower is Risky	17%	-3%	-3%	-4%	-3%	-2%

NOTE. -- The table reports estimates from ordinary least squares regressions. The dependent variable in all models is Credit Granted which equals one if an individual receives a loan in given month in the domestic or foreign currency (HUF or CHF) and equals zero otherwise. Risky Borrower equals one if the borrower defaults (gets into three-month delinquency) within six years after taking the loan, and equals zero otherwise. All independent variables are either lagged one month or calculated over the preceding month. Timing, definition and summary statistics for each variable is in Table I. The number of observations equals 4,378,430 and this sample is based on a 20 percent random sample of mortgages in the credit register data set. Coefficients are listed in the first row, t-statistics based on robust standard errors clustered at the individual level are reported in the row below in parentheses, and the corresponding significance levels are in the adjacent column. "Yes" indicates that the set of fixed effects is included. "No" indicates that the set of fixed effects is not included. "--" indicates that the set of fixed effects is comprised in the wider included set of fixed effects. *** Significant at 1%, ** significant at 5%, * significant at 10%, + significant at 12%.

Model	(1)	(2)	(3)	(4)	(5)	(6)
Δ Interest Rate	-0.0387***	-0.1160***				
	(-2.77)	(-4.61)				
Δ Interest Rate * Bank Capital Ratio	0.0975	0.2882**	0.2382**	0.2381**		
	(0.84)	(2.39)	(1.97)	(1.96)		
Δ Interest Rate * Credit Is Granted in Foreign Currency	0.0180	0.2153***	0.2153***			
	(1.28)	(8.65)	(8.65)			
Δ Interest Rate * Bank Capital Ratio * Credit Is Granted in Foreign Currency	-0.7724***	-0.9861***	-0.9863***	-0.9891***	-0.9889***	-0.9959***
	(-5.15)	(-6.30)	(-6.30)	(-6.26)	(-4.44)	(-4.12)
Δ Interest Rate * Risky Borrower	-0.0304	-0.0235	-0.0265	-0.0259		
	(-1.54)	(-1.17)	(-1.32)	(-1.28)		
Δ Interest Rate * Bank Capital Ratio * Risky Borrower	-0.2826	-0.3144	-0.2851	-0.2891		
	(-1.34)	(-1.46)	(-1.32)	(-1.34)		
Δ Interest Rate * Credit Is Granted in Foreign Currency * Risky Borrower	-0.0242	-0.0279	-0.0281	-0.0278	-0.0277	-0.0386
	(-0.78)	(-0.89)	(-0.90)	(-0.89)	(-0.63)	(-0.80)
Δ Interest Rate * Bank Capital Ratio * Credit Is Granted in Foreign Currency * Risky Borrower	1.0230***	1.0151***	1.0164***	1.0074***	1.0059**	1.0777**
	(3.18)	(3.11)	(3.11)	(3.07)	(2.18)	(2.13)
Δ Interest Rate in Switzerland	0.0567	0.7374***				
	(1.09)	(7.55)				
Δ Interest Rate in Switzerland * Bank Capital Ratio	-4.9458***	-6.9576***	-7.0092***	-6.9793***		
	(-9.92)	(-12.84)	(-12.97)	(-12.95)		
Δ Interest Rate in Switzerland * Credit Is Granted in Foreign Currency	1.2429***	0.4360**	0.4360**			
	(17.72)	(2.47)	(2.47)			
Δ Interest Rate in Switzerland * Bank Capital Ratio * Credit Is Granted in Foreign Currency	0.3686	3.1425***	3.1425***	3.2647***	3.2647***	3.5398***
	(0.53)	(4.20)	(4.20)	(4.34)	(3.08)	(3.06)
Δ Interest Rate in Switzerland * Risky Borrower	0.6204***	0.5169***	0.5171***	0.5236***		
	(6.36)	(5.04)	(5.04)	(5.10)		
Δ Interest Rate in Switzerland * Bank Capital Ratio * Risky Borrower	-0.5992	0.1131	0.1295	0.0625		
	(-0.60)	(0.11)	(0.12)	(0.06)		
Δ Interest Rate in Switzerland * Credit Is Granted in Foreign Currency * Risky Borrower	-0.4048*	-0.3279*	-0.3279*	-0.3231*	-0.3231	-0.3539
	(-2.38)	(-1.89)	(-1.89)	(-1.86)	(-1.32)	(-1.32)
Δ Interest Rate in Switzerland * Bank Capital Ratio * Credit Is Granted in Foreign Currency * Risky Borrower	-2.5302	-3.2327*	-3.2320*	-3.3156**	-3.3164	-3.2948
	(-1.54)	(-1.92)	(-1.92)	(-1.96)	(-1.39)	(-1.26)
Δ GDP	0.0602***					
	(4.30)					
Δ GDP * Bank Capital Ratio	-0.0701	-0.1833	-0.0317	-0.1284		
	(-0.48)	(-1.27)	(-0.21)	(-0.87)		
Δ GDP * Credit Granted in Foreign Currency	-0.4054***					
	(-19.94)					
Δ GDP * Bank Capital Ratio * Credit Is Granted in Foreign Currency	1.7968***	1.7680***	1.7683***	1.7971***	1.7967***	1.9360***
	(8.75)	(8.41)	(8.41)	(8.53)	(6.04)	(6.01)
Δ GDP * Risky Borrower	0.0587**	0.0348	0.0451	0.0378		
	(2.05)	(1.21)	(1.56)	(1.31)		
Δ GDP * Bank Capital Ratio * Risky Borrower	-1.1501***	-0.9347***	-1.0320***	-0.9592***		
	(-3.73)	(-3.03)	(-3.32)	(-3.09)		
Δ GDP * Credit Is Granted in Foreign Currency * Risky Borrower	-0.0858	-0.0720	-0.0717	-0.0712	-0.0715	-0.0776
	(-1.55)	(-1.30)	(-1.30)	(-1.29)	(-0.92)	(-0.92)
Δ GDP * Bank Capital Ratio * Credit Is Granted in Foreign Currency * Risky Borrower	-1.5526***	-1.6523***	-1.6546***	-1.6580***	-1.6553**	-1.6078*
	(-2.80)	(-2.98)	(-2.99)	(-2.99)	(-2.12)	(-1.91)
Δ CPI	-0.0259	-0.0429**				
	(-1.58)	(-2.06)				
Δ CPI * Bank Capital Ratio	0.1987	0.2042	0.3474**	0.3560**		
	(1.16)	(1.18)	(1.99)	(2.03)		
Δ CPI * Credit Granted in Foreign Currency	-0.1161***	-0.1362***	-0.1362***			
	(-4.82)	(-4.19)	(-4.19)			
Δ CPI * Bank Capital Ratio * Credit Is Granted in Foreign Currency	0.6895***	0.7774***	0.7778***	0.7969***	0.7964**	0.8165**
	(2.76)	(3.08)	(3.08)	(3.13)	(2.22)	(2.12)
Δ CPI * Risky Borrower	0.0308	0.0242	0.0311	0.0326		
	(0.99)	(0.77)	(0.99)	(1.04)		
Δ CPI * Bank Capital Ratio * Risky Borrower	-0.1734	-0.1228	-0.1915	-0.2055		
	(-0.53)	(-0.38)	(-0.59)	(-0.63)		
Δ CPI * Credit Is Granted in Foreign Currency * Risky Borrower	0.2216***	0.2281***	0.2284***	0.2285***	0.2282***	0.2393***
	(3.84)	(3.95)	(3.95)	(3.94)	(2.79)	(2.70)
Δ CPI * Bank Capital Ratio * Credit Is Granted in Foreign Currency * Risky Borrower	-1.5926***	-1.5818***	-1.5846***	-1.5757***	-1.5725**	-1.5827*
	(-2.71)	(-2.69)	(-2.70)	(-2.67)	(-1.89)	(-1.76)
Credit Granted in Foreign Currency	0.0214***					
	(12.09)					
Bank Capital Ratio * Credit Is Granted in Foreign Currency	-0.1590***	-0.1898***	-0.1899***	-0.1930***	-0.1929***	-0.2047***
	(-8.73)	(-10.16)	(-10.16)	(-10.27)	(-7.27)	(-7.12)
Credit Is Granted in Foreign Currency * Risky Borrower	-0.0044	-0.0059	-0.0060	-0.0060	-0.0060	-0.0063
	(-0.98)	(-1.32)	(-1.33)	(-1.33)	(-0.94)	(-0.92)
Credit Is Granted in Foreign Currency * Bank Capital Ratio * Risky Borrower	0.2118***	0.2212***	0.2215***	0.2213***	0.2211***	0.2219***
	(4.65)	(4.84)	(4.85)	(4.84)	(3.43)	(3.18)
Δ Credit Default Swap Spread	0.0036***	-0.0002				
	(10.55)	(-0.32)				
Δ Exchange Rate	0.0093***	0.0084*				
	(5.40)	(1.85)				
Δ Yield Curve	-0.1845***	-0.0135				
	(-11.41)	(-0.51)				
Foreign Direct Investment	0.0001***					
	(10.13)					
Bank Capital Ratio	0.0116	0.0262*	0.0121	0.0156		
	(0.85)	(1.90)	(0.85)	(1.10)		
Bank Total Assets	0.0058***	0.0048***	0.0047***	0.0050***		
	(15.45)	(12.35)	(11.79)	(12.67)		
Bank Liquidity Ratio	-0.0023	-0.0010	-0.0025	-0.0021		
	(-1.21)	(-0.52)	(-1.24)	(-1.07)		
Bank Return On Assets	-0.0183***	-0.0105**	0.0097	0.0112*		
	(-4.23)	(-2.36)	(1.49)	(1.69)		
Bank Doubtful Loan Ratio	-0.0387***	-0.0409***	-0.0412***	-0.0405***		
	(-26.79)	(-28.01)	(-28.00)	(-27.82)		
Income in Subregion	-0.0087***					
	(-6.33)					
Population in Subregion	0.0010					
	(1.61)					
Unemployment in Subregion	-0.0121					
	(-0.93)					
Bank Capital Ratio * Risky Borrower	0.0631**	0.0477*	0.0557**	0.0549*		
	(2.28)	(1.70)	(1.97)	(1.94)		
Constant	0.0000***	-0.0000	-0.0000	-0.0000	0.0000***	0.0000***
	(6.39)	(-0.00)	(-0.01)	(-0.00)	(6.37)	(2.65)
Individual Borrower Fixed Effects	Yes	Yes	Yes	Yes	--	--
Subregion-Year:Quarter-Currency Fixed Effects	No	Yes	Yes	No	--	--
Subregion-Year:Month-Currency Fixed Effects	No	No	No	Yes	Yes	--
Settlement-Year:Month-Currency Fixed Effects	No	No	No	No	No	Yes
Year:Month Fixed Effects	No	No	Yes	No	--	--
Individual Borrower-Year:Month Fixed Effects	No	No	No	No	Yes	Yes
N	4,378,430	4,378,430	4,378,430	4,378,430	4,378,430	4,378,430
R2	0.0037	0.0011	0.0012	0.0011	0.0010	0.0010

Percentage Point Difference in Impact of a One Standard Deviation (299 bps) Decrease in Domestic Interest Rate on the Likelihood of Granting a Mortgage by Lower versus Higher Capitalized Banks (Δ=2 Standard Deviations)						
in Hungarian Forint when Borrower is Not Risky	--	0.0790	0.0653	0.0653	--	--
in Foreign Currency when Borrower is Not Risky	-0.2117	-0.1918	-0.2050	-0.2058	--	--
in Hungarian Forint when Borrower is Risky	--	0.0790	0.0653	0.0653	--	--
in Foreign Currency when Borrower is Risky	0.0687	0.0864	0.0735	0.0703	--	--
Difference in Impact between Foreign Currency and Hungarian Forint, when Borrower is Not Risky	--	-0.2708	-0.2703	-0.2711	-0.2710	-0.2730
Difference in Impact between Foreign Currency and Hungarian Forint, when Borrower is Risky	--	0.0074	0.0083	0.0050	0.0047	0.0224
Difference in Impact of a One Standard Deviation (299 bps) Decrease in Domestic Interest Rate on the Likelihood of Granting a Mortgage by Lower versus Higher Capitalized Banks (Δ=2 Standard Deviations) as Percent of Unconditional Probability of Granting a Mortgage in Sample (= 0.92%)						
in Hungarian Forint when Borrower is Not Risky	--	9%	7%	7%	-	-
in Foreign Currency when Borrower is Not Risky	-23%	-21%	-22%	-22%	-	-
in Hungarian Forint when Borrower is Risky	--	9%	7%	7%	-	-
in Foreign Currency when Borrower is Risky	7%	9%	8%	8%	-	-
Difference in Impact between Foreign Currency and Hungarian Forint, when Borrower is Not Risky	--	-29%	-29%	-29%	-29%	-30%
Difference in Impact between Foreign Currency and Hungarian Forint, when Borrower is Risky	--	1%	1%	1%	1%	2%
Percentage Point Difference in Impact of a One Standard Deviation (41 bps) Decrease in Swiss Franc Interest Rate on the Likelihood of Granting a Mortgage by Lower versus Higher Capitalized Banks (Δ=2 Standard Deviations)						
in Hungarian Forint when Borrower is Not Risky	-0.1859	-0.2615	-0.2634	-0.2623	--	--
in Swiss Franc when Borrower is Not Risky	-0.1859	-0.1434	-0.1453	-0.1396	--	--
in Hungarian Forint when Borrower is Risky	-0.1859	-0.2615	-0.2634	-0.2623	--	--
in Swiss Franc when Borrower is Risky	-0.1859	-0.2649	-0.2668	-0.2642	--	--
Difference in Impact between Swiss Franc and Hungarian Forint, when Borrower is Not Risky	0.0000	0.1181	0.1181	0.1227	0.1227	0.1330
Difference in Impact between Swiss Franc and Hungarian Forint, when Borrower is Risky	0.0000	-0.0034	-0.0034	-0.0019	-0.0019	0.0092
Difference in Impact of a One Standard Deviation (41 bps) Decrease in Swiss Franc Interest Rate on the Likelihood of Granting a Mortgage by Lower versus Higher Capitalized Banks (Δ=2 Standard Deviations) as Percent of Unconditional Probability of Granting a Mortgage in Sample (= 0.92%)						
in Hungarian Forint when Borrower is Not Risky	-20%	-28%	-29%	-29%	--	--
in Swiss Franc when Borrower is Not Risky	-20%	-16%	-16%	-15%	--	--
in Hungarian Forint when Borrower is Risky	-20%	-28%	-29%	-29%	--	--
in Swiss Franc when Borrower is Risky	-20%	-29%	-29%	-29%	--	--
Difference in Impact between Swiss Franc and Hungarian Forint, when Borrower is Not Risky	0%	13%	13%	13%	13%	14%
Difference in Impact between Foreign Currency and Hungarian Forint, when Borrower is Risky	0%	0%	0%	0%	0%	1%

NOTE. -- The table reports estimates from ordinary least squares regressions. The dependent variable in all models is Credit Granted which equals one if an individual receives a loan in given month in the domestic or foreign currency (HUF or CHF) and equals zero otherwise. Risky Borrower equals one if the borrower defaults (gets into three-month delinquency) within six years after taking the loan, and equals zero otherwise. All independent variables are either lagged one month or calculated over the preceding month. Timing, definition and summary statistics for each variable is in Table I. The number of observations equals 4,378,430 and it is a 20 percent random sample of mortgages in the credit register data set. Coefficients are listed in the first row, t-statistics based on robust standard errors clustered at the individual level are reported in the row below in parentheses, and the corresponding significance levels are in the adjacent column. "Yes" indicates that the set of fixed effects is included. "No" indicates that the set of fixed effects is not included. "--" indicates that the set of fixed effects is comprised in the wider included set of fixed effects. *** Significant at 1%, ** significant at 5%, * significant at 10%.

APPENDIX TABLE 1

BANK RISK-TAKING CHANNEL IN THE DOMESTIC AND THE FOREIGN CURRENCY WITH EX POST DEFAULT AS RISK MEASURE, DEFAULTS DUE TO 2008 EXCHANGE RATE SHOCK EXCLUDED

	(1)	(2)	(3)	(4)	(5)	(6)
Δ Interest Rate	-0.0260**	-0.1339***				
	(-1.97)	(-5.45)				
Δ Interest Rate * Bank Capital Ratio	0.2265**	0.7746***	0.7224***	0.7232***		
	(2.19)	(7.00)	(6.51)	(6.49)		
Δ Interest Rate * Credit Is Granted in Foreign Currency	-0.0652***	0.2316***	0.2316***			
	(-5.49)	(9.50)	(9.50)			
Δ Interest Rate * Bank Capital Ratio * Credit Is Granted in Foreign Currency	-0.4023***	-1.1976***	-1.1980***	-1.2121***	-1.2129***	-1.2413***
	(-3.14)	(-8.27)	(-8.28)	(-8.31)	(-5.89)	(-5.50)
Δ Interest Rate * Risky Borrower	-0.0688***	-0.0515***	-0.0555***	-0.0554***		
	(-3.89)	(-2.84)	(-3.06)	(-3.05)		
Δ Interest Rate * Bank Capital Ratio * Risky Borrower	-0.1029	-0.2248	-0.1855	-0.1847		
	(-0.55)	(-1.16)	(-0.96)	(-0.95)		
Δ Interest Rate * Credit Is Granted in Foreign Currency * Risky Borrower	0.0047	-0.0047	-0.0049	-0.0052	-0.0057	-0.0161
	(0.17)	(-0.16)	(-0.17)	(-0.18)	(-0.14)	(-0.35)
Δ Interest Rate * Bank Capital Ratio * Credit Is Granted in Foreign Currency * Risky Borrower	0.9843***	1.0428***	1.0452***	1.0417***	1.0470**	1.1157**
	(3.29)	(3.30)	(3.31)	(3.28)	(2.34)	(2.27)
Δ GDP	0.1365***					
	(9.75)					
Δ GDP * Bank Capital Ratio	0.0021	0.0300	0.2321	0.1469		
	(0.01)	(0.20)	(1.53)	(0.98)		
Δ GDP * Credit Granted in Foreign Currency	-0.5473***					
	(-27.43)					
Δ GDP * Bank Capital Ratio * Credit Is Granted in Foreign Currency	1.9551***	1.6607***	1.6614***	1.6854***	1.6869***	1.8214***
	(9.48)	(7.86)	(7.86)	(7.95)	(5.64)	(5.63)
Δ GDP * Risky Borrower	-0.0077	-0.0241	-0.0096	-0.0162		
	(-0.26)	(-0.82)	(-0.33)	(-0.55)		
Δ GDP * Bank Capital Ratio * Risky Borrower	-1.0544***	-0.8879***	-1.0282***	-0.9627***		
	(-3.33)	(-2.82)	(-3.25)	(-3.04)		
Δ GDP * Credit Is Granted in Foreign Currency * Risky Borrower	-0.0033	-0.0046	-0.0041	-0.0038	-0.0027	-0.0056
	(-0.06)	(-0.08)	(-0.07)	(-0.07)	(-0.04)	(-0.07)
Δ GDP * Bank Capital Ratio * Credit Is Granted in Foreign Currency * Risky Borrower	-1.7676***	-1.7220***	-1.7266***	-1.7246***	-1.7346**	-1.6850**
	(-3.16)	(-3.08)	(-3.09)	(-3.08)	(-2.20)	(-1.99)
Δ CPI	0.0077	0.0375*				
	(0.53)	(1.91)				
Δ CPI * Bank Capital Ratio	-0.4603***	-0.6838***	-0.5191***	-0.5154***		
	(-3.12)	(-4.50)	(-3.38)	(-3.35)		
Δ CPI * Credit Granted in Foreign Currency	-0.0524**	-0.1612***	-0.1613***			
	(-2.53)	(-5.31)	(-5.31)			
Δ CPI * Bank Capital Ratio * Credit Is Granted in Foreign Currency	0.7663***	1.2548***	1.2556***	1.2969***	1.2987***	1.3598***
	(3.65)	(5.72)	(5.72)	(5.87)	(4.16)	(4.01)
Δ CPI * Risky Borrower	0.0591**	0.0434	0.0529*	0.0543*		
	(2.10)	(1.53)	(1.86)	(1.90)		
Δ CPI * Bank Capital Ratio * Risky Borrower	-0.1310	-0.0100	-0.1044	-0.1181		
	(-0.46)	(-0.03)	(-0.36)	(-0.41)		
Δ CPI * Credit Is Granted in Foreign Currency *Risky Borrower	0.2186***	0.2279***	0.2284***	0.2295***	0.2307***	0.2409***
	(4.19)	(4.31)	(4.32)	(4.33)	(3.09)	(2.97)
Δ CPI * Bank Capital Ratio * Credit Is Granted in Foreign Currency *Risky Borrower	-1.9812***	-1.9954***	-2.0005***	-2.0029***	-2.0142***	-2.0202**
	(-3.82)	(-3.79)	(-3.80)	(-3.79)	(-2.71)	(-2.49)
Credit Granted in Foreign Currency	0.0285***					
	(16.32)					
Bank Capital Ratio * Credit Is Granted in Foreign Currency	-0.1617***	-0.1942***	-0.1942***	-0.1978***	-0.1979***	-0.2100***
	(-9.02)	(-10.46)	(-10.46)	(-10.59)	(-7.50)	(-7.34)
Credit Is Granted in Foreign Currency * Risky Borrower	-0.0091**	-0.0099**	-0.0100**	-0.0100**	-0.0101	-0.0107
	(-2.00)	(-2.16)	(-2.17)	(-2.17)	(-1.56)	(-1.52)
Credit Is Granted in Foreign Currency * Bank Capital Ratio * Risky Borrower	0.2243***	0.2266***	0.2271***	0.2269***	0.2279***	0.2284***
	(4.82)	(4.83)	(4.84)	(4.83)	(3.45)	(3.19)
Δ Credit Default Swap Spread	0.0014***	-0.0003				
	(5.08)	(-0.44)				
Δ Exchange Rate	0.0130***	0.0042				
	(7.65)	(0.94)				
Δ Yield Curve	-0.1662***	0.0214				
	(-10.26)	(0.83)				
Foreign Direct Investment	0.0001***					
	(5.09)					
Bank Capital Ratio	0.0172	0.0219	0.0034	0.0070		
	(1.28)	(1.61)	(0.25)	(0.51)		
Bank Total Assets	0.0084***	0.0057***	0.0054***	0.0056***		
	(24.07)	(14.52)	(13.61)	(14.38)		
Bank Liquidity Ratio	-0.0024	0.0013	-0.0002	0.0001		
	(-1.25)	(0.67)	(-0.09)	(0.06)		
Bank Return On Assets	-0.0161***	-0.0093**	0.0089	0.0104		
	(-3.70)	(-2.07)	(1.36)	(1.56)		
Bank Doubtful Loan Ratio	-0.0323***	-0.0364***	-0.0370***	-0.0365***		
	(-22.76)	(-25.16)	(-25.35)	(-25.21)		
Income in Subregion	-0.0046***					
	(-3.65)					
Population in Subregion	0.0007					
	(1.06)					
Unemployment in Subregion	-0.0070					
	(-0.54)					
Bank Capital Ratio * Risky Borrower	0.0505*	0.0371	0.0484*	0.0471*		
	(1.82)	(1.33)	(1.73)	(1.68)		
Constant	-0.0000***	-0.0000	-0.0000	-0.0000	-0.0000***	0.0000***
	(-25.72)	(-0.00)	(-0.01)	(-0.00)	(-6.73)	(5.89)
Individual Borrower Fixed Effects	Yes	Yes	Yes	Yes	--	--
Subregion-Year:Quarter-Currency Fixed Effects	No	Yes	Yes	No	--	--
Subregion-Year:Month-Currency Fixed Effects	No	No	No	Yes	Yes	--
Settlement-Year:Month-Currency Fixed Effects	No	No	No	No	No	Yes
Year:Month Fixed Effects	No	No	Yes	No	--	--
Individual Borrower-Year:Month Fixed Effects	No	No	No	No	Yes	Yes
N	4,342,100	4,342,100	4,342,100	4,342,100	4,342,100	4,342,100
R2	0.0031	0.0010	0.0011	0.0011	0.0009	0.0009

NOTE. -- The table reports estimates from ordinary least squares regressions. The dependent variable in all models is Credit Granted which equals one if an individual receives a loan in given month in the domestic or foreign currency (HUF or CHF) and equals zero otherwise. Risky Borrower equals one if the borrower defaults (gets into three-month delinquency) within six years after taking the loan, and equals zero otherwise. All independent variables are either lagged one month or calculated over the preceding month. Timing, definition and summary statisticcs for each variable is in Table I. The number of observations equals 4,342,100 and this sample is based on a 20 percent random sample of mortgages in the credit register data set. Coefficients are listed in the first row, t-statistics based on robust standard errors clustered at the individual level are reported in the row below in parentheses, and the corresponding significance levels are in the adjacent column. "Yes" indicates that the set of fixed effects is included. "No" indicates that the set of fixed effects is not included. "--" indicates that the set of fixed effects is comprised in the wider included set of fixed effects. *** Significant at 1%, ** significant at 5%, * significant at 10%, + significant at 12%.

APPENDIX TABLE 2
BANK RISK-TAKING CHANNEL IN THE DOMESTIC AND THE FOREIGN CURRENCY WITH **PRESENCE OF GUARANTOR** AS RISK MEASURE

	(1)	(2)	(3)	(4)	(5)	(6)
Model						
Δ Interest Rate	-0.0504***	-0.1530***				
	(-3.25)	(-5.88)				
Δ Interest Rate * Bank Capital Ratio	0.5016***	1.0704***	0.9536***	0.9467***		
	(3.32)	(6.72)	(5.99)	(5.94)		
Δ Interest Rate * Credit Is Granted in Foreign Currency	-0.0011	0.2886***	0.2889***			
	(-0.06)	(10.49)	(10.50)			
Δ Interest Rate * Bank Capital Ratio * Credit Is Granted in Foreign Currency	-0.9860***	-1.6988***	-1.7012***	-1.7115***	-1.7185***	-1.7534***
	(-5.10)	(-7.91)	(-7.92)	(-7.93)	(-5.64)	(-5.36)
Δ Interest Rate * Borrower Has Guarantor	0.0042	0.0134	0.0033	0.0032		
	(0.25)	(0.77)	(0.19)	(0.18)		
Δ Interest Rate * Bank Capital Ratio * Borrower Has Guarantor	-0.3204	-0.3859**	-0.2768	-0.2749		
	(-1.68)	(-1.97)	(-1.41)	(-1.40)		
Δ Interest Rate * Credit Is Granted in Foreign Currency * Borrower Has Guarantor	-0.1063***	-0.0990***	-0.0994***	-0.0992***	-0.1004***	-0.1057***
	(-4.80)	(-4.16)	(-4.18)	(-4.16)	(-2.98)	(-2.88)
Δ Interest Rate * Bank Capital Ratio * Credit Is Granted in Foreign Currency * Borrower Has Guarantor	1.1871***	1.0729***	1.0770***	1.0717***	1.0838***	1.1416***
	(4.89)	(4.06)	(4.07)	(4.04)	(2.89)	(2.80)
Δ GDP	0.1723***					
	(10.28)					
Δ GDP * Bank Capital Ratio	-0.5302***	-0.6444***	-0.1775	-0.4493**		
	(-2.78)	(-3.52)	(-0.92)	(-2.38)		
Δ GDP * Credit Granted in Foreign Currency	-0.7899***					
	(-28.04)					
Δ GDP * Bank Capital Ratio * Credit Is Granted in Foreign Currency	3.3504***	2.9598***	2.9642***	2.9833***	2.9962***	3.1071***
	(11.02)	(9.63)	(9.65)	(9.69)	(6.89)	(6.62)
Δ GDP * Borrower Has Guarantor	-0.0482**	-0.0650***	-0.0248	-0.0477**		
	(-2.06)	(-2.87)	(-1.07)	(-2.07)		
Δ GDP * Bank Capital Ratio * Borrower Has Guarantor	0.5269**	0.7246***	0.3072	0.5453**		
	(2.05)	(2.89)	(1.20)	(2.14)		
Δ GDP * Credit Is Granted in Foreign Currency *Borrower Has Guarantor	0.4766***	0.4407***	0.4415***	0.4412***	0.4435***	0.4359***
	(12.65)	(11.70)	(11.72)	(11.70)	(8.31)	(7.56)
Δ GDP * Bank Capital Ratio * Credit Is Granted in Foreign Currency * Borrower Has Guarantor	-3.2971***	-2.9625***	-2.9703***	-2.9660***	-2.9889***	-2.9617***
	(-8.36)	(-7.52)	(-7.54)	(-7.52)	(-5.36)	(-4.91)
Δ CPI	0.0815***	0.1268***				
	(4.68)	(5.73)				
Δ CPI * Bank Capital Ratio	-1.2246***	-1.5822***	-1.2590***	-1.2108***		
	(-6.31)	(-7.95)	(-6.28)	(-6.04)		
Δ CPI * Credit Granted in Foreign Currency	-0.1026***	-0.2025***	-0.2030***			
	(-3.69)	(-5.57)	(-5.58)			
Δ CPI * Bank Capital Ratio * Credit Is Granted in Foreign Currency	1.7631***	2.1193***	2.1243***	2.1562***	2.1711***	2.2726***
	(5.97)	(6.84)	(6.85)	(6.91)	(4.94)	(4.80)
Δ CPI * Borrower Has Guarantor	-0.1231***	-0.1442***	-0.1201***	-0.1131***		
	(-5.02)	(-5.88)	(-4.87)	(-4.58)		
Δ CPI * Bank Capital Ratio * Borrower Has Guarantor	1.3682***	1.5591***	1.3032***	1.2333***		
	(5.23)	(5.93)	(4.94)	(4.67)		
Δ CPI * Credit Is Granted in Foreign Currency * Borrower Has Guarantor	0.1397***	0.1266***	0.1275***	0.1267***	0.1294**	0.1341**
	(3.67)	(3.25)	(3.27)	(3.24)	(2.34)	(2.24)
Δ CPI * Bank Capital Ratio * Credit Is Granted in Foreign Currency * Borrower Has Guarantor	-2.1811***	-1.9487***	-1.9577***	-1.9469***	-1.9732***	-2.0625***
	(-5.62)	(-4.87)	(-4.89)	(-4.85)	(-3.48)	(-3.36)
Credit Granted in Foreign Currency	0.0446***					
	(18.63)					
Bank Capital Ratio * Credit Is Granted in Foreign Currency	-0.2819***	-0.3048***	-0.3052***	-0.3081***	-0.3094***	-0.3223***
	(-10.87)	(-11.35)	(-11.36)	(-11.42)	(-8.13)	(-7.84)
Credit Is Granted in Foreign Currency * Borrower Has Guarantor	-0.0335***	-0.0314***	-0.0315***	-0.0315***	-0.0317***	-0.0315***
	(-10.28)	(-9.53)	(-9.56)	(-9.51)	(-6.77)	(-6.22)
Credit Is Granted in Foreign Currency * Bank Capital Ratio * Borrower Has Guarantor	0.2898***	0.2659***	0.2667***	0.2659***	0.2683***	0.2717***
	(8.55)	(7.72)	(7.74)	(7.70)	(5.49)	(5.13)
Δ Credit Default Swap Spread	0.0013***	0.0001				
	(4.69)	(0.11)				
Δ Exchange Rate	0.0133***	0.0012				
	(7.83)	(0.27)				
Δ Yield Curve	-0.1689***	0.0274				
	(-10.47)	(1.06)				
Foreign Direct Investment	0.0001***					
	(4.96)					
Bank Capital Ratio	0.0914***	0.1131***	0.0746***	0.0827***		
	(5.20)	(6.49)	(4.16)	(4.60)		
Bank Total Assets	0.0080***	0.0054***	0.0050***	0.0054***		
	(22.91)	(13.71)	(12.51)	(13.88)		
Bank Liquidity Ratio	-0.0007	0.0031	0.0018	0.0022		
	(-0.36)	(1.56)	(0.87)	(1.10)		
Bank Return On Assets	-0.0186***	-0.0117***	0.0051	0.0067		
	(-4.27)	(-2.62)	(0.79)	(1.01)		
Bank Doubtful Loan Ratio	-0.0313***	-0.0356***	-0.0363***	-0.0355***		
	(-21.91)	(-24.38)	(-24.70)	(-24.28)		
Income in Subregion	-0.0034***					
	(-2.72)					
Population in Subregion	0.0005					
	(0.79)					
Unemployment in Subregion	0.0034					
	(0.26)					
Bank Capital Ratio * Borrower Has Guarantor	-0.1312***	-0.1546***	-0.1235***	-0.1272***		
	(-5.56)	(-6.64)	(-5.23)	(-5.38)		
Constant	0.0000***	-0.0000	-0.0000	-0.0000	0.0000***	0.0000
	(9.05)	(-0.00)	(-0.01)	(-0.00)	(4.64)	(1.14)
Individual Borrower Fixed Effects	Yes	Yes	Yes	Yes	--	--
Subregion-Year:Quarter-Currency Fixed Effects	No	Yes	Yes	No	--	--
Subregion-Year:Month-Currency Fixed Effects	No	No	No	Yes	Yes	--
Settlement-Year:Month-Currency Fixed Effects	No	No	No	No	No	Yes
Year:Month Fixed Effects	No	No	Yes	No	--	--
Individual Borrower-Year:Month Fixed Effects	No	No	No	No	Yes	Yes
N	4,378,430	4,378,430	4,378,430	4,378,430	4,378,430	4,378,430
R2	0.0030	0.0009	0.0010	0.0009	0.0008	0.0008

Percentage Point Difference in Impact of a One Standard Deviation (299 bps) Decrease in Interest Rate on the Likelihood of Granting a Mortgage by Lower versus Higher Capitalized Banks (Δ=2 Standard Deviations)

in Hungarian Forint when Borrower does Not Have a Guarantor	0.1375	0.2934	0.2614	0.2676	-	-
in Foreign Currency when Borrower does Not Have a Guarantor	-0.1328	-0.1722	-0.2049	-0.2096	-	-
in Hungarian Forint when Borrower does Have a Guarantor	0.0497	0.1876	0.1855	0.1841	-	-
in Foreign Currency when Borrower does Have a Guarantor	0.1048	0.0161	0.0144	0.0088	-	-
Difference in Impact between Foreign Currency and Hungarian Forint, when Borrower does Not Have a Guarantor	-0.2703	-0.4656	-0.4663	-0.4772	-0.4710	-0.4806
Difference in Impact between Foreign Currency and Hungarian Forint, when Borrower does Have a Guarantor	0.0551	-0.1716	-0.1711	-0.1754	-0.1740	-0.1677

Difference in Impact of a One Standard Deviation (299 bps) Decrease in Interest Rate on the Likelihood of Granting a Mortgage by Lower versus Higher Capitalized Banks (Δ=2 Standard Deviations) as Percent of Unconditional Probability of Granting a Mortgage in Sample (= 0.92%)

in Hungarian Forint when Borrower does Not Have a Guarantor	15%	32%	28%	29%	-	-
in Foreign Currency when Borrower does Not Have a Guarantor	-14%	-19%	-22%	-23%	-	-
in Hungarian Forint when Borrower does Have a Guarantor	5%	20%	20%	20%	-	-
in Foreign Currency when Borrower does Have a Guarantor	11%	2%	2%	1%	-	-
Difference in Impact between Foreign Currency and Hungarian Forint, when Borrower does Not Have a Guarantor	-29%	-51%	-51%	-52%	-51%	-52%
Difference in Impact between Foreign Currency and Hungarian Forint, when Borrower does Have a Guarantor	6%	-19%	-19%	-19%	-19%	-18%

NOTE. -- The table reports estimates from ordinary least squares regressions. The dependent variable in all models is Credit Granted which equals one if an individual receives a loan in given month in the domestic or foreign currency (HUF or CHF) and equals zero otherwise. Risky Borrower equals one if there are two borrowers, i.e., if there is a guarantor for the loan, and equals zero otherwise. All independent variables are either lagged one month or calculated over the preceding month. Timing, definition and summary statisticcs for each variable is in Table I. The number of observations equals 4,378,430 and it is a 20 percent random sample of mortgages in the credit register data set. Coefficients are listed in the first row, t-statistics based on robust standard errors clustered at the firm level are reported in the row below in parentheses, and the corresponding significance levels are in the adjacent column. "Yes" indicates that the set of fixed effects is included. "No" indicates that the set of fixed effects is not included. "--" indicates that the set of fixed effects is comprised in the wider included set of fixed effects. *** Significant at 1%, ** significant at 5%, * significant at 10%.

DOMESTIC AND FOREIGN BANK RISK-TAKING CHANNEL IN THE DOMESTIC AND THE FOREIGN CURRENCY WITH **PRESENCE OF GUARANTOR** AS RISK MEASURE

	Model (1)	(2)	(3)	(4)	(5)	(6)
Δ Interest Rate	-0.0724***	-0.1488***				
	(-4.53)	(-5.61)				
Δ Interest Rate * Bank Capital Ratio	0.4434***	0.6478***	0.5591***	0.5600***		
	(2.81)	(3.96)	(3.41)	(3.41)		
Δ Interest Rate * Credit Is Granted in Foreign Currency	0.0905***	0.2851***	0.2853***			
	(4.91)	(10.20)	(10.21)			
Δ Interest Rate * Bank Capital Ratio * Credit Is Granted in Foreign Currency	-1.4030***	-1.5664***	-1.5684***	-1.5688***	-1.5757***	-1.5916***
	(-6.69)	(-7.15)	(-7.15)	(-7.12)	(-5.06)	(-4.78)
Δ Interest Rate * Borrower Has Guarantor	0.0321*	0.0376**	0.0323*	0.0331*		
	(1.71)	(1.98)	(1.70)	(1.73)		
Δ Interest Rate * Bank Capital Ratio * Borrower Has Guarantor	-0.4960**	-0.5259**	-0.4645**	-0.4715**		
	(-2.37)	(-2.46)	(-2.18)	(-2.21)		
Δ Interest Rate * Credit Is Granted in Foreign Currency * Borrower Has Guarantor	-0.1346***	-0.1319***	-0.1323***	-0.1321***	-0.1333***	-0.1389***
	(-5.23)	(-5.02)	(-5.03)	(-5.01)	(-3.57)	(-3.44)
Δ Interest Rate * Bank Capital Ratio * Credit Is Granted in Foreign Currency * Borrower Has Guarantor	1.3414***	1.2579***	1.2614***	1.2560***	1.2679***	1.3291***
	(4.86)	(4.43)	(4.44)	(4.40)	(3.14)	(3.05)
Δ Interest Rate in Switzerland	-0.0056	0.7393***				
	(-0.08)	(6.73)				
Δ Interest Rate in Switzerland * Bank Capital Ratio	-5.0907***	-7.3779***	-7.2324***	-7.0433***		
	(-6.74)	(-8.99)	(-8.86)	(-8.76)		
Δ Interest Rate in Switzerland * Credit Is Granted in Foreign Currency	1.4224***	0.5759***	0.5758***			
	(14.45)	(3.01)	(3.01)			
Δ Interest Rate in Switzerland * Bank Capital Ratio * Credit Is Granted in Foreign Currency	-0.1954	3.0002***	2.9997***	3.1157***	3.1139**	3.3072*
	(-0.19)	(2.68)	(2.68)	(2.77)	(1.97)	(1.92)
Δ Interest Rate in Switzerland * Borrower Has Guarantor	0.2878***	0.1894**	0.2209**	0.2351**		
	(3.27)	(2.05)	(2.40)	(2.57)		
Δ Interest Rate in Switzerland * Bank Capital Ratio * Borrower Has Guarantor	0.0855	0.6878	0.3957	0.2401		
	(0.09)	(0.69)	(0.40)	(0.24)		
Δ Interest Rate in Switzerland * Credit Is Granted in Foreign Currency *Borrower Has Guarantor	-0.4929***	-0.4094***	-0.4094***	-0.4083***	-0.4084**	-0.4119**
	(-3.80)	(-3.02)	(-3.02)	(-3.01)	(-2.13)	(-1.98)
Δ Interest Rate in Switzerland * Bank Capital Ratio * Credit Is Granted in Foreign Currency * Borrower Has Guarantor	0.9242	0.1616	0.1628	0.1489	0.1530	0.2240
	(0.71)	(0.12)	(0.12)	(0.11)	(0.08)	(0.11)
Δ GDP	0.0867***					
	(5.12)					
Δ GDP * Bank Capital Ratio	-0.5762***	-0.8227***	-0.4418**	-0.7276***		
	(-3.04)	(-4.50)	(-2.29)	(-3.86)		
Δ GDP * Credit Granted in Foreign Currency	-0.6289***					
	(-21.35)					
Δ GDP * Bank Capital Ratio * Credit Is Granted in Foreign Currency	3.1189***	3.0224***	3.0261***	3.0500***	3.0625***	3.1813***
	(10.11)	(9.70)	(9.71)	(9.77)	(6.95)	(6.67)
Δ GDP * Borrower Has Guarantor	-0.0180	-0.0385*	-0.0050	-0.0288		
	(-0.78)	(-1.70)	(-0.22)	(-1.25)		
Δ GDP * Bank Capital Ratio * Borrower Has Guarantor	0.4648*	0.6600***	0.3167	0.5677**		
	(1.84)	(2.67)	(1.25)	(2.26)		
Δ GDP * Credit Is Granted in Foreign Currency * Borrower Has Guarantor	0.4224***	0.3964***	0.3970***	0.3967***	0.3990***	0.3918***
	(10.92)	(10.27)	(10.28)	(10.26)	(7.30)	(6.62)
Δ GDP * Bank Capital Ratio * Credit Is Granted in Foreign Currency * Borrower Has Guarantor	-3.1413***	-2.8930***	-2.8995***	-2.8943***	-2.9164***	-2.8903***
	(-7.93)	(-7.32)	(-7.33)	(-7.31)	(-5.21)	(-4.77)
Δ CPI	0.0582***	0.0513**				
	(3.11)	(2.24)				
Δ CPI * Bank Capital Ratio	-0.6169***	-0.6954***	-0.4419**	-0.3990*		
	(-2.89)	(-3.28)	(-2.05)	(-1.85)		
Δ CPI * Credit Granted in Foreign Currency	-0.1764***	-0.1875***	-0.1879***			
	(-5.72)	(-4.91)	(-4.92)			
Δ CPI * Bank Capital Ratio * Credit Is Granted in Foreign Currency	1.7168***	1.6689***	1.6732***	1.6835***	1.6982***	1.7680***
	(5.17)	(5.00)	(5.01)	(5.01)	(3.58)	(3.47)
Δ CPI * Borrower Has Guarantor	-0.1517***	-0.1614***	-0.1458***	-0.1390***		
	(-5.46)	(-5.88)	(-5.29)	(-5.02)		
Δ CPI * Bank Capital Ratio * Borrower Has Guarantor	1.4697***	1.5608***	1.3933***	1.3274***		
	(4.88)	(5.23)	(4.65)	(4.42)		
Δ CPI * Credit Is Granted in Foreign Currency * Borrower Has Guarantor	0.1675***	0.1542***	0.1549***	0.1539***	0.1566**	0.1622**
	(3.81)	(3.52)	(3.53)	(3.50)	(2.51)	(2.42)
Δ CPI * Bank Capital Ratio * Credit Is Granted in Foreign Currency * Borrower Has Guarantor	-2.2337***	-1.9924***	-2.0002***	-1.9853***	-2.0115***	-2.1122***
	(-4.91)	(-4.39)	(-4.41)	(-4.36)	(-3.12)	(-3.05)
Credit Granted in Foreign Currency	0.0366***					
	(15.07)					
Bank Capital Ratio * Credit Is Granted in Foreign Currency	-0.2763***	-0.3010***	-0.3014***	-0.3038***	-0.3051***	-0.3176***
	(-10.56)	(-11.22)	(-11.23)	(-11.27)	(-8.02)	(-7.74)
Credit Is Granted in Foreign Currency * Borrower Has Guarantor	-0.0309***	-0.0296***	-0.0297***	-0.0296***	-0.0298***	-0.0297***
	(-9.36)	(-8.92)	(-8.94)	(-8.90)	(-6.33)	(-5.82)
Credit Is Granted in Foreign Currency * Bank Capital Ratio *Borrower Has Guarantor	0.2849***	0.2676***	0.2682***	0.2673***	0.2696***	0.2731***
	(8.30)	(7.73)	(7.75)	(7.70)	(5.49)	(5.14)
Δ Credit Default Swap Spread	0.0035***	0.0001				
	(10.36)	(0.12)				
Δ Exchange Rate	0.0096***	0.0068				
	(5.55)	(1.50)				
Δ Yield Curve	-0.1869***	-0.0128				
	(-11.54)	(-0.48)				
Foreign Direct Investment	0.0001***					
	(10.14)					
Bank Capital Ratio	0.0927***	0.1229***	0.0914***	0.0988***		
	(5.14)	(6.79)	(4.91)	(5.32)		
Bank Total Assets	0.0053***	0.0045***	0.0043***	0.0048***		
	(14.13)	(11.48)	(10.67)	(12.18)		
Bank Liquidity Ratio	-0.0005	0.0009	-0.0005	0.0000		
	(-0.24)	(0.44)	(-0.24)	(0.02)		
Bank Return On Assets	-0.0201***	-0.0122***	0.0070	0.0086		
	(-4.64)	(-2.73)	(1.08)	(1.30)		
Bank Doubtful Loan Ratio	-0.0379***	-0.0401***	-0.0405***	-0.0394***		
	(-25.89)	(-27.09)	(-27.20)	(-26.70)		
Income in Subregion	-0.0078***					
	(-5.68)					
Population in Subregion	0.0009					
	(1.51)					
Unemployment in Subregion	-0.0013					
	(-0.10)					
Bank Capital Ratio * Risky Borrower	-0.1422***	-0.1628***	-0.1374***	-0.1404***		
	(-5.92)	(-6.79)	(-5.67)	(-5.79)		

Constant	0.0000***	-0.0000	-0.0000	-0.0000	0.0000***	0.0000
	(7.19)	(-0.00)	(-0.01)	(-0.00)	(4.57)	(1.17)
Individual Borrower Fixed Effects	Yes	Yes	Yes	Yes	--	--
Subregion-Year:Quarter-Currency Fixed Effects	No	Yes	Yes	No	--	--
Subregion-Year:Month-Currency Fixed Effects	No	No	No	Yes	Yes	--
Settlement-Year:Month-Currency Fixed Effects	No	No	No	No	No	Yes
Year:Month Fixed Effects	No	No	Yes	No	--	--
Individual Borrower-Year:Month Fixed Effects	No	No	No	No	Yes	Yes
N	4,378,430	4,378,430	4,378,430	4,378,430	4,378,430	4,378,430
R2	0.0035	0.0009	0.0010	0.0009	0.0008	0.0008

Percentage Point Difference in Impact of a One Standard Deviation (299 bps) Decrease in Domestic Interest Rate on the Likelihood of Granting a Mortgage by Lower versus Higher Capitalized Banks (Δ=2 Standard Deviations)

in Hungarian Forint when Borrower does Not Have a Guarantor	0.1215	0.1776	0.1532	0.1535	-	-
in Foreign Currency when Borrower does Not Have a Guarantor	-0.2630	-0.2518	-0.2766	-0.2765		
in Hungarian Forint when Borrower does Have a Guarantor	-0.0144	0.0334	0.0259	0.0243	-	-
in Foreign Currency when Borrower does Have a Guarantor	-0.0313	-0.0511	-0.0582	-0.0615	-	-
Difference in Impact between Foreign Currency and Hungarian Forint, when Borrower does Not Have a Guarantor	-0.3845	-0.4293	-0.4299	-0.4300	-0.4319	-0.4362
Difference in Impact between Foreign Currency and Hungarian Forint, when Borrower does Have a Guarantor	-0.0169	-0.0846	-0.0841	-0.0857	-0.0844	-0.0719

Difference in Impact of a One Standard Deviation (299 bps) Decrease in Domestic Interest Rate on the Likelihood of Granting a Mortgage by Lower versus Higher Capitalized Banks (Δ=2 Standard Deviations) as Percent of Unconditional Probability of Granting a Mortgage in Sample (= 0.92%)

in Hungarian Forint when Borrower does Not Have a Guarantor	13%	19%	17%	17%	-	-
in Foreign Currency when Borrower does Not Have a Guarantor	-29%	-27%	-30%	-30%	-	-
in Hungarian Forint when Borrower does Have a Guarantor	-2%	4%	3%	3%	-	-
in Foreign Currency when Borrower does Have a Guarantor	-3%	-6%	-6%	-7%	-	-
Difference in Impact between Foreign Currency and Hungarian Forint, when Borrower does Not Have a Guarantor	-42%	-47%	-47%	-47%	-47%	-47%
Difference in Impact between Foreign Currency and Hungarian Forint, when Borrower does Have a Guarantor	-2%	-9%	-9%	-9%	-9%	-8%

Percentage Point Difference in Impact of a One Standard Deviation (41 bps) Decrease in Swiss Franc Interest Rate on the Likelihood of Granting a Mortgage by Lower versus Higher Capitalized Banks (Δ=2 Standard Deviations)

in Hungarian Forint when Borrower does Not Have a Guarantor	-0.1913	-0.2773	-0.2718	-0.2647	-	-
in Foreign Currency when Borrower does Not Have a Guarantor	-0.1913	-0.1645	-0.1591	-0.1476		
in Hungarian Forint when Borrower does Have a Guarantor	-0.1913	-0.2773	-0.2718	-0.2647	-	-
in Foreign Currency when Borrower does Have a Guarantor	-0.1987	-0.1645	-0.1591	-0.1476	-	-
Difference in Impact between Swiss Franc and Hungarian Forint, when Borrower does Not Have a Guarantor	0.0000	0.1128	0.1127	0.1171	0.1170	0.1243
Difference in Impact between Swiss Franc and Hungarian Forint, when Borrower does Have a Guarantor	-0.0073	0.1128	0.1127	0.1171	0.1150	0.1159

Difference in Impact of a One Standard Deviation (41 bps) Decrease in Swiss Franc Interest Rate on the Likelihood of Granting a Mortgage by Lower versus Higher Capitalized Banks (Δ=2 Standard Deviations) as Percent of Unconditional Probability of Granting a Mortgage in Sample (= 0.92%)

in Hungarian Forint when Borrower does Not Have a Guarantor	-21%	-30%	-30%	-29%	-	-
in Foreign Currency when Borrower does Not Have a Guarantor	-21%	-18%	-17%	-16%		
in Hungarian Forint when Borrower does Have a Guarantor	-21%	-30%	-30%	-29%	-	-
in Foreign Currency when Borrower does Have a Guarantor	-22%	-18%	-17%	-16%	-	-
Difference in Impact between Swiss Franc and Hungarian Forint, when Borrower does Not Have a Guarantor	0%	12%	12%	13%	13%	14%
Difference in Impact between Foreign Currency and Hungarian Forint, when Borrower does Have a Guarantor	-1%	12%	12%	13%	13%	13%

NOTE. -- The table reports estimates from ordinary least squares regressions. The dependent variable in all models is Credit Granted which equals one if an individual receives a loan in given month in the domestic or foreign currency (HUF or CHF) and equals zero otherwise. Risky Borrower equals one if there are two borrowers, i.e., if there is guarantor for the loan, and equals zero otherwise. All independent variables are either lagged one month or calculated over the preceding month. Timing, definition and summary statisticcs for each variable is in Table I. The number of observations equals 4,378,430 and it is a 20 percent random sample of mortgages in the credit register data set. Coefficients are listed in the first row, t-statistics based on robust standard errors clustered at the firm level are reported in the row below in parentheses, and the corresponding significance levels are in the adjacent column. "Yes" indicates that the set of fixed effects is included. "No" indicates that the set of fixed effects is not included. "--" indicates that the set of fixed effects is comprised in the wider included set of fixed effects. *** Significant at 1%, ** significant at 5%, * significant at 10%.

APPENDIX TABLE 4

BANK LENDING CHANNEL IN THE DOMESTIC AND THE FOREIGN CURRENCY, SAMPLE ADJUSTED FOR LOANS MISSING DUE TO SELECTION BIAS

Model	(1)	(2)	(3)	(4)	(5)	(6)
Δ Interest Rate	-0.0339***	-0.0918***				
	(-3.04)	(-4.30)				
Δ Interest Rate * Bank Capital Ratio	0.1371	0.5208***	0.4807***	0.5614***		
	(1.62)	(5.71)	(5.26)	(6.16)		
Δ Interest Rate * Credit Is Granted in Foreign Currency	-0.0420***	0.1773***	0.1773***			
	(-4.37)	(8.31)	(8.31)			
Δ Interest Rate * Bank Capital Ratio * Credit Is Granted in Foreign Currency	-0.3497***	-0.7949***	-0.7949***	-0.9690***	-0.9690***	-0.9945***
	(-3.24)	(-6.50)	(-6.50)	(-7.90)	(-5.61)	(-5.30)
Δ GDP	0.1569***					
	(13.70)					
Δ GDP * Bank Capital Ratio	-0.2160*	0.0725	0.2364*	0.0318		
	(-1.71)	(0.56)	(1.77)	(0.24)		
Δ GDP * Credit Granted in Foreign Currency	-0.5933***					
	(-34.12)					
Δ GDP * Bank Capital Ratio * Credit Is Granted in Foreign Currency	1.9877***	1.3125***	1.3125***	1.5574***	1.5574***	1.6963***
	(10.66)	(6.73)	(6.73)	(8.07)	(5.73)	(5.79)
Δ CPI	0.0557***	0.0255				
	(4.82)	(1.50)				
Δ CPI * Bank Capital Ratio	-0.9438***	-0.7884***	-0.6450***	-0.8267***		
	(-7.78)	(-6.13)	(-4.95)	(-6.47)		
Δ CPI * Credit Is Granted in Foreign Currency	-0.1135***	-0.0634**	-0.0634**			
	(-6.43)	(-2.23)	(-2.23)			
Δ CPI * Bank Capital Ratio * Credit Is Granted in Foreign Currency	1.5073***	1.3215***	1.3215***	1.7305***	1.7305***	1.8885***
	(8.15)	(6.67)	(6.67)	(8.84)	(6.27)	(6.30)
Credit Granted in Foreign Currency	0.0380***					
	(25.49)					
Bank Capital Ratio * Credit Is Granted in Foreign Currency	-0.2258***	-0.2015***	-0.2015***	-0.2347***	-0.2347***	-0.2522***
	(-14.17)	(-11.92)	(-11.92)	(-14.05)	(-9.97)	(-9.90)
Δ Credit Default Swap Spread	0.0016***	0.0008				
	(5.98)	(1.26)				
Δ Exchange Rate	0.0095***	-0.0027				
	(5.96)	(-0.64)				
Δ Yield Curve	-0.1634***	0.0285				
	(-11.05)	(1.20)				
Foreign Direct Investment	0.0000***					
	(3.96)					
Bank Capital Ratio	0.0734***	0.0415***	0.0256**	0.0445***		
	(6.51)	(3.56)	(2.14)	(3.78)		
Bank Total Assets	0.0092***	0.0057***	0.0055***	0.0057***		
	(32.11)	(17.74)	(16.63)	(17.80)		
Bank Liquidity Ratio	-0.0040**	0.0002	-0.0012	-0.0009		
	(-2.19)	(0.09)	(-0.61)	(-0.44)		
Bank Return On Assets	-0.0170***	-0.0090**	0.0101*	0.0098		
	(-4.20)	(-2.16)	(1.66)	(1.59)		
Bank Doubtful Loan Ratio	-0.0333***	-0.0393***	-0.0399***	-0.0393***		
	(-24.00)	(-27.75)	(-27.99)	(-27.73)		
Income in Subregion	-0.0026**					
	(-2.23)					
Population in Subregion	0.0000					
	(0.02)					
Unemployment in Subregion	-0.0188					
	(-1.51)					
Constant	-0.0000***	-0.0000	-0.0000	-0.0000	0.0000	0.0000***
	(-9.27)	(-0.00)	(-0.00)	(-0.00)	(1.54)	(6.97)
Individual Borrower Fixed Effects	Yes	Yes	Yes	Yes	--	--
Subregion-Year:Quarter-Currency Fixed Effects	No	Yes	Yes	No	--	--
Subregion-Year:Month-Currency Fixed Effects	No	No	No	Yes	Yes	--
Settlement-Year:Month-Currency Fixed Effects	No	No	No	No	No	Yes
Year:Month Fixed Effects	No	No	Yes	No	--	--
Individual Borrower-Year:Month Fixed Effects	No	No	No	No	Yes	Yes
N	4,985,470	4,987,822	4,987,822	4,987,822	4,987,822	4,987,822
R2	0.0035	0.0006	0.0007	0.0006	0.0005	0.0005

Percentage Point Difference in Impact of a One Standard Deviation (299 bps) Decrease in Interest Rate on the Likelihood of Granting a Mortgage by Lower versus Higher Capitalized Banks (Δ =2 Standard Deviations)

		(1)	(2)	(3)	(4)	(5)	(6)
	in Hungarian Forint	-	0.1427	0.1318	0.1539	-	-
	in Foreign Currency	-	-0.0751	-0.0861	-0.1117	-	-
Difference in Impact Between Foreign Currency and Hungarian Forint		-	-0.2179	-0.2179	-0.2656	-0.2656	-0.2726

Difference in Impact of a One Standard Deviation (299 bps) Decrease in Interest Rate on the Likelihood of Granting a Mortgage by Lower versus Higher Capitalized Banks (Δ Standard Deviations) as Percent of Unconditional Probability of Granting a Mortgage in Sample (= 0.92%)

		(1)	(2)	(3)	(4)	(5)	(6)
	in Hungarian Forint	-	16%	14%	17%	-	-
	in Foreign Currency	-	-8%	-9%	-12%	-	-
Difference in Impact Between Foreign Currency and Hungarian Forint		-	-24%	-24%	-29%	-29%	-30%

NOTE. -- The table reports estimates from ordinary least squares regressions. The dependent variable in all models is Credit Granted which equals one if an individual receives a loan in given month in the domestic or foreign currency (HUF or CHF) and equals zero otherwise. All independent variables are either lagged one month or calculated over the preceding month. Timing, definition and summary statisticcs for each variable is given in Table I. The number of observations equals 4,985,470 and it is a 20 percent random sample of mortgages taken from the combined credit register and three major banks dataset. Coefficients are listed in the first row, t-statistics based on robust standard errors clustered at the firm level are reported in the row below in parentheses, and the corresponding significance levels are in the adjacent column. "Yes" indicates that the set of fixed effects is included. "No" indicates that the set of fixed effects is not included. "--" indicates that the set of fixed effects is comprised in the wider included set of fixed effects. *** Significant at 1%, ** significant at 5%, * significant at 10%.