

Gyöngyösi, Gyözo; Ongena, Steven; Schindele, Ibolya

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GYŐZŐ GYÖNGYÖSI | STEVEN ONGENA | IBOLYA SCHINDELE

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HOUSEHOLD LOAN SUPPLY:
VOLUME AND COMPOSITION
EFFECTS**

MNB WORKING PAPERS | 2

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The views expressed are those of the authors' and do not necessarily reflect the official view of the central bank of Hungary (Magyar Nemzeti Bank).

MNB Working Papers 2022/2

Monetary policy and household loan supply: volume and composition effects

(A monetáris politika háztartási hitelcsatornája: volumen és összetételhatások)

Written by Győző Gyöngyösi, Steven Ongena, Ibolya Schindele*

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Abstract

We study how monetary conditions change the supply by banks of mortgage credit to households. We exploit the widespread presence of foreign currency mortgages in Hungary and study this country's comprehensive credit registry. Changes in monetary conditions not only affect the supply of credit in volume, but also in its currency and risk composition. Hence, we establish a "bank-lending-to-households" channel of monetary policy that is heterogeneous. While the availability of foreign currency mortgages weakens the domestic bank-lending channel overall, weakly capitalized domestic banks relying on swap transactions for their foreign currency lending are more sensitive to changes in monetary conditions.

JEL: E51, F3, G21.

Keywords: Bank balance-sheet channel, household lending, monetary policy, foreign currency lending.

Összefoglaló

A tanulmányban a monetáris politikai kondíciók megváltozásának hatását vizsgáljuk a bankok lakáshitel kínálatára. Az elemzéshez a teljeskörű lakossági hitelregiszter adatokra támaszkodunk és az identifikációhoz a devizahitelek elérhetőségét használjuk a lakáshitel piacon. Eredményeink szerint a monetáris politikai kondíciók megváltozása nem csak a bankok hitelkínálatára hat, hanem hatással van a banki hitelkínálat deviza és adóskockázati összetételére is. Eredményeink megmutatják, hogy létezik a monetáris politika "lakossági hitelcsatornája", amely heterogén a bankok szintjén. Az összetételhatások tekintetében azt találjuk, hogy a) a lakossági devizahitelek elérhetősége gyengíti a hazai monetáris politika hitelcsatornáját, b) a swap tranzakciókra támaszkodó alacsony sajáttőke-hányaddal rendelkező bankok érzékenyebben reagálnak a monetáris politikai kondíciók megváltozására.

1 Introduction

Although prominent academic writings have long emphasized the crucial role households' balance sheets play in monetary transmission, extant empirical work is scant and almost exclusively focused on the impact of monetary policy on the demand for mortgages by households.¹ To the best of our knowledge there is little empirical research with micro data on the equally important question if and how monetary policy has an impact on the supply of mortgages via the bank-lending channel of monetary transmission. While around 50 percent of total bank lending goes to households, most of the literature on the bank-lending channel has so far focused exclusively on firms.²

{Bernanke, 1995} employ US macro series data to examine how monetary shocks affect the economy and housing investment in particular. They show that following monetary tightening, residential investment drops sharply and accounts for a substantial part of the decline in aggregate spending, indicating that mortgage lending may play a crucial role in the transmission of monetary shocks to the real economy. Even so, they argue that the magnitude, timing, and composition of the economy's response to a monetary policy shock suggest that changes in demand cannot fully account for the decline in aggregate spending.³

To fill the gap in the literature, we investigate the impact of changes in monetary conditions on the supply by banks of mortgage credit to households, in volume and in composition. Foreign currency denominated mortgages are widely available in our setting so that households can readily borrow in either domestic and/or foreign currency. For identification, we start from the observation that households in Hungary typically do not have an inherent transactional need for a foreign currency when obtaining credit and that therefore the variation in observed currency denomination of mortgages is likely to be driven by the banks' currency specific credit supply (e.g., {Brown, 2014}).

We first 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 likelihood of banks' granting mortgages to households 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 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.

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, 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, 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, 2016}).

² The absence of (micro-level) research on a potential "bank-lending-to-household" channel of monetary transmission is also surprising in the light of the 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 2008-09 financial crisis (e.g., {Mian, 2014}).

³ Studying bank level data *à la* {Kashyap, 2000 #543}, {Black, 2010} find that only a few banks reduce mortgage lending in response to monetary contractions. {Albertazzi, 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 in its focus on household credit and in granularity of data, {Epure, 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.

Two salient frictions may play a role in generating changes in banks' lending decisions following monetary policy shocks. First, the *agency costs* of obtaining funding (in any currency) represent a friction that is especially relevant for banks with weak balance sheets. Identifying changes in the supply of credit from the differential reaction (to changes in monetary conditions) by lowly versus highly capitalized banks has been the standard approach in the literature since the seminal paper by {Kashyap, 2000 #543}. In addition, banks with weak balance sheets are more prone to lend to riskier borrowers ({Rajan, 2006}, {Borio, 2012}, {Jiménez, 2014}, {Ioannidou, 2015}, {Dell'Ariccia, 2017}). Bank capitalization may thus also affect the risk composition of loan supply.

Second, there is the financial friction corresponding to the *violation of interest parity* conditions, whereby monetary changes can generate currency-compositional shifts in banks' loan supply. Consistent with {Ivashina, 2015} and {Bräuning, 2020}), we hypothesize that shocks to banks' relative costs of funding in different currencies translate into shifts in the composition of their loan supply due to the violations of interest parity and the consequent increase in the cost of synthetic funding using the low cost currency. In addition, agency costs themselves may have an impact on the currency composition of banks' loan supply, when lending in one currency represents higher risk-taking from the banks' perspective and when banks with weak balance-sheets are more prone to lend to riskier clients.⁴

In line with {Bräuning, 2020} and {Ongena, 2021}, we show that the impact of monetary policy shocks on banks' lending responses depends on both bank capitalization and the cost of funding foreign currency lending by swap transactions in financial markets. Specifically, we argue that frictions in foreign currency swap markets create heterogeneity for banks in our sample in the easiness to fund lending in foreign rather than in the domestic currency.⁵ We show that banks relying primarily on swap transactions to fund their foreign currency lending are more sensitive to those frictions than banks receiving currency funding directly from their foreign parent banks, especially when not well capitalized.⁶ In addition, our evidence shows that following a domestic monetary expansion even the swap market friction does not constrain the lowly capitalized banks to lend in the high-cost foreign currency to risky borrowers. This implies that when lending takes place in a foreign currency, expansionary policy will incentivize banks to take risk, creating an amplifying interplay between the currency and risk compositional channels of monetary policy transmission.

Hungary provides an almost ideal setting to identify the potency of a bank-lending-to-household channel. The comprehensive credit register at the Central 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.

Our identification strategy exploits the extent to which banks' lending in Hungary is denominated in foreign currency. We identify the effect of monetary policy on 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).⁷ 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

⁴ Without financial market frictions, we are unlikely to identify currency compositional supply effects of monetary policy transmission (see also {Ongena, 2021}). If interest parity conditions hold, banks should be able to use the financial market to keep the currency composition of their lending unchanged when their relative cost of funding in different currencies is altered.

⁵ Hungarian banks mostly used foreign currency funding when lending in foreign currency, but at times also relied on domestic currency funds while hedging some of the resultant on-balance sheet open positions with foreign exchange swap transactions ({Mák, 2009}). According to Hungarian regulation, foreign currency lending does not require banks to maintain different bank capital levels, as long as the position is hedged through foreign currency funding (on-balance) or through the foreign exchange swap market (off-balance sheet). Similarly, banks' reserve requirements do not differ for deposits in different currencies.

⁶ For related evidence, see (see, e.g., {Eguren-Martin, 2019}).

⁷ Using fixed effects is a standard way to control for demand-side heterogeneity also in other strands of the literature. {Jiménez, 2012} and {Jiménez, 2014} for example explore a dataset of firms' loan applications to multiple banks and control for firm-level time-varying heterogeneity in credit demand by including firm-time fixed effects. 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. {Paravisini, 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.

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.⁸

To disentangle the supply from the demand 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, 1996}, {Kashyap, 2000 #543}).⁹ As common in the literature, we account for the changes in 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”,¹⁰ 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, assessing the full population of mortgages granted between January 2004 and August 2008, we find that following a one standard deviation decrease in the domestic interest rate, lowly capitalized banks increase their mortgage credit supply by 0.04 percentage point (pp) 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 5 percent increase, representing an economically significant supply effect.

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 0.15 pp more 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 pp less than by highly capitalized banks. These numbers are economically significant, representing +16 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 lowly versus highly capitalized banks, in the domestic versus the foreign currency, amounts to -30 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 only -15 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.

⁸ 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.

⁹ 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, 1997 #317}, {Holmstrom, 1998}, {Bernanke, 1999}, {Gertler, 2011}).

¹⁰ 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.

We also assess the impact of foreign monetary conditions on the volume and composition of the domestic mortgage 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, 1992 #224}, {Kashyap, 2000 #543}, {Jiménez, 2012}, {Becker, 2014}),¹¹ 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.¹²

Second, our paper contributes to an incipient literature which investigates the international transmission of monetary policy shocks ({Cetorelli, 2012}, {Cerutti, 2017}, {Temesvary, 2018}, {Temesváry, 2018}, and {Morais, 2019},), that may possibly occur along loan currency denomination ({Ongena, 2021}).¹³

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 primarily on direct credit risk taken ({Dell’Ariccia, 2014}, {Jiménez, 2014}, {Ioannidou, 2015}, and references therein). Our paper is closest to the most recent literature addressing the impact of monetary changes on the currency composition of loan supply (e.g., {Temesvary, 2018}, {Bräuning, 2020}, and {Ongena, 2021}). To our knowledge, our paper is the first to show that an interplay between the currency and risk compositional channels of monetary transmission may amplify 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.

¹¹ {Benkovskis, 2008}, {Matousek, 2009} and {Kujundžić, 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, 2010} and {Brown, 2018} study the effectiveness of macroeconomic policies including monetary policy in the presence of financial dollarization.

¹² Though there are several papers studying changes in the credit supply to households, these studies exploit differential exposure of banks to the financial crisis to identify credit supply responses (e.g., {Puri, 2011}, {Ramcharan, 2016}, {Jensen, 2017}). In contrast, we measure the impact of monetary policy on the supply of credit by exploiting variation in bank capitalization.

¹³ 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, 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, 2003}, {De Nicolo, 2005}, {Rajan, 2005}, {Rosenberg, 2009}, {Basso, 2011}, {Neanidis, 2015}).

2 Bank Lending to Households in Hungary and Data Sources

2.1 HOUSEHOLD LENDING IN HUNGARY

Hungary's transition from a centrally planned to a market economy started at the end of the 1980s. However, 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.

Loans denominated in foreign currencies appeared from 2004 onwards and their share increased rapidly, especially in household lending.¹⁴ 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, a stable exchange rate environment and 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.¹⁵

When the financial crisis hit Hungary, the Hungarian forint suffered a major unexpected 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.

2.2 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.¹⁶ Our initial sample encompasses all mortgage-backed housing loans recorded in the Household Registry of the Credit Information System in April 2012.

¹⁴ 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.

¹⁵ 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, 2012).

¹⁶ 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.

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.¹⁷

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 with a minimum maturity of eight and a half years.¹⁸ 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 loans of eight and a half year or longer maturity, denominated in Hungarian Forint or Swiss Franc and originated between January 2004 and August 2008.

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 using the entire population of mortgages granted by banks in Hungary in the period January 2004 to August 2008.

To this dataset, we add borrowers’ place of living’ characteristics at the region (175 units) and the locality (3,152 units) level. We obtain data on banks’ financial statements from regulatory reports available at the Central Bank of Hungary. We have information on regional characteristics including population, unemployment, and tax base per capita, at the locality 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 of April 2012 (which is the 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 defined unambiguously 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.¹⁹

¹⁷ 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.

¹⁸ 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.

¹⁹ Individuals may shop around for better loan terms before borrowing. If an individual obtains offers from several banks, she will choose the bank with the best offer in terms of loan conditions. As long as this choice is determined only by loan characteristics and not by bank specific credit demand, our results should not be affected. As Swiss franc loans were cheaper than unsubsidized local currency mortgages, main differences in loan terms are likely to be currency specific. Since the locality-time-currency fixed effects we employ account for time-varying currency specific terms in local credit markets, our estimates should not be affected by individuals’ potential pre-borrowing shopping behavior. Further, our sample may suffer from a second selection issue. Following substantial depreciation of the Hungarian forint during the crisis period, the 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 will not be recorded in the registry. In Section 7, we show that our main results are not affected by this potential selection issue.

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.

Our benchmark specification focuses on the extensive margin of mortgage granting to individual borrowers in a given currency. We account for the heterogeneity in credit demand with location-time-currency and borrower-time fixed effects, the state-of-the-art methodology in the recent literature,²⁰ and 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.

To be more complete, our identification strategy actually rests on three crucial ingredients: (1) The saturation of the specification with borrower-time and locality-time-currency fixed effects to account for observable and unobservable demand; (2) the interaction of the change in the interest rate with bank capital, loan currency denomination, and a measure of borrower risk; and, (3) the horseshoeing of the interest rate, in its interaction with bank capital, currency denomination, and borrower risk, with the corresponding triple and quadruple interactions of key macro variables, in particular GDP growth and inflation.

3.1 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 other currencies.²¹ 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 (e.g., {Aladangady, 2015}). Therefore, to suppress concurrent changes in households' credit demand, we saturate our benchmark specifications with borrower-time fixed effects *à la* {Khwaja, 2008}. Observed and unobserved time-varying borrower characteristics that we account for in this way include the individual's income, employment status, collateral, marital status, and household characteristics.²² Therefore, 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.²³ Essentially, our identification relies on the assumption that household credit demand is not currency specific: On the condition that

²⁰ 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, 2011}, {Jiménez, 2012}, {Berg, 2015} and {Jiménez, 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 (e.g., {Miller, 2003}).

²¹ 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).

²² 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.

²³ 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, 2012}), {Jiménez, 2014}), we do not rely on the multiplicity in the borrower-bank relationship dimension.

households take into account borrowing costs and potential risks associated with taking on debt, the actual currency of the granted mortgage will depend on banks' loan supply in the different currencies.

To account for the differences in currency-specific loan terms that may affect household credit demand, we include locality-time-currency fixed effects in the regressions.^{24,25} While households may, in principle, be indifferent between the currency denomination of their mortgages, their choice may still be influenced by differences in loan terms between domestic and foreign currency loans. Although we do not observe loan terms by currency denomination, locality-time-currency fixed effects control for any time-varying local credit market-specific differences between domestic and foreign currency loan conditions, ensuring that “the remainder of the measured currency choice” is almost surely not driven by demand factors, but instead it reflects differences in bank related credit supply.

3.2 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 ratio ({Holmstrom, 1997 #317}). The ratio is particularly meaningful in Hungary because off-balance sheet activity by banks has been almost non-existent.²⁶

To identify the “currency compositional channel” of monetary policy, we interact, in the spirit of {Kashyap, 2000 #543} and {Ongena, 2021}, 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.²⁷

To identify how currency-specific funding costs are associated with currency and risk compositional loan supply effects, we examine, in the spirit of {Ivashina, 2015}, {Bräuning, 2020}, and {Ongena, 2021}, whether a source of heterogeneity is discernible in the lending responses of banks using the financial market to fund their foreign currency lending transactions. Using data on banks' foreign currency swap exposures, we test the hypothesis that banks that heavily rely on swap markets to fund their foreign currency lending are more sensitive to frictions in that market than banks that potentially receive currency funding from foreign parent banks. To test this mechanism, we use a specification similar to the one employed by

²⁴ Localities are defined as settlements, which are cities or zip-codes. In 2010, there were 3,152 settlements in Hungary. The average population per settlement was equal to 3,168.

²⁵ The locality-time-currency fixed effects also mop up supply effects generated by changes in bank market structure that are unrelated to monetary policy changes. The availability of a low interest rate foreign currency may allow banks to engage in new market segments, by extending loans to households that are ineligible for credit in the high interest rate domestic currency. The fixed effects set also control for such region-specific time-variation in such aggregate lending in a given currency.

²⁶ 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.

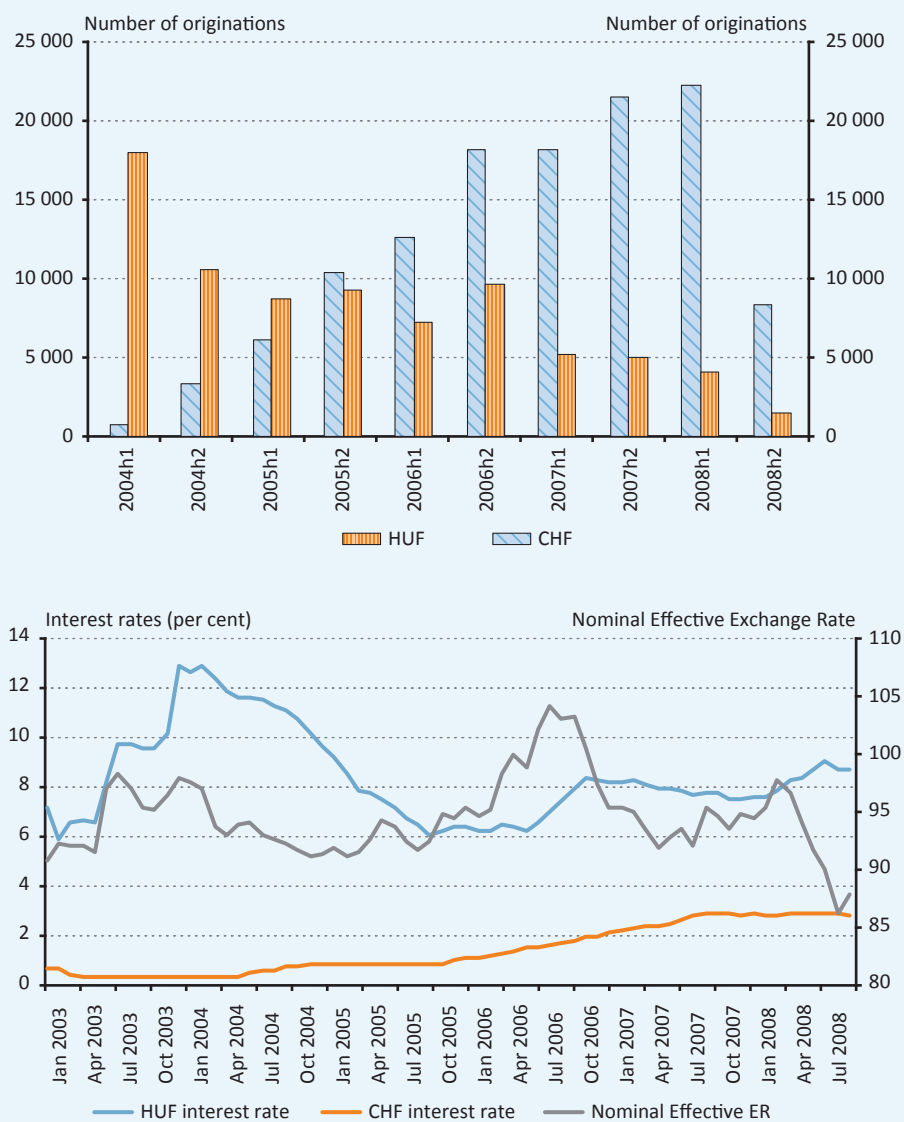
²⁷ In a related vein, {Ongena, 2013} provide evidence that foreign banks may engage in risky lending in domestic markets, especially when entry barriers and restrictions on non-core bank activities in domestic markets are low. At the same time, {Dell'Ariccia, 2016} point out that lending in a foreign currency does not necessarily involve more risk-taking.

{Bräuning, 2020} and run regressions of credit granting in the foreign (rather than domestic) currency on the differential between the foreign and domestic interest rates interacted with the bank capital ratio, high swap ratio, and borrower risk.

3.3 HORSERACING HIGHER-ORDER INTERACTION TERMS

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, 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, we use the annual change in the Swiss 3-month LIBOR interest rate.²⁸ 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).

Figure 1
Number of new mortgage originations and evolution of interest rates



²⁸ We use a three-month interbank rate because there is no three-month Swiss Treasury bill or government bond.

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.

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 and prices, with bank capital and currency denomination, with the equivalent triple interaction of 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 of the two macro variables with bank capital, currency denomination, and borrower risk, with the quadruple interaction of the same variables and the interest rate.²⁹

²⁹ 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. We base our estimations on the full population of loans granted by banks in the two currencies, i.e., Swiss Franc and Hungarian Forint. The total number of observations in our three-dimensional panel, i.e., individual – year:month – currency denomination, thus equals 21,893,838.

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 (default) information obtained 6 years subsequent to loan taking. The number of banks in our sample is 146 and the number of individuals is close to 200,000. Out of the total number of banks, 125 are cooperatives while 21 are commercial banks. Approximately 95 percent of all loans in the sample are offered by commercial banks.

4.1 EMPIRICAL MODEL LINE-UP

We now 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 individual level.

To estimate the effect of monetary policy on changes in the volume of credit supply, we use a panel of individual-year:month level observations (excluding the loan currency dimension) and test whether interest rate changes impact the likelihood of mortgage granting (in any currency):

$$\begin{aligned} MORTGAGELOAN_{it} = & \alpha_i + \alpha_{jt} + \beta \Delta INTERESTRATE_{t-1} \\ & + \gamma \Delta INTERESTRATE_{t-1} * BANKCAPITAL_{bt-1} + Controls + \varepsilon_{it} \end{aligned} \quad (1)$$

The dependent variable, $MORTGAGE\ LOAN_{it}$, is a dummy variable that equals one if individual i is granted a mortgage in month t .³⁰ The main independent variables are $\Delta INTEREST\ RATE_{t-1}$ 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-year:quarter fixed effects (represented by α_i and α_{jt}) and includes the following sets of variables as controls: (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-year:quarter fixed effects the income, population, and unemployment in the subregion (or locality) where the borrower lives; (4) in specifications with no time fixed effects the changes in the exchange rate, foreign direct investment, sovereign credit default swap spread and yield curve.

Next, to measure the currency and risk compositional channels of monetary policy, we exploit the currency dimension of our data. Using individual-time-currency panel data, we saturate our regressions with borrower-time fixed effects by estimating the following equation (in abridged form):

³⁰ 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.

$$\begin{aligned}
MORTGAGELOAN_{itk} = & \alpha_i + \alpha_{jtk} + \beta FX_{itk} + \gamma RISK_i \\
& + \delta \Delta INTERESTRATE_{t-1} * FX_{itk} \\
& + \theta \Delta INTERESTRATE_{t-1} * RISK_i \\
& + \eta \Delta INTERESTRATE_{t-1} * BANKCAPITAL_{bt-1} * FX_{itk} \\
& + \kappa \Delta INTERESTRATE_{t-1} * BANKCAPITAL_{bt-1} * RISK_i \\
& + \mu \Delta INTERESTRATE_{t-1} * BANKCAPITAL_{bt-1} * FX_{itk} * RISK_i \\
& + Controls + \varepsilon_{itk}
\end{aligned} \tag{2}$$

The main independent variables in this second specification are FX_{itk} ³¹ the abridged label for the *Credit Is Granted in Foreign Currency*, which equals one if the mortgage granted to individual i in month t is in Swiss Franc, 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, $\Delta INTERESTRATE_{t-1}$, which as before is the annual change in the relevant three month interest rate at $t-1$, and $BANKCAPITAL_{bt-1}$, which as before is the capital ratio at time $t-1$.

We are interested in 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, i.e. b , δ , and θ . In addition, we are interested in the coefficients 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).

We also estimate this model on the sample of individual-time observations where the individuals take out a loan. Therefore, we ask the question that conditional on borrowing in a month, how do bank capitalization and monetary policy affect the currency denomination of the mortgage loan. This approach is equivalent to estimating a currency choice model conditional on borrowing.³²

To test the economic mechanism assessing the effect of banks' foreign currency swap usage on the impact of monetary changes on the currency and risk composition of loan supply, we apply a specification similar to the one in {Bräuning, 2020} on a sample of loans granted in the domestic or the foreign currency, using individual-time level data. The complete model accounting for bank and region-year:quarter fixed effects is:

³¹ An alternative notation would be to use α_k instead of βFX_k and interpret it as a currency dummy or currency fixed effect.

³² Since we include region-time-currency fixed effect in the regressions, we use OLS for estimation instead of a conditional logit specification.

$$\begin{aligned}
MORTGAGELOAN \in FX_{it} & \\
&= \alpha_b + \alpha_{jt} + \beta \Delta INTERESTDIFF_{t-1} + \gamma BANKCAPITAL_{bt-1} \\
&\quad + \delta \Delta INTERESTDIFF_{t-1} * BANKCAPITAL_{bt-1} \\
&\quad + \theta \Delta INTERESTDIFF_{t-1} * HIGHSWAPRATIO_{bt-1} \\
&\quad + \eta \Delta INTERESTDIFF_{t-1} * BANKCAPITAL_{bt-1} * HIGHSWAPRATIO_{bt-1} \\
&\quad + \kappa \Delta INTERESTDIFF_{t-1} * BANKCAPITAL_{bt-1} * RISK_i \\
&\quad + \mu \Delta INTERESTDIFF_{t-1} * BANKCAPITAL_{bt-1} * HIGHSWAPRATIO_{bt-1} * RISK_i \\
&\quad + Controls + \varepsilon_{it}
\end{aligned} \tag{3}$$

The dependent variable, MORTGAGE LOAN IN FX_{it} , is a dummy variable that equals one if in month t individual i is granted a mortgage in Swiss Franc and equals zero if the mortgage is granted in Hungarian Forint. The main independent variable in this specification is $INTERESTDIFF_{t-1}$, which is the difference in the annual change in the three-month Hungarian Forint and Swiss Franc interest rates at time $t-1$. Other core explanatory variables include $BANKCAPITAL_{bt-1}$ and $RISK_i$, defined as before, and $HIGHSWAPRATIO_{bt-1}$, a dummy variable equal to 1 if the bank granting the loan has above median average swap exposure in month $t-1$.

4.2 MAIN INDEPENDENT VARIABLES

4.2.1 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 pp and the change varies between -5.08 pp and 6.98 pp. 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 pp and it varies between -0.42 pp and 1.19 pp. 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.

4.2.2 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.³³ This ratio is a measure of the bank's ability to obtain funding from its financiers (Holmstrom, 1997 #317) 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 account for banks' foreign currency swap market exposure, we define the *High Swap Ratio* dummy variable based on the median value of the banks' net swap volume to total assets ratio in a given month. The net swap volume equals the difference of the volumes of banks' long and short positions in swap transactions involving the exchange of the domestic currency, Hungarian Forint, to a foreign currency (short positions in HUF) or vice versa (long positions in HUF).³⁴

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.

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 $t-1$.

4.2.3 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.³⁵

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 the sample period and the definition of our borrower risk measure.

4.2.4 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).³⁶ 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.

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

³³ Consistent with the literature, for bank subsidiaries we use local subsidiary rather than bank-group-level capital ratios (see, for example, {Kashyap, 2000 #543}).

³⁴ Banks' gross swap volume is equivalent to the volume banks' open HUF short swap positions, i.e. the volume of Hungarian Forint exchanged for foreign currencies. Our measure is based on banks' net positions in a given month that is the difference between the volume of HUF received for and volume of HUF exchanged for foreign currencies.

³⁵ 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.

³⁶ 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.

5 First Findings

5.1 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 and we estimate the extensive margin of granting mortgage credit.

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-year: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-year:month fixed effects.

While we tabulate all estimated coefficients in this Table, to maintain the readability of the subsequent Tables III to VII, we report their estimated coefficients for the groups of Other Macroeconomic Variables and their Relevant Interactions, the Bank Characteristics and their Relevant Interactions, and the Subregion Characteristics, and the constant, in correspondingly numbered tables in the Appendix.

[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 decrease expands lending.³⁷ 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, 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 (bps) in our sample.³⁸ Using the parameter estimates of Model 3, we find that a lowly capitalized bank increases its mortgage credit supply by approximately 0.04 pp 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 is equal to about 5 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.

³⁷ 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-year:quarter fixed effects and hence the estimation relies only on within-year:quarter variation in monetary policy conditions.

³⁸ 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.

5.2 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.

5.2.1 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-year:quarter-currency* fixed effects, while Model 3 adds time (month) fixed effects to the specification of Model 2.

[Insert Table III here]

Model 4 further refines our empirical approach by including *subregion-year:month-currency* fixed effects. Models 5 and 6 represent our most robust specifications that use, in addition, *individual-year:month* fixed effects to control for the time-variation in individual-specific credit demand. In Model 7, we restrict our sample to those individual-time observations, where the household borrows in only one currency. This sample restriction renders the estimated regression equivalent to a currency choice model, where conditional on the individual taking a mortgage, we estimate how monetary policy and bank characteristics affect the currency denomination of the loan. 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. The last column that reports estimates for the restricted sample shows similar results, although the estimated coefficients are larger in size. This is because the estimation focuses only on those individual-time observations, where the individual borrows, and thus effectively estimates a currency choice model.

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 proposed, for the corporate sector, by {Ongena, 2021} and confirmed using data on cross-border lending flows by {Takáts, 2020}.

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 0.15 pp more than by highly capitalized banks (in Model 2). 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 0.10 pp less than by highly capitalized banks. Although seemingly small, these numbers represent economically significant effects of around +16 and -10 percent of the unconditional mean, 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.

5.2.2 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.

[Insert Table IV here]

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 bps) decrease in the Swiss interest rate, a lowly capitalized bank decreases its supply of mortgage credit in the domestic currency by 0.25 pp more than a highly capitalized bank (in Model 4). This number equals only to 0.15 pp 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 pp difference (in the bottom row of Model 4) in the differential reactions of lowly versus 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.

5.3 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, bank capital ratio, 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, Table V follows the structure of Tables III and IV.

[Insert Table V here]

In robustness estimations, we present results employing a second risk measure based on the level of education of the borrower's area of location. We employ this risk measure applying the idea that borrowers located in areas with below median education are likely to exhibit lower financial literacy and may thus be more prone to take on risky loans.

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. In Model 7, we restrict our sample to those individual-time observations where the individual takes out a loan, hence the bigger estimated coefficients.

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 specification including both individual and subregion-year: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 0.15 pp more than highly capitalized banks. When mortgages are granted in the foreign currency, a decrease of the same magnitude in the interest rate generates approximately 0.13 pp 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 -31 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 -5 percent, a significantly smaller number.³⁹

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.

We further investigate the hypothesis that monetary expansion may result in banks' lending to riskier clients in a riskier currency by testing for asymmetric effects of changes in the monetary policy rate on the volume and composition of banks' loan supply. In Table VI, we present regressions that separate the impact of interest rate increases from the impact of interest rate decreases on banks' lending decisions. Rather than interacting the interest rate change with the bank capital ratio, the loan currency denomination, and our risk measure, we create the respective double, triple, and quadruple interactions by including *interest rate increases* and *decreases* as separate variables. With respect to our proxy for borrower risk and the use of various fixed effects, the table follows the approach and structure of Table V.

[Insert Table VI here]

The results in Table VI suggest that the effect of monetary policy on the differential reaction of lowly versus highly capitalized banks depends on the direction of the change in the interest rate. Monetary tightening (interest rate increase) impacts primarily the *volume* and *risk composition* of banks' loan supply. Coefficient estimates on the interaction of our interest rate increase and bank capital variables are significantly positive in all estimations, suggesting that interest rate increases trigger decreases in bank lending especially by low capitalization banks. The significant negative sign of the triple interaction of the interest rate increase, bank capital, and risky borrower dummy variables indicates that monetary tightening is less likely to generate a contraction in the supply of loans to risky borrowers, independent of the denomination

³⁹ When banks lend to risky clients in the domestic currency, a one standard deviation decrease in the interest rate results in 0.20 pp 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 pp.

of the loan currency. The result suggests that contractionary monetary changes trigger bank risk-taking by shifting the risk composition of banks' loan supply.

In contrast, interest rate decreases (monetary expansion) appear to have a significant impact primarily on the *composition* of loan supply along the currency denomination and risk dimensions. The significant negative coefficient on the triple interaction of the interest rate decrease, bank capital, and foreign currency denomination dummy variables indicates that a monetary expansion increases lending especially in the domestic (rather than the foreign) currency. The significant positive coefficient on the quadruple interaction term, at the same time, shows that expansionary monetary policy boosts bank lending for risky borrowers in the foreign currency. The result suggests that expansionary monetary policy may enhance banks' risk-taking by increasing lending to riskier clients in the riskier foreign currency. Estimates are once more economically relevant (to avoid further clutter, from now on we no longer display this calculation panel).

Finally, in Table VII we focus on the impact of foreign monetary policy on banks' local lending decisions extending our specifications in Table V by including 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 interplay between the currency compositional and risk-taking channels 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.⁴⁰

[Insert Table VII here]

Similar to the results in Table V, the coefficient of the interaction between the Swiss 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 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 decrease in the Swiss interest rate does not depend on the currency denomination of the loan.

⁴⁰ When banks lend to risky clients in the domestic currency, a one standard deviation decrease in the interest rate results in 0.065 pp 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 pp.

6 Heterogeneous Effects

Next, we focus on how differences in foreign currency funding can affect the currency and risk compositional loan supply effects of monetary policy changes. Our hypothesis is that banks' access to funding in various currencies is a determining factor for the impact of monetary policy on their lending in various currencies. Given that many banks in our sample have foreign owners, we first examine whether the impact of monetary policy shocks on the volume and composition of loan supply is dependent on bank ownership.

We split our sample into individuals with domestic versus foreign bank relationships and re-estimate our main regressions for the bank-lending and the bank risk-taking channels. Appendix Table V-2 summarizes our estimates. It shows that the relevant triple and quadruple interactions measuring the currency and risk compositional channels are much larger and significant for domestic banks, while they are smaller and, in some specifications, insignificant for foreign banks.

A major difference between domestic and foreign banks is their access to foreign currency funding. Foreign banks can directly borrow from their parent banks while domestic banks do not have this option. Instead, domestic banks use swap transactions to fund their foreign currency lending, which is likely to make their lending more sensitive to external shocks. In the following, we examine this by estimating how the currency and risk compositional channels vary by the extent to which banks rely on swap transactions.

In Table VIII, we estimate the specification shown by equation (3) and present regressions of credit granting in the foreign versus the domestic currency on the *differential* between changes in the *foreign* and *domestic* interest rates and its relevant double, triple, and quadruple interactions with bank capital, borrower risk, and the high swap ratio dummy variables. Consistent with our main specification (Model (4) in Table V), we also include, in these regressions, the change in GDP growth, inflation rate, and their respective triple and quadruple interaction terms.⁴¹

[Insert Table VIII]

We estimate our regressions on a cross-section of actual loans by commercial banks excluding the loans offered by cooperative banks, which engage the swap market intermittently, if at all, yet represent only approximately 5 percent of the total number of loans in the sample.⁴² We include in the specification bank as well as locality-time fixed effects, at various levels of aggregation, based on the borrower's area of location.

Our most complete specification is Model 6 that includes bank and locality-year:month fixed effects. The estimated positive and significant coefficients on the interaction of the change in the interest differential and bank capital ratio indicate that domestic monetary expansion (i.e., a higher interest differential) generates less lending in the foreign currency primarily by lowly capitalized banks, consistent with our earlier findings. The negative and highly significant coefficient on the triple interaction of the change in the interest differential, bank capital, and the high swap ratio variables suggests that banks generating funding for their currency lending from foreign currency swap markets are particularly affected by the impact of the interest rate change. High capitalization in itself is insufficient, for these banks, to balance the impact of the interest rate change on the cost of synthetic funding in the higher interest rate currency, a result consistent with {Bräuning, 2020}

⁴¹ Models in Table VIII are estimated on a collapsed sample of actual loans granted by banks in the foreign or the domestic currency and thus use a much lower number of observations than our models in earlier tables. This is because using our three-dimensional panel, we would not be able to assess the mechanism that interacts the currency and risk compositional channels since that would require the inclusion of an interaction term consisting of five variables (the change in the interest rate, bank capital, borrower risk, the high swap ratio and the foreign currency dummies) making estimations computationally complex and difficult to interpret.

⁴² When we include the additional 5 percent of the loans by cooperative banks, our estimates are correspondingly somewhat less significant. In Appendix Table V-3 we further compare commercial with cooperative banks in their lending responses to interest rate changes. As is the case with foreign banks, cooperatives are much less responsive to changes in the interest rate than commercial banks, likely because of their non-profit motives (and not because like foreign banks they would have within bank-group access to foreign currency).

and {Ongena, 2021}. Foreign currency lending by these banks will therefore decrease more, independent of the level of bank capitalization.

To assess the interaction of the currency and risk compositional channels, we also include in the regression a quadruple interaction variable, interacting the triple term with our borrower risk measure, a dummy variable indicating the borrower defaults on the loan within six years following loan granting. The estimated coefficients are positive and significant indicating that when lending takes place to risky borrowers, the increase in the cost of synthetic swap funding plays no significant role and foreign currency lending to these borrowers increases, in spite of the raise in the relative cost of foreign currency funding. The result suggests that following domestic monetary expansion, the currency and risk compositional changes in banks' loan supply may interact in a way that increases bank risk-taking by leading to banks' loan granting to riskier clients in the riskier foreign currency.

7 Robustness: Samples and Risk of Borrowers and Bank Characteristics

7.1 BORROWER RISK MEASURES

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

The October 2008 exchange rate shock for example substantially increased foreign currency debtor households' monthly payments and their probability of default (Verner, 2017). Therefore, some households might have defaulted on their mortgage because of the exchange rate shock rather than their ex-ante riskiness.

To account for the impact of the exchange rate shock, we also estimate our regressions on a sample that excludes individuals defaulting on their mortgage in the period between October 2008 and October 2009. Our results are almost unaffected by this modification of the sample and we leave them further unreported.

We also present, in the Appendix Table V-4, robustness estimations using a second risk measure: A dummy variable that equals one if the borrower lives in a region with below median average education, and zero otherwise. Living in a region with lower educational attainment can be related to riskiness for two reasons. First, education is often correlated with financial literacy, and therefore people living in less educated region may take out riskier loan products. Second, education is a strong predictor of income and less educated people are also more likely to become unemployed during a recession. These imply that people living in less educated regions may exhibit larger risks for the banks.

Estimates with the low education dummy variable capturing the riskiness of borrowers are presented in Appendix Table V-4. Given that this risk measure varies at the region level instead of the individual level, some parameters cannot be estimated due to the inclusion of fixed effects. The coefficients reported, in Model 6, for the currency and risk compositional effects are close to our coefficients estimated in Table V. We rerun Tables VI to VIII with the new risk measure and find similar results (not reported), suggesting that our results are robust to the measure of borrower riskiness.

7.2 SAMPLE SELECTION

All loan contract samples face potential borrower discouragement and loan application approval biases (e.g., Cole, 1998 #318, Brown, 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 foreign currency 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 entitled households to repay their mortgage and home equity debt denominated in FX 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. Appendix Table III-2 presents coefficient estimates based on the specifications established in Table III. The estimated coefficients are very similar to our earlier estimates such that also the economic effect of a unit change in the monetary policy rate using these coefficients are of similar size as in our main specifications in Table III. We conclude that our results are robust to the inclusion of loans repaid before the establishment of the credit registry in April 2012.

7.3 BANK GROUP CAPITALIZATION AND OTHER BANK CHARACTERISTICS

We use bank capitalization as a measure for the strength of the bank balance sheet in our baseline specifications. However, several banks in Hungary have parent banks. Therefore, bank capitalization might not be closely related to the bank's ability to obtain funding from its financiers as it can borrow directly from its parent bank as well. To take this possibility into account, we use the bank group capitalization, when it is available, as an alternative measure to proxy the funding conditions of banks. In case of banks with no parent banks, we use the original bank capitalization measure. We then create the double, triple and quadruple interaction terms between the bank group capitalization variable and all the other relevant macro and individual level variables.

Models 1 to 3 in Appendix Table IX present the results when time-varying demand is controlled for either by subregion-time-currency fixed effects or borrower-time fixed effects. The point estimates of the relevant double, triple, and quadruple interaction terms are quantitatively similar to the coefficients of our baseline specifications. These indicate that the volume, composition and risk-taking channels of monetary policy are not driven by the bank group level funding costs.

Next, we examine whether other bank characteristics, instead of bank capitalization, are driving the credit supply of banks. To do this, we include another bank characteristic and its relevant interaction terms as control variables. Models 4 to 6 in Appendix Table IX report the results when bank liquidity rate is controlled for, while Models 7 to 9 show the estimates when the interaction terms of total assets are included. We report only the same specifications as in the first three columns.

We find that the volume and composition effects are somewhat smaller in absolute value but quantitatively similar to the baseline results when controlling for either bank liquidity rate or bank total assets. The coefficients of quadruple interaction term measuring the risk-taking channel are also smaller than the baseline estimates across these specifications. The coefficients are significant at traditional significance level in all three specifications when controlling for bank liquidity rate. When we include total assets as control in Models 7 to 9, the point estimates are significant only in the first two specifications and marginally insignificant ($p=0.11$) in the last specification.

These results suggest that the composition of banks' loan supply is not driven by other bank characteristics, while risk-taking might have been moderated by other bank characteristics as well.

8 Conclusion

How do monetary conditions affect the supply of mortgage credit by banks to households? To answer this question we turn to 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 expansionary foreign monetary policy decreases the supply of mortgages more in the domestic currency than in the foreign currency, except when banks lend to risky households. When mortgages are offered to risky borrowers, the currency compositional effects of foreign monetary policy seem to disappear.

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.

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H-1013 BUDAPEST, KRISZTINA KÖRÚT 55.

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 CHF-HUF Interest Differential _{t-1m}	-	Difference in annual change in the Swiss 3-month LIBOR interest rate and the Hungarian 3-month government bond rate in month t-1	0,0055	0,0306	-0,0732	-0,0091	0,0051	0,0290	0,0517
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
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
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
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
High Swap Ratio	0/1	=1 if bank has above median net (HUF short) swap volume to total assets ratio in month t-1	0,0630	0,1888	0	0	0	0,0179	1
Subregion Characteristics									
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
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
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
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 21,893,838. 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	-0.1628*** (-23.60)	-0.0868*** (-9.05)	-0.0317* (-1.85)			
	Δ Interest rate * Bank Capital Ratio		-0.0176 (-0.33)	0.1625*** (2.95)	0.1208** (2.18)	0.1247** (2.25)	
Other Macroeconomic Variables and Relevant Interactions	Δ GDP	-0.1886*** (-54.14)	-0.2820*** (-28.02)				
	Δ GDP * Bank Capital Ratio		1.6605*** (16.85)	1.7707*** (17.56)	1.7973*** (17.78)	1.8008*** (17.78)	
	Δ CPI	-0.0439*** (-7.96)	-0.0247** (-2.47)	-0.0703*** (-5.27)			
	Δ CPI * Bank Capital Ratio		-0.2436*** (-2.66)	-0.0220 (-0.24)	0.0811 (0.86)	0.0864 (0.91)	
	Δ Credit Default Swap Spread	0.0048*** (29.58)	0.0021*** (10.62)	-0.0021*** (-3.56)			
	Δ Nominal Effective Exchange Rate	0.0201*** (14.05)	0.0197*** (13.44)	0.0187*** (4.65)			
	Δ Yield Curve	-0.3896*** (-30.96)	-0.2828*** (-20.80)	0.0408* (1.83)			
	Foreign Direct Investment	0.0000*** (3.39)	0.0001*** (8.79)				
Bank Characteristics	Bank Capital Ratio		-0.1015*** (-11.81)	-0.1411*** (-16.05)	-0.1468*** (-16.63)	-0.1475*** (-16.66)	
	Bank Total Assets		0.0149*** (59.02)	0.0118*** (34.01)	0.0120*** (34.52)	0.0120*** (34.50)	
	Bank Liquidity Ratio		-0.0005 (-0.30)	0.0019 (1.11)	0.0004 (0.23)	0.0005 (0.28)	
	Bank Return on Assets		-0.0247*** (-6.78)	-0.0015 (-0.40)	0.0363*** (6.76)	0.0365*** (6.73)	
	Bank Doubtful Loan Ratio		-0.0660*** (-55.95)	-0.0727*** (-58.28)	-0.0725*** (-58.01)	-0.0725*** (-58.00)	
Subregion Characteristics	Log Income in Subregion	0.0124 (1.20)	0.0113 (1.11)				
	Log Population in Subregion	-0.0011 (-1.29)	-0.0011 (-1.28)				
	Unemployment in Subregion	0.0553* (1.78)	0.0526* (1.72)				
Fixed Effects and Summary Statistics	constant	-0.0484 (-0.75)	-0.2087*** (-3.26)	-0.0986*** (-18.95)	-0.1063*** (-20.66)	-0.1063*** (-20.64)	
	Borrower Fixed Effects	Yes	Yes	Yes	Yes	Yes	
	Region-Year:Quarter Fixed Effects	No	No	Yes	Yes	--	
	Region-Year:Month Fixed Effects	No	No	No	No	--	
	Locality-Year:Month Fixed Effects	No	No	No	No	Yes	
	Month Fixed Effects	No	No	No	Yes	--	
	Number of Observations	10,946,919	10,946,919	10,946,919	10,946,919	10,946,919	
	<i>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)</i>						
			0,0048	0,0445	0,0331	0,0342	
	<i>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) as Percent of Unconditional Probability of Granting a Mortgage in Sample (= 0.92%)</i>						
			1%	5%	4%	4%	

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 statistics for each variable is given in Table I. The number of observations equals 10,946,919. 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%.

Table III
Bank lending channel in the domestic and the foreign currency

Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Δ Interest rate	-0.0115** (-2.12)	-0.1111*** (-10.46)					
Δ Interest rate * Bank Capital Ratio	0.1044*** (2.61)	0.5477*** (12.76)	0.5265*** (12.26)	0.5313*** (12.33)			
Δ Interest rate * Credit is Granted in Foreign Currency	-0.0698*** (-14.81)	0.1916*** (18.36)	0.1916*** (18.36)				
Δ Interest rate * Bank Capital Ratio * Credit is Granted in Foreign Currency	-0.1959*** (-3.88)	-0.8968*** (-15.85)	-0.8968*** (-15.85)	-0.9025*** (-15.87)	-0.9025*** (-15.87)	-0.9150*** (-15.78)	-29.95*** (-5.33)
All Other Variables in Appendix Table III	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Borrower Fixed Effects	Yes	Yes	Yes	Yes	--	--	--
Borrower-Year:Month Fixed Effects	No	No	No	No	Yes	Yes	Yes
Region-Year:Quarter-Currency Fixed Effects	No	Yes	Yes	--	--	--	--
Region-Year:Month-Currency Fixed Effects	No	No	No	Yes	Yes	--	--
Locality-Year:Month-Currency Fixed Effects	No	No	No	No	No	Yes	Yes
Month Fixed Effects	No	No	Yes	--	--	--	--
Number of Observations	21 893 838	21 893 838	21 893 838	21 893 838	21 893 838	21 872 776	332 992
<i>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)</i>							
in Hungarian Forint	0,0286	0,1501	0,1443	0,1456	-	-	-
in Foreign Currency	-0,0251	-0,0957	-0,1015	-0,1017	-	-	-
Difference in Impact Between Foreign Currency and Hungarian Forint	-0,0537	-0,2458	-0,2458	-0,2474	-0,2474	-0,2508	-8,2089
<i>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%)</i>							
in Hungarian Forint	3%	16%	16%	16%	-	-	-
in Foreign Currency	-3%	-10%	-11%	-11%	-	-	-
Difference in Impact Between Foreign Currency and Hungarian Forint	-6%	-27%	-27%	-27%	-27%	-27%	-13%

NOTE. -- The table reports estimates from ordinary least squares regressions (an accompanying 'full' table in appendix reports all estimated coefficients). 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. In Model 7, we restrict the sample to those individual-time observations, where the individual takes out loan only in one currency. All independent variables are either lagged one month or calculated over the preceding month. Timing, definition and summary statistics for each variable is given in Table I. The number of observations equals 21,893,838 and accounts for the full population of mortgages in HUF or CHF 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%.

Table IV
Domestic and foreign bank lending channel in the domestic and the foreign currency

Model	(1)	(2)	(3)	(4)	(5)	(6)
Δ Interest rate	-0.0126** (-2.19)	-0.0897*** (-8.22)				
Δ Interest rate * Bank Capital Ratio	-0.0682 (-1.52)	0.0613 (1.30)	0.0325 (0.69)	0.0302 (0.64)		
Δ Interest rate * Credit is Granted in Foreign Currency	0.0072 (1.29)	0.1734*** (16.25)	0.1734*** (16.25)			
Δ Interest rate * Bank Capital Ratio * Credit is Granted in Foreign Currency	-0.5481*** (-9.24)	-0.6996*** (-11.30)	-0.6996*** (-11.30)	-0.6952*** (-11.16)	-0.6952*** (-11.16)	-0.6975*** (-11.02)
Δ Swiss interest rate	0.0724*** (3.57)	0.6982*** (16.33)				
Δ Swiss Interest Rate * Bank Capital Ratio	-4.9725*** (-25.81)	-6.5995*** (-31.42)	-6.6609*** (-31.77)	-6.7349*** (-32.03)		
Δ Swiss interest rate * Credit is Granted in Foreign Currency	1.1648*** (41.95)	0.4434*** (5.75)	0.4434*** (5.75)			
Δ Swiss Interest Rate * Bank Capital Ratio * Credit is Granted in Foreign Currency	-0,1769 (-0.65)	2.5401*** (8.70)	2.5401*** (8.70)	2.6501*** (9.05)	2.6501*** (9.05)	2.7779*** (9.31)
All Other Variables in Appendix Table IV	Yes	Yes	Yes	Yes	Yes	Yes
Borrower Fixed Effects	Yes	Yes	Yes	Yes	--	--
Borrower-Year:Month Fixed Effects	No	No	No	No	Yes	Yes
Region-Year:Quarter-Currency Fixed Effects	No	Yes	Yes	--	--	--
Region-Year:Month-Currency Fixed Effects	No	No	No	Yes	Yes	-
Locality-Year:Month-Currency Fixed Effects	No	No	No	No	No	Yes
Month Fixed Effects	No	No	Yes	--	--	--
Number of Observations	21 893 838	21 893 838	21 893 838	21 893 838	21 893 838	21 872 776
<i>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)</i>						
in Hungarian Forint	-0,0187	-0,0168	-0,0089	-0,0083		
in Foreign Currency	-0,1502	-0,1918	-0,1918	-0,1905		
Difference in Impact Between Foreign Currency and Hungarian Forint	-0,1315	-0,1749	-0,1828	-0,1823	-0,1905	-0,1912
<i>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%)</i>						
in Hungarian Forint	-2%	-2%	-1%	-1%		
in Foreign Currency	-16%	-21%	-21%	-21%		
Difference in Impact Between Foreign Currency and Hungarian Forint	-14%	-19%	-20%	-20%	-21%	-21%
<i>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)</i>						
in Hungarian Forint	-0,1869	-0,2480	-0,2503	-0,2531		
in Foreign Currency	-0,0066	-0,1526	-0,1549	-0,1535		
Difference in Impact Between Foreign Currency and Hungarian Forint	0,1869	0,0955	0,0955	0,0996	0,0996	0,1044
<i>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%)</i>						
in Hungarian Forint	-20%	-27%	-27%	-28%		
in Foreign Currency	-1%	-17%	-17%	-17%		
Difference in Impact Between Foreign Currency and Hungarian Forint	20%	10%	10%	11%	11%	11%

NOTE. -- The table reports selected estimates from ordinary least squares regressions (an accompanying 'full' table in appendix reports all estimated coefficients). 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 statistics for each variable is in Table I. The number of observations equals 21,893,838 and it accounts for the full population 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%.

Table V							
Bank risk-taking channel in the domestic and the foreign currency with “ex-post default within six years” as risk measure							
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Δ Interest rate	-0.0023 (-0.40)	-0.1026*** (-9.53)					
Δ Interest rate * Bank Capital Ratio	0.1278*** (2.84)	0.5710*** (11.92)	0.5506*** (11.49)	0.5550*** (11.56)			
Δ Interest rate * Credit is Granted in Foreign Currency	-0.0720*** (-13.80)	0.1898*** (17.73)	0.1898*** (17.73)				
Δ Interest rate * Bank Capital Ratio * Credit is Granted in Foreign Currency	-0.3408*** (-6.07)	-1.0375*** (-16.50)	-1.0375*** (-16.50)	-1.0426*** (-16.51)	-1.0426*** (-16.51)	-1.0554*** (-16.41)	-38.54*** (-7.46)
Δ Interest rate * Person defaulted on loan (in HUF/CHF) within 6 years	-0.0776*** (-9.91)	-0.0715*** (-9.03)	-0.0714*** (-9.02)	-0.0714*** (-9.01)			
Δ Interest rate * Bank Capital Ratio * Person defaulted on loan (in HUF/CHF) within 6 years	-0.0287 (-0.34)	-0.0341 (-0.40)	-0.0367 (-0.43)	-0.0361 (-0.42)			
Δ Interest rate * Credit is Granted in Foreign Currency * Person defaulted on loan (in HUF/CHF) within 6 years	0.0269** (2.29)	0.0227* (1.87)	0.0227* (1.87)	0.0226* (1.86)	0.0226* (1.86)	0.0185 (1.49)	-4.491* (-2.18)
Δ Interest rate * Bank Capital Ratio * Credit is Granted in Foreign Currency * Person defaulted on loan (in HUF/CHF) within 6 years	0.8618*** (6.88)	0.8600*** (6.59)	0.8600*** (6.59)	0.8594*** (6.58)	0.8594*** (6.58)	0.8782*** (6.59)	49.59* (2.18)
All Other Variables in Appendix Table V	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Borrower Fixed Effects	Yes	Yes	Yes	Yes	--	--	--
Borrower-Year:Month Fixed Effects	No	No	No	No	Yes	Yes	Yes
Region-Year:Quarter-Currency Fixed Effects	No	Yes	Yes	--	--	--	--
Region-Year:Month-Currency Fixed Effects	No	No	No	Yes	Yes	--	--
Locality-Year:Month-Currency Fixed Effects	No	No	No	No	No	Yes	Yes
Month Fixed Effects	No	No	Yes	--	--	--	--
Number of Observations	21 893 838	21 893 838	21 893 838	21 893 838	21 893 838	21 872 776	332 992
<i>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)</i>							
in Hungarian Forint when Borrower is Not Risky	0,0350	0,1565	0,1509	0,1521			
in Foreign Currency when Borrower is Not Risky	-0,0584	-0,1279	-0,1335	-0,1336			
in Hungarian Forint when Borrower is Risky	0,0350	0,1565	0,1509	0,1521			
in Foreign Currency when Borrower is Risky	0,1773	0,1079	0,1023	0,1019			
Difference in Impact between Foreign Currency and Hungarian Forint, when Borrower is Not Risky	-0,0934	-0,2844	-0,2844	-0,2858	-0,2858	-0,2893	-10,5633
Difference in Impact between Foreign Currency and Hungarian Forint, when Borrower is Risky	0,1423	-0,0487	-0,0487	-0,0502	-0,0502	-0,0486	3,0287
<i>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%)</i>							
in Hungarian Forint when Borrower is Not Risky	4%	17%	16%	17%			
in Foreign Currency when Borrower is Not Risky	-6%	-14%	-15%	-15%			
in Hungarian Forint when Borrower is Risky	4%	17%	16%	17%			
in Foreign Currency when Borrower is Risky	19%	12%	11%	11%			
Difference in Impact between Foreign Currency and Hungarian Forint, when Borrower is Not Risky	-10%	-31%	-31%	-31%	-31%	-31%	-17%
Difference in Impact between Foreign Currency and Hungarian Forint, when Borrower is Risky	15%	-5%	-5%	-5%	-5%	-5%	5%

NOTE. -- The table reports selected estimates from ordinary least squares regressions (an accompanying ‘full’ table in appendix reports all estimated coefficients). 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 21,893,838 and it accounts for the full population 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%.

Table VI						
Domestic and foreign bank risk-taking channel in the domestic and the foreign currency with “ex-post default within 6 years” as risk measure, asymmetric effects						
Model	(1)	(2)	(3)	(4)	(5)	(6)
Δ Interest rate	-0.1051*** (-12.13)	0.0229 (1.50)				
Δ Interest rate Positive	0.1294*** (10.96)	-0.1963*** (-10.56)				
Δ Interest rate Positive * Bank Capital Ratio	1.2317*** (16.61)	1.3592*** (17.03)	1.3146*** (16.54)	1.3195*** (16.56)		
Δ Interest rate Negative * Bank Capital Ratio	-0.4349*** (-5.05)	-0.2525*** (-2.87)	-0.2329*** (-2.65)	-0.2257** (-2.56)		
Δ Interest rate Positive * Credit is Granted in Foreign Currency	-0.3754*** (-50.14)	0.1416*** (10.87)	0.1416*** (10.87)			
Δ Interest rate Negative * Credit is Granted in Foreign Currency	0.3210*** (29.67)	0.2401*** (11.93)	0.2401*** (11.93)			
Δ Interest rate Positive * Bank Capital Ratio * Credit is Granted in Foreign Currency	-0.2818*** (-3.31)	-0.3738*** (-4.04)	-0.3738*** (-4.04)	-0.3695*** (-3.98)	-0.3695*** (-3.98)	-0.3905*** (-4.10)
Δ Interest rate Negative * Bank Capital Ratio * Credit is Granted in Foreign Currency	-1.6650*** (-14.41)	-1.8371*** (-15.70)	-1.8371*** (-15.70)	-1.8571*** (-15.81)	-1.8571*** (-15.81)	-1.8584*** (-15.63)
Δ Interest rate Positive * Person defaulted on loan (in HUF/CHF) within 6 years	-0.1283*** (-11.43)	-0.1197*** (-10.53)	-0.1186*** (-10.46)	-0.1193*** (-10.52)		
Δ Interest rate Negative * Person defaulted on loan (in HUF/CHF) within 6 years	-0.0099 (-0.63)	-0.0082 (-0.52)	-0.0087 (-0.55)	-0.0079 (-0.50)		
Δ Interest rate Positive * Bank Capital Ratio * Person defaulted on loan (in HUF/CHF) within 6 years	-0.9888*** (-7.80)	-0.9405*** (-7.31)	-0.9540*** (-7.43)	-0.9519*** (-7.42)		
Δ Interest rate Negative * Bank Capital Ratio * Person defaulted on loan (in HUF/CHF) within 6 years	0.5753*** (3.39)	0.5526*** (3.26)	0.5578*** (3.29)	0.5543*** (3.27)		
Δ Interest rate Positive * Credit is Granted in Foreign Currency * Person defaulted on loan (in HUF/CHF) within 6 years	0.0680*** (4.37)	0.0699*** (4.31)	0.0699*** (4.31)	0.0706*** (4.35)	0.0706*** (4.35)	0.0657*** (3.93)
Δ Interest rate Negative * Credit is Granted in Foreign Currency * Person defaulted on loan (in HUF/CHF) within 6 years	-0.0285 (-1.14)	-0.0385 (-1.54)	-0.0385 (-1.54)	-0.0397 (-1.59)	-0.0397 (-1.59)	-0.0424* (-1.69)
Δ Interest rate Positive * Bank Capital Ratio * Credit is Granted in Foreign Currency * Person defaulted on loan (in HUF/CHF) within 6 years	0.5044*** (2.89)	0.3599** (1.96)	0.3599** (1.96)	0.3537* (1.93)	0.3537* (1.93)	0.3585* (1.90)
Δ Interest rate Negative * Bank Capital Ratio * Credit is Granted in Foreign Currency * Person defaulted on loan (in HUF/CHF) within 6 years	1.4031*** (5.37)	1.4960*** (5.73)	1.4960*** (5.73)	1.5046*** (5.76)	1.5046*** (5.76)	1.5279*** (5.78)
All Other Variables in Appendix Table VI	Yes	Yes	Yes	Yes	Yes	Yes
Borrower Fixed Effects	Yes	Yes	Yes	Yes	--	--
Borrower-Year:Month Fixed Effects	No	No	No	No	Yes	Yes
Region-Year:Quarter-Currency Fixed Effects	No	Yes	Yes	--	--	--
Region-Year:Month-Currency Fixed Effects	No	No	No	Yes	Yes	--
Locality-Year:Month-Currency Fixed Effects	No	No	No	No	No	Yes
Month Fixed Effects	No	No	Yes	--	--	--
Number of Observations	21 893 838	21 893 838	21 893 838	21 893 838	21 893 838	21 872 776

NOTE. -- The table reports selected estimates from ordinary least squares regressions (an accompanying ‘full’ table in appendix reports all estimated coefficients). 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 21,893,838 and it accounts for the full population 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%.

Table VII						
Domestic and foreign bank risk-taking channel in the domestic and the foreign currency with "ex-post default within 6 years" as risk measure						
Model	(1)	(2)	(3)	(4)	(5)	(6)
Δ Interest rate	-0.0069 (-1.14)	-0.0847*** (-7.63)				
Δ Interest rate * Bank Capital Ratio	-0.0354 (-0.70)	0.0939* (1.78)	0.0651 (1.23)	0.0621 (1.17)		
Δ Interest rate * Credit is Granted in Foreign Currency	0.0067 (1.09)	0.1736*** (15.79)	0.1736*** (15.79)			
Δ Interest rate * Bank Capital Ratio * Credit is Granted in Foreign Currency	-0.6837*** (-10.36)	-0.8346*** (-12.15)	-0.8346*** (-12.15)	-0.8295*** (-12.02)	-0.8295*** (-12.02)	-0.8338*** (-11.91)
Δ Interest rate * Person defaulted on loan (in HUF/CHF) within 6 years	-0.0485*** (-5.34)	-0.0462*** (-5.02)	-0.0465*** (-5.06)	-0.0467*** (-5.08)		
Δ Interest rate * Bank Capital Ratio * Person defaulted on loan (in HUF/CHF) within 6 years	-0.1164 (-1.20)	-0.0967 (-0.98)	-0.0943 (-0.96)	-0.0917 (-0.93)		
Δ Interest rate * Credit is Granted in Foreign Currency * Person defaulted on loan (in HUF/CHF) within 6 years	0.0153 (1.10)	0.0108 (0.77)	0.0108 (0.77)	0.0108 (0.77)	0.0108 (0.77)	0.0064 (0.45)
Δ Interest rate * Bank Capital Ratio * Credit is Granted in Foreign Currency * Person defaulted on loan (in HUF/CHF) within 6 years	0.7954*** (5.49)	0.7859*** (5.36)	0.7859*** (5.36)	0.7832*** (5.34)	0.7832*** (5.34)	0.8024*** (5.39)
Δ Swiss Interest rate	0.0017 (0.08)	0.6345*** (14.51)				
Δ Swiss Interest rate * Bank Capital Ratio	-5.0215*** (-23.06)	-6.6639*** (-28.47)	-6.7390*** (-28.87)	-6.8147*** (-29.12)		
Δ Swiss Interest rate * Credit is Granted in Foreign Currency	1.2051*** (39.13)	0.4843*** (6.19)	0.4843*** (6.19)			
Δ Swiss Interest rate * Bank Capital Ratio * Credit is Granted in Foreign Currency	0.1646 (0.54)	2.8678*** (8.81)	2.8678*** (8.81)	2.9780*** (9.12)	2.9780*** (9.12)	3.0897*** (9.31)
Δ Swiss Interest rate * Person defaulted on loan (in HUF/CHF) within 6 years	0.5038*** (11.45)	0.4556*** (9.95)	0.4483*** (9.79)	0.4469*** (9.75)		
Δ Swiss Interest rate * Bank Capital Ratio * Person defaulted on loan (in HUF/CHF) within 6 years	0.1623 (0.36)	0.3414 (0.72)	0.4215 (0.88)	0.4334 (0.91)		
Δ Swiss Interest rate * Credit is Granted in Foreign Currency * Person defaulted on loan (in HUF/CHF) within 6 years	-0.2428*** (-3.27)	-0.2350*** (-3.13)	-0.2350*** (-3.13)	-0.2355*** (-3.13)	-0.2355*** (-3.13)	-0.2432*** (-3.19)
Δ Swiss Interest rate * Bank Capital Ratio * Credit is Granted in Foreign Currency * Person defaulted on loan (in HUF/CHF) within 6 years	-2.7495*** (-3.88)	-2.8237*** (-3.92)	-2.8237*** (-3.92)	-2.8244*** (-3.91)	-2.8244*** (-3.91)	-2.8291*** (-3.86)
All Other Variables in Appendix Table VII	Yes	Yes	Yes	Yes	Yes	Yes
Borrower Fixed Effects	Yes	Yes	Yes	Yes	--	--
Borrower-Year:Month Fixed Effects	No	No	No	No	Yes	Yes
Region-Year:Quarter-Currency Fixed Effects	No	Yes	Yes	--	--	--
Region-Year:Month-Currency Fixed Effects	No	No	No	Yes	Yes	--
Locality-Year:Month-Currency Fixed Effects	No	No	No	No	No	Yes
Month Fixed Effects	No	No	Yes	--	--	--
Number of Observations	21 893 838	21 893 838	21 893 838	21 893 838	21 893 838	21 872 776

NOTE. -- The table reports selected estimates from ordinary least squares regressions (an accompanying 'full' table in appendix reports all estimated coefficients). 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 21,893,838 and it accounts for the full population 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. "--" indicates that the coefficient is insignificant and hence that no economic relevancy is calculated. *** Significant at 1%, ** significant at 5%, * significant at 10%.

Table VIII
Domestic bank risk-taking channel, banks with different swap to assets ratios, default within 6 years as risk measure

Model	(1)	(2)	(3)	(4)	(5)
Δ Interest rate CHF - HUF	2.6898*** (10.20)	-4.4377*** (-10.43)			
Δ Interest rate CHF - HUF * Bank Capital Ratio	19.8745*** (9.25)	25.3142*** (11.60)	26.6436*** (12.08)	26.7400*** (11.90)	27.4850*** (10.53)
Δ Interest rate CHF - HUF * High Net Swap Ratio	-0.0153 (-0.04)	3.7407*** (9.90)	4.0410*** (10.65)	4.1018*** (10.58)	4.2598*** (9.70)
Δ Interest rate CHF - HUF * Bank Capital Ratio * High Net Swap Ratio	40.1094*** (8.58)	-4.5509 (-0.96)	-8.6760* (-1.82)	-9.3628* (-1.92)	-10.7757* (-1.95)
Δ Interest rate CHF - HUF * Person defaulted on loan (in HUF/CHF) within 6 years	4.5912*** (4.64)	5.3916*** (7.76)	5.5086*** (8.00)	5.3090*** (7.63)	5.5542*** (6.90)
Δ Interest rate CHF - HUF * Bank Capital Ratio * Person defaulted on loan (in HUF/CHF) within 6 years	-39.0850*** (-3.88)	-45.6146*** (-6.53)	-46.6616*** (-6.74)	-45.0969*** (-6.45)	-45.6274*** (-5.63)
Δ Interest rate CHF - HUF * Person defaulted on loan (in HUF/CHF) within 6 years * High Net Swap Ratio	-1.6075 (-1.06)	-5.5835*** (-4.33)	-5.6259*** (-4.37)	-5.3427*** (-4.07)	-5.1646*** (-3.59)
Δ Interest rate CHF - HUF * Bank Capital Ratio * Person defaulted on loan (in HUF/CHF) within 6 years * High Net Swap Ratio	-18.7628 (-1.04)	37.1006** (2.34)	37.9507** (2.39)	35.1844** (2.16)	30.7705* (1.73)
All Other Variables in Appendix Table VIII	Yes	Yes	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes
Region-Year:Quarter Fixed Effects	No	Yes	Yes	--	--
Region-Year:Month Fixed Effects	No	No	No	Yes	--
Locality-Year:Month Fixed Effects	No	No	No	No	Yes
Month Fixed Effects	No	No	Yes	--	--
Number of Observations	186 574	186 561	186 561	186 222	160 718

NOTE. -- The table reports selected estimates from ordinary least squares regressions (an accompanying 'full' table in appendix reports all estimated coefficients). 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. 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 III Bank lending channel in the domestic and the foreign currency							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Δ Interest rate	-0.0115** (-2.12)	-0.1111*** (-10.46)					
Δ Interest rate * Bank Capital Ratio	0.1044*** (2.61)	0.5477*** (12.76)	0.5265*** (12.26)	0.5313*** (12.33)			
Δ Interest rate * Credit is Granted in Foreign Currency	-0.0698*** (-14.81)	0.1916*** (18.36)	0.1916*** (18.36)				
Δ Interest rate * Bank Capital Ratio * Credit is Granted in Foreign Currency	-0.1959*** (-3.88)	-0.8968*** (-15.85)	-0.8968*** (-15.85)	-0.9025*** (-15.87)	-0.9025*** (-15.87)	-0.9150*** (-15.78)	-29.95*** (-5.33)
Δ GDP	0.1414*** (25.17)						
Δ GDP * Bank Capital Ratio	-0.0638 (-1.07)	0.1444** (2.34)	0.1580** (2.56)	0.1525** (2.46)			
Δ GDP * Credit is Granted in Foreign Currency	-0.5632*** (-67.48)						
Δ GDP * Bank Capital Ratio * Credit is Granted in Foreign Currency	1.7588*** (20.34)	1.4560*** (16.34)	1.4560*** (16.34)	1.4705*** (16.47)	1.4705*** (16.47)	1.5289*** (16.87)	6,891 (0.87)
Δ CPI	0.0143** (2.45)	0.0274*** (3.21)					
Δ CPI * Bank Capital Ratio	-0.5629*** (-9.82)	-0.6410*** (-10.67)	-0.5885*** (-9.77)	-0.5974*** (-9.87)			
Δ CPI * Credit is Granted in Foreign Currency	-0.0426*** (-5.02)	-0.1137*** (-8.75)	-0.1137*** (-8.75)				
Δ CPI * Bank Capital Ratio * Credit is Granted in Foreign Currency	0.7374*** (8.59)	1.1146*** (12.39)	1.1146*** (12.39)	1.1375*** (12.56)	1.1375*** (12.56)	1.1842*** (12.88)	37.72*** (4.18)
Δ Credit Default Swap Spread	0.0010*** (10.03)	-0.0011*** (-3.63)					
Δ Nominal Effective Exchange Rate	0.0100*** (13.33)	0.0095*** (4.58)					
Δ Yield Curve	-0.1444*** (-20.72)	0.0214* (1.86)					
Foreign Direct Investment	0.0000*** (8.46)						
Bank Capital Ratio	0.0284*** (5.34)	0.0203*** (3.67)	0.0174*** (3.14)	0.0182*** (3.26)			
Bank Total Assets	0.0077*** (59.83)	0.0060*** (34.15)	0.0062*** (34.69)	0.0062*** (34.67)			
Bank Liquidity Ratio	-0.0014* (-1.68)	-0.0002 (-0.19)	-0.0010 (-1.07)	-0.0009 (-1.03)			
Bank Return on Assets	-0.0123*** (-6.55)	-0.0006 (-0.32)	0.0187*** (6.75)	0.0189*** (6.75)			
Bank Doubtful Loan Ratio	-0.0330*** (-53.53)	-0.0365*** (-56.09)	-0.0364*** (-55.84)	-0.0364*** (-55.82)			
Log Income in Subregion	0.0065 (1.21)						
Log Population in Subregion	-0.0007 (-1.51)						
Unemployment in Subregion	0.0267 (1.62)						
Credit is Granted in Foreign Currency	0.0293*** (40.67)						
Bank Capital Ratio * Credit is Granted in Foreign Currency	-0.1486*** (-20.06)	-0.1731*** (-22.47)	-0.1731*** (-22.47)	-0.1753*** (-22.64)	-0.1753*** (-22.64)	-0.1818*** (-23.13)	-6,209 '(-8.65)
constant	-0.1272*** (-3.74)	-0.0512*** (-19.28)	-0.0515*** (-19.49)	-0.0548*** (-20.86)	0.0119*** (225.01)	0.0120*** (224.11)	0.668*** (164.33)
Borrower Fixed Effects	Yes	Yes	Yes	Yes	--	--	--
Borrower-Year:Month Fixed Effects	No	No	No	No	Yes	Yes	Yes
Region-Year:Quarter-Currency Fixed Effects	No	Yes	Yes	--	--	--	--
Region-Year:Month-Currency Fixed Effects	No	No	No	Yes	Yes	--	--
Locality-Year:Month-Currency Fixed Effects	No	No	No	No	No	Yes	Yes
Month Fixed Effects	No	No	Yes	--	--	--	--
Number of Observations	21 893 838	21 893 838	21 893 838	21 893 838	21 893 838	21 872 776	332 992
<i>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)</i>							
in Hungarian Forint	0,0286	0,1501	0,1443	0,1456	-	-	-
in Foreign Currency	-0,0251	-0,0957	-0,1015	-0,1017	-	-	-
Difference in Impact Between Foreign Currency and Hungarian Forint	-0,0537	-0,2458	-0,2458	-0,2474	-0,2474	-0,2508	-8,2089
<i>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%)</i>							
in Hungarian Forint	3%	16%	16%	16%	-	-	-
in Foreign Currency	-3%	-10%	-11%	-11%	-	-	-
Difference in Impact Between Foreign Currency and Hungarian Forint	-6%	-27%	-27%	-27%	-27%	-27%	-13%
NOTE. -- The table reports estimates from ordinary least squares regressions (an accompanying 'full' table in appendix reports all estimated coefficients). 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. In Model 7, we restrict the sample to those individual-time observations, where the individual takes out loan only in one currency. All independent variables are either lagged one month or calculated over the preceding month. Timing, definition and summary statistics for each variable is given in Table I. The number of observations equals 21,893,838 and accounts for the full population of mortgages in HUF or CHF 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 III-2

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	-0.0115** (-2.12)	-0.111*** (-10.46)				
Δ Interest rate * Bank Capital Ratio	0.104*** (2.61)	0.548*** (12.76)	0.527*** (12.26)	0.531*** (12.33)		
Δ Interest rate * Credit is Granted in Foreign Currency	-0.0698*** (-14.81)	0.192*** (18.36)	0.192*** (18.36)			
Δ Interest rate * Bank Capital Ratio * Credit is Granted in Foreign Currency	-0.196*** (-3.88)	-0.897*** (-15.85)	-0.897*** (-15.85)	-0.902*** (-15.87)	-0.902*** (-15.87)	-0.915*** (-15.78)
Δ GDP	0.141*** (25.17)					
Δ GDP * Bank Capital Ratio	-0.0638 (-1.07)	0.144** (2.34)	0.158** (2.56)	0.153** (2.46)		
Δ GDP * Credit is Granted in Foreign Currency	-0.563*** (-67.48)					
Δ GDP * Bank Capital Ratio * Credit is Granted in Foreign Currency	1.759*** (20.34)	1.456*** (16.34)	1.456*** (16.34)	1.471*** (16.47)	1.471*** (16.47)	1.529*** (16.87)
Δ CPI	0.0143** (2.45)	0.0274*** (3.21)				
Δ CPI * Bank Capital Ratio	-0.563*** (-9.82)	-0.641*** (-10.67)	-0.589*** (-9.77)	-0.597*** (-9.87)		
Δ CPI * Credit is Granted in Foreign Currency	-0.0426*** (-5.02)	-0.114*** (-8.75)	-0.114*** (-8.75)			
Δ CPI * Bank Capital Ratio * Credit is Granted in Foreign Currency	0.737*** (8.59)	1.115*** (12.39)	1.115*** (12.39)	1.138*** (12.56)	1.138*** (12.56)	1.184*** (12.88)
Δ Credit Default Swap Spread	0.00101*** (10.03)	-0.00112*** (-3.63)				
Δ Nominal Effective Exchange Rate	0.0100*** (13.33)	0.00947*** (4.58)				
Δ Yield Curve	-0.144*** (-20.72)	0.0214* (1.86)				
Foreign Direct Investment	0.0000392*** (8.46)					
Bank Capital Ratio	0.0284*** (5.34)	0.0203*** (3.67)	0.0174*** (3.14)	0.0182*** (3.26)		
Bank Total Assets	0.00772*** (59.83)	0.00605*** (34.15)	0.00616*** (34.69)	0.00616*** (34.67)		
Bank Liquidity Ratio	-0.00143* (-1.68)	-0.000165 (-0.19)	-0.000960 (-1.07)	-0.000931 (-1.03)		
Bank Return on Assets	-0.0123*** (-6.55)	-0.000629 (-0.32)	0.0187*** (6.75)	0.0189*** (6.75)		
Bank Doubtful Loan Ratio	-0.0330*** (-53.53)	-0.0365*** (-56.09)	-0.0364*** (-55.84)	-0.0364*** (-55.82)		
Log Income in Subregion	0.00652 (1.21)					
Log Population in Subregion	-0.000668 (-1.51)					
Unemployment in Subregion	0.0267 (1.62)					
Credit is Granted in Foreign Currency	0.0293*** (40.67)					
Bank Capital Ratio * Credit is Granted in Foreign Currency	-0.149*** (-20.06)	-0.173*** (-22.47)	-0.173*** (-22.47)	-0.175*** (-22.64)	-0.175*** (-22.64)	-0.182*** (-23.13)
constant	-0.127*** (-3.74)	-0.0512*** (-19.28)	-0.0515*** (-19.49)	-0.0548*** (-20.86)	0.0119*** (225.01)	0.0120*** (224.11)
Borrower Fixed Effects	Yes	Yes	Yes	Yes	--	--
Borrower-Year:Month Fixed Effects	No	No	No	No	Yes	Yes
Region-Year:Quarter-Currency Fixed Effects	No	Yes	Yes	--	--	--
Region-Year:Month-Currency Fixed Effects	No	No	No	Yes	Yes	--
Locality-Year:Month-Currency Fixed Effects	No	No	No	No	No	Yes
Month Fixed Effects	No	No	Yes	--	--	--
Number of Observations	21 893 838	21 893 838	21 893 838	21 893 838	21 893 838	21 872 776

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. In Model 7, we restrict the sample to those individual-time observations, where the individual takes out loan only in one currency. All independent variables are either lagged one month or calculated over the preceding month. Timing, definition and summary statistics for each variable is given in Table I. The number of observations equals 21,893,838 and accounts for the full population of mortgages in HUF or CHF 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 IV						
Domestic and foreign bank lending channel in the domestic and the foreign currency						
Model	(1)	(2)	(3)	(4)	(5)	(6)
Δ Interest rate	-0.0126** (-2.19)	-0.0897*** (-8.22)				
Δ Interest rate * Bank Capital Ratio	-0.0682 (-1.52)	0.0613 (1.30)	0.0325 (0.69)	0.0302 (0.64)		
Δ Interest rate * Credit is Granted in Foreign Currency	0.0072 (1.29)	0.1734*** (16.25)	0.1734*** (16.25)			
Δ Interest rate * Bank Capital Ratio * Credit is Granted in Foreign Currency	-0.5481*** (-9.24)	-0.6996*** (-11.30)	-0.6996*** (-11.30)	-0.6952*** (-11.16)	-0.6952*** (-11.16)	-0.6975*** (-11.02)
Δ Swiss interest rate	0.0724*** (3.57)	0.6982*** (16.33)				
Δ Swiss Interest Rate * Bank Capital Ratio	-4.9725*** (-25.81)	-6.5995*** (-31.42)	-6.6609*** (-31.77)	-6.7349*** (-32.03)		
Δ Swiss interest rate * Credit is Granted in Foreign Currency	1.1648*** (41.95)	0.4434*** (5.75)	0.4434*** (5.75)			
Δ Swiss Interest Rate * Bank Capital Ratio * Credit is Granted in Foreign Currency	-0.1769 (-0.65)	2.5401*** (8.70)	2.5401*** (8.70)	2.6501*** (9.05)	2.6501*** (9.05)	2.7779*** (9.31)
Δ GDP	0.0834*** (14.86)					
Δ GDP * Bank Capital Ratio	-0.1452** (-2.48)	-0.0991 (-1.62)	-0.0862 (-1.41)	-0.0937 (-1.53)		
Δ GDP * Credit is Granted in Foreign Currency	-0.4341*** (-50.84)					
Δ GDP * Bank Capital Ratio * Credit is Granted in Foreign Currency	1.6046*** (18.53)	1.5421*** (17.30)	1.5421*** (17.30)	1.5623*** (17.49)	1.5623*** (17.49)	1.6239*** (17.90)
Δ CPI	-0.0208*** (-3.17)	-0.0461*** (-5.12)				
Δ CPI * Bank Capital Ratio	0.0856 (1.27)	0.1880*** (2.72)	0.2511*** (3.62)	0.2558*** (3.67)		
Δ CPI * Credit is Granted in Foreign Currency	-0.1057*** (-10.71)	-0.0917*** (-6.61)	-0.0917*** (-6.61)			
Δ CPI * Bank Capital Ratio * Credit is Granted in Foreign Currency	0.7329*** (7.18)	0.7209*** (6.95)	0.7209*** (6.95)	0.7242*** (6.93)	0.7242*** (6.93)	0.7498*** (7.09)
Δ Credit Default Swap Spread	0.0022*** (19.80)	-0.0009*** (-2.97)				
Δ Nominal Effective Exchange Rate	0.0077*** (10.08)	0.0130*** (6.21)				
Δ Yield Curve	-0.1497*** (-21.47)	-0.0105 (-0.89)				
Foreign Direct Investment	0.0001*** (16.77)					
Bank Capital Ratio	0.0247*** (4.59)	0.0275*** (4.86)	0.0247*** (4.37)	0.0252*** (4.44)		
Bank Total Assets	0.0053*** (33.26)	0.0053*** (30.00)	0.0055*** (30.62)	0.0055*** (30.59)		
Bank Liquidity Ratio	-0.0015* (-1.72)	-0.0022** (-2.45)	-0.0031*** (-3.43)	-0.0031*** (-3.43)		
Bank Return on Assets	-0.0141*** (-7.42)	-0.0011 (-0.54)	0.0204*** (7.38)	0.0206*** (7.37)		
Bank Doubtful Loan Ratio	-0.0396*** (-61.98)	-0.0408*** (-62.04)	-0.0406*** (-61.63)	-0.0406*** (-61.63)		
Log Income in Subregion	0.0064 (1.19)					
Log Population in Subregion	-0.0007 (-1.50)					
Unemployment in Subregion	0.0264 (1.60)					
Credit is Granted in Foreign Currency	0.0229*** (31.37)					
Bank Capital Ratio * Credit is Granted in Foreign Currency	-0.1463*** (-19.46)	-0.1691*** (-21.81)	-0.1691*** (-21.81)	-0.1710*** (-21.93)	-0.1710*** (-21.93)	-0.1772*** (-22.40)
constant	-0.0850** (-2.50)	-0.0408*** (-15.26)	-0.0420*** (-15.72)	-0.0434*** (-16.45)	0.0120*** (217.73)	0.0121*** (216.70)
Borrower Fixed Effects	Yes	Yes	Yes	Yes	--	--
Borrower-Year:Month Fixed Effects	No	No	No	No	Yes	Yes
Region-Year:Quarter-Currency Fixed Effects	No	Yes	Yes	--	--	--
Region-Year:Month-Currency Fixed Effects	No	No	No	Yes	Yes	-
Locality-Year:Month-Currency Fixed Effects	No	No	No	No	No	Yes
Month Fixed Effects	No	No	Yes	--	--	--
Number of Observations	21 893 838	21 893 838	21 893 838	21 893 838	21 893 838	21 872 776
<i>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)</i>						
in Hungarian Forint	-0,0187	-0,0168	-0,0089	-0,0083		
in Foreign Currency	-0,1502	-0,1918	-0,1918	-0,1905		
Difference in Impact Between Foreign Currency and Hungarian Forint	-0,1315	-0,1749	-0,1828	-0,1823	-0,1905	-0,1912
<i>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%)</i>						
in Hungarian Forint	-2%	-2%	-1%	-1%		
in Foreign Currency	-16%	-21%	-21%	-21%		
Difference in Impact Between Foreign Currency and Hungarian Forint	-14%	-19%	-20%	-20%	-21%	-21%
<i>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)</i>						
in Hungarian Forint	-0,1869	-0,2480	-0,2503	-0,2531		
in Foreign Currency	-0,0066	-0,1526	-0,1549	-0,1535		
Difference in Impact Between Foreign Currency and Hungarian Forint	0,1869	0,0955	0,0955	0,0996	0,0996	0,1044
<i>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%)</i>						
in Hungarian Forint	-20%	-27%	-27%	-28%		
in Foreign Currency	-1%	-17%	-17%	-17%		
Difference in Impact Between Foreign Currency and Hungarian Forint	20%	10%	10%	11%	11%	11%
NOTE. -- The table reports selected estimates from ordinary least squares regressions (an accompanying 'full' table in appendix reports all estimated coefficients). 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 statistics for each variable is in Table I. The number of observations equals 21,893,838 and it accounts for the full population 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 V							
Bank risk-taking channel in the domestic and the foreign currency with “ex-post default within six years” as risk measure							
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Δ Interest rate	-0.0023 (-0.40)	-0.1026*** (-9.53)					
Δ Interest rate * Bank Capital Ratio	0.1278*** (2.84)	0.5710*** (11.92)	0.5506*** (11.49)	0.5550*** (11.56)			
Δ Interest rate * Credit is Granted in Foreign Currency	-0.0720*** (-13.80)	0.1898*** (17.73)	0.1898*** (17.73)				
Δ Interest rate * Bank Capital Ratio * Credit is Granted in Foreign Currency	-0.3408*** (-6.07)	-1.0375*** (-16.50)	-1.0375*** (-16.50)	-1.0426*** (-16.51)	-1.0426*** (-16.51)	-1.0554*** (-16.41)	-38.54*** (-7.46)
Δ Interest rate * Person defaulted on loan (in HUF/CHF) within 6 years	-0.0776*** (-9.91)	-0.0715*** (-9.03)	-0.0714*** (-9.02)	-0.0714*** (-9.01)			
Δ Interest rate * Bank Capital Ratio * Person defaulted on loan (in HUF/CHF) within 6 years	-0.0287 (-0.34)	-0.0341 (-0.40)	-0.0367 (-0.43)	-0.0361 (-0.42)			
Δ Interest rate * Credit is Granted in Foreign Currency * Person defaulted on loan (in HUF/CHF) within 6 years	0.0269** (2.29)	0.0227* (1.87)	0.0227* (1.87)	0.0226* (1.86)	0.0226* (1.86)	0.0185 (1.49)	-4.491* (-2.18)
Δ Interest rate * Bank Capital Ratio * Credit is Granted in Foreign Currency * Person defaulted on loan (in HUF/CHF) within 6 years	0.8618*** (6.88)	0.8600*** (6.59)	0.8600*** (6.59)	0.8594*** (6.58)	0.8594*** (6.58)	0.8782*** (6.59)	49.59* (2.18)
Δ GDP	0.1406*** (22.88)						
Δ GDP * Bank Capital Ratio	0.0906 (1.38)	0.2886*** (4.26)	0.2988*** (4.41)	0.2939*** (4.33)			
Δ GDP * Credit is Granted in Foreign Currency	-0.5648*** (-63.19)						
Δ GDP * Bank Capital Ratio * Credit is Granted in Foreign Currency	2.1029*** (22.70)	1.7599*** (18.50)	1.7599*** (18.50)	1.7732*** (18.61)	1.7732*** (18.61)	1.8292*** (18.93)	27.78** (3.25)
Δ GDP * Person defaulted on loan (in HUF/CHF) within 6 years	-0.0143 (-1.09)	-0.0170 (-1.29)	-0.0190 (-1.44)	-0.0191 (-1.45)			
Δ GDP * Bank Capital Ratio * Person defaulted on loan (in HUF/CHF) within 6 years	-0.8591*** (-6.06)	-0.8246*** (-5.80)	-0.8026*** (-5.65)	-0.8032*** (-5.65)			
Δ GDP * Credit is Granted in Foreign Currency * Person defaulted on loan (in HUF/CHF) within 6 years	-0.0347 (-1.41)	-0.0343 (-1.40)	-0.0343 (-1.40)	-0.0344 (-1.40)	-0.0344 (-1.40)	-0.0332 (-1.34)	6.662*** (3.74)
Δ GDP * Bank Capital Ratio * Credit is Granted in Foreign Currency * Person defaulted on loan (in HUF/CHF) within 6 years	-1.9059*** (-7.54)	-1.8991*** (-7.51)	-1.8991*** (-7.51)	-1.8943*** (-7.49)	-1.8943*** (-7.49)	-1.9231*** (-7.55)	-61.28** (-3.21)
Δ CPI	0.0050 (0.78)	0.0178** (1.98)					
Δ CPI * Bank Capital Ratio	-0.5593*** (-8.62)	-0.6268*** (-9.29)	-0.5767*** (-8.53)	-0.5852*** (-8.62)			
Δ CPI * Credit is Granted in Foreign Currency	-0.0734*** (-7.80)	-0.1431*** (-10.50)	-0.1431*** (-10.50)				
Δ CPI * Bank Capital Ratio * Credit is Granted in Foreign Currency	1.0801*** (11.27)	1.4327*** (14.30)	1.4327*** (14.30)	1.4551*** (14.45)	1.4551*** (14.45)	1.5035*** (14.72)	55.77*** (5.82)
Δ CPI * Person defaulted on loan (in HUF/CHF) within 6 years	0.0694*** (5.68)	0.0668*** (5.42)	0.0658*** (5.34)	0.0653*** (5.30)			
Δ CPI * Bank Capital Ratio * Person defaulted on loan (in HUF/CHF) within 6 years	-0.0679 (-0.54)	-0.0815 (-0.64)	-0.0702 (-0.55)	-0.0681 (-0.53)			
Δ CPI * Credit is Granted in Foreign Currency * Person defaulted on loan (in HUF/CHF) within 6 years	0.2298*** (10.40)	0.2314*** (10.40)	0.2314*** (10.40)	0.2321*** (10.43)	0.2321*** (10.43)	0.2385*** (10.60)	8.332*** (3.96)
Δ CPI * Bank Capital Ratio * Credit is Granted in Foreign Currency * Person defaulted on loan (in HUF/CHF) within 6 years	-2.4745*** (-11.32)	-2.4147*** (-10.95)	-2.4147*** (-10.95)	-2.4170*** (-10.96)	-2.4170*** (-10.96)	-2.4592*** (-11.02)	-101.6*** (-4.40)
Δ Credit Default Swap Spread	0.0010*** (10.06)	-0.0011*** (-3.63)					
Δ Nominal Effective Exchange Rate	0.0100*** (13.30)	0.0094*** (4.57)					
Δ Yield Curve	-0.1445*** (-20.73)	0.0214* (1.87)					
Foreign Direct Investment	0.0000*** (8.46)						
Bank Capital Ratio	0.0232*** (3.89)	0.0145** (2.36)	0.0118* (1.91)	0.0125** (2.02)			
Bank Total Assets	0.0076*** (59.28)	0.0059*** (33.55)	0.0060*** (34.10)	0.0061*** (34.08)			
Bank Liquidity Ratio	-0.0013 (-1.59)	-0.0001 (-0.11)	-0.0009 (-0.99)	-0.0009 (-0.96)			
Bank Return on Assets	-0.0123*** (-6.56)	-0.0007 (-0.38)	0.0184*** (6.67)	0.0187*** (6.67)			
Bank Doubtful Loan Ratio	-0.0323*** (-52.77)	-0.0357*** (-55.17)	-0.0356*** (-54.92)	-0.0356*** (-54.90)			
Log Income in Subregion	0.0069 (1.29)						
Log Population in Subregion	-0.0007 (-1.49)						
Unemployment in Subregion	0.0298* (1.83)						
Credit is Granted in Foreign Currency	0.0308*** (39.19)						
Bank Capital Ratio * Credit is Granted in Foreign Currency	-0.1897*** (-23.41)	-0.2111*** (-25.13)	-0.2111*** (-25.13)	-0.2132*** (-25.27)	-0.2132*** (-25.27)	-0.2197*** (-25.68)	-8.397*** (-11.01)
Credit is Granted in Foreign Currency * Person defaulted on loan (in HUF/CHF) within 6 years	-0.0084*** (-4.24)	-0.0086*** (-4.37)	-0.0086*** (-4.37)	-0.0087*** (-4.39)	-0.0087*** (-4.39)	-0.0092*** (-4.62)	-0.702*** (-4.28)
Bank Capital Ratio * Credit is Granted in Foreign Currency * Person defaulted on loan (in HUF/CHF) within 6 years	0.2582*** (12.86)	0.2561*** (12.72)	0.2561*** (12.72)	0.2561*** (12.72)	0.2561*** (12.72)	0.2603*** (12.80)	10.63*** (5.93)
Bank Capital Ratio * Person defaulted on loan (in HUF/CHF) within 6 years	0.0366*** (3.00)	0.0361*** (2.94)	0.0350*** (2.85)	0.0349*** (2.84)			
constant	-0.1291*** (-3.85)	-0.0493*** (-18.60)	-0.0501*** (-18.97)	-0.0542*** (-20.71)	0.0117*** (201.79)	0.0118*** (201.30)	0.674*** (157.00)
Borrower Fixed Effects	Yes	Yes	Yes	Yes	--	--	--
Borrower-Year:Month Fixed Effects	No	No	No	No	Yes	Yes	Yes
Region-Year:Quarter-Currency Fixed Effects	No	Yes	Yes	--	--	--	--
Region-Year:Month-Currency Fixed Effects	No	No	No	Yes	Yes	--	--
Locality-Year:Month-Currency Fixed Effects	No	No	No	No	No	Yes	Yes
Month Fixed Effects	No	No	Yes	--	--	--	--
Number of Observations	21 893 838	21 893 838	21 893 838	21 893 838	21 893 838	21 872 776	332 992
<i>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)</i>							
in Hungarian Forint when Borrower is Not Risky	0,0350	0,1565	0,1509	0,1521			
in Foreign Currency when Borrower is Not Risky	-0,0584	-0,1279	-0,1335	-0,1336			
in Hungarian Forint when Borrower is Risky	0,0350	0,1565	0,1509	0,1521			
in Foreign Currency when Borrower is Risky	0,1773	0,1079	0,1023	0,1019			
<i>Difference in Impact between Foreign Currency and Hungarian Forint, when Borrower is Not Risky</i>	-0,0934	-0,2844	-0,2844	-0,2858	-0,2858	-0,2893	-10,5633
<i>Difference in Impact between Foreign Currency and Hungarian Forint, when Borrower is Risky</i>	0,1423	-0,0487	-0,0487	-0,0502	-0,0502	-0,0486	3,0287
<i>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%)</i>							
in Hungarian Forint when Borrower is Not Risky	4%	17%	16%	17%			
in Foreign Currency when Borrower is Not Risky	-6%	-14%	-15%	-15%			
in Hungarian Forint when Borrower is Risky	4%	17%	16%	17%			
in Foreign Currency when Borrower is Risky	19%	12%	11%	11%			
<i>Difference in Impact between Foreign Currency and Hungarian Forint, when Borrower is Not Risky</i>	-10%	-31%	-31%	-31%	-31%	-31%	-17%
<i>Difference in Impact between Foreign Currency and Hungarian Forint, when Borrower is Risky</i>	15%	-5%	-5%	-5%	-5%	-5%	5%

NOTE. -- The table reports selected estimates from ordinary least squares regressions (an accompanying ‘full’ table in appendix reports all estimated coefficients). 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 21,893,838 and it accounts for the full population 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 V-2
BANK LENDING CHANNEL AND BANK RISK-TAKING CHANNEL BY OWNERSHIP OF THE BANK

Model	(1)	(2)	(3)	(4)	(5)	(6)
Bank Nationality	Domestic	Foreign	Domestic	Foreign	Domestic	Foreign
Δ Interest rate * Bank Capital Ratio * Credit is Granted in Foreign Currency	-2.478*** (-24.20)	-0,136 (-1.81)	-2.705*** (-24.00)	-0.189*** (-2.35)	-2.667*** (-24.59)	-0,133 (-1.73)
Δ Interest rate * Bank Capital Ratio * Credit is Granted in Foreign Currency * Person defaulted on loan (in HUF/CHF) within 6 years			1.402*** (6.34)	0.414* (2.07)		
Δ Interest rate * Bank Capital Ratio * Credit is Granted in Foreign Currency * Below median education (locality)					2.000*** (6.03)	-0,0784 (-0.20)
All Other Variables in Appendix Table V	Yes	Yes	Yes	Yes	Yes	Yes
Borrower Fixed Effects	--	--	--	--	--	--
Borrower-Year:Month Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Region-Year:Quarter-Currency Fixed Effects	--	--	--	--	--	--
Region-Year:Month-Currency Fixed Effects	--	--	--	--	--	--
Locality-Year:Month-Currency Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Month Fixed Effects	--	--	--	--	--	--
Number of Observations	12 143 284	9 673 038	12 143 284	9 673 038	12 143 284	9 673 038

NOTE. -- The table reports selected 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 split between domestic and foreign banks equals 21,893,838 and it accounts for the full population 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 V-3
Bank lending channel and bank risk-taking channel by different organizational form

Model	(1)	(2)	(3)	(4)	(5)	(6)
	Commercial banks	Saving coops	Commercial banks	Saving coops	Commercial banks	Saving coops
Δ Interest rate * Bank Capital Ratio * Credit is Granted in Foreign Currency	-0.878*** (-14.64)	0,319 (0.46)	-1.015*** (-15.23)	0,394 (0.55)	-0.922*** (-14.81)	0,269 (0.37)
Δ Interest rate * Bank Capital Ratio * Credit is Granted in Foreign Currency * Person defaulted on loan (in HUF/CHF) within 6 years			0.880*** (6.50)	-0,737 (-0.59)		
Δ Interest rate * Bank Capital Ratio * Credit is Granted in Foreign Currency * Below median education (locality)					0.650** (2.74)	0,654 (0.28)
All Other Variables in Appendix Table V	Yes	Yes	Yes	Yes	Yes	Yes
Borrower Fixed Effects	--	--	--	--	--	--
Borrower-Year:Month Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Region-Year:Quarter-Currency Fixed Effects	--	--	--	--	--	--
Region-Year:Month-Currency Fixed Effects	--	--	--	--	--	--
Locality-Year:Month-Currency Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Month Fixed Effects	--	--	--	--	--	--
Number of Observations	20 690 268	1 109 354	20 690 268	1 109 354	20 690 268	1 109 354

NOTE. -- The table reports selected 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 split between commercial and saving coop banks equals 21,893,838 and it accounts for the full population 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 V-4

Bank risk-taking channel in the domestic and the foreign currency with "borrower lives in below median education community", as risk measure

Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Δ Interest rate	-0.0113** (-2.03)	-0.1162*** (-10.18)					
Δ Interest rate * Bank Capital Ratio	0.2295*** (5.22)	0.6191*** (13.07)	0.5990*** (12.65)	0.6029*** (12.69)			
Δ Interest rate * Credit is Granted in Foreign Currency	-0.0682*** (-13.32)	0.1940*** (16.54)	0.1940*** (16.54)				
Δ Interest rate * Bank Capital Ratio * Credit is Granted in Foreign Currency	-0.3510*** (-6.34)	-0.9502*** (-15.25)	-0.9502*** (-15.25)	-0.9578*** (-15.30)	-0.9578*** (-15.30)	-0.9558*** (-15.82)	-29.93*** (-5.19)
Δ Interest rate * Below median education, (subregion)	-0.0131 (-1.28)	0.0343* (1.72)	0.0347* (1.74)				
Δ Interest rate * Bank Capital Ratio * Below median education, (subregion)	-0.4285*** (-3.96)	-0.4137*** (-3.64)	-0.4208*** (-3.71)	-0.4252*** (-3.73)			
Δ Interest rate * Credit is Granted in Foreign Currency * Below median education, (subregion)	-0.0038 (-0.29)	-0.0178 (-0.68)	-0.0178 (-0.68)				
Δ Interest rate * Bank Capital Ratio * Credit is Granted in Foreign Currency * Below median education (subregion)	0.6379*** (4.60)	0.2944** (1.96)	0.2944** (1.96)	0.3241** (2.15)	0.3241** (2.15)		
Δ Interest rate * Bank Capital Ratio * Credit is Granted in Foreign Currency * Below median education (locality)						0.6315*** (2.85)	-7.707 (-0.31)
Δ GDP	0.1533*** (24.75)						
Δ GDP * Bank Capital Ratio	-0.1847*** (-2.74)	0.0140 (0.20)	0.0260 (0.37)	0.0202 (0.29)			
Δ GDP * Credit is Granted in Foreign Currency	-0.6209*** (-66.89)						
Δ GDP * Bank Capital Ratio * Credit is Granted in Foreign Currency	2.3474*** (24.03)	2.0905*** (20.91)	2.0905*** (20.91)	2.1037*** (21.01)	2.1037*** (21.01)	1.8694*** (19.71)	10,7 (1.33)
Δ GDP * Below median education (subregion)	-0.0606*** (-4.43)						
Δ GDP * Bank Capital Ratio * Below median education (subregion)	0.5753*** (4.09)	0.5838*** (4.01)	0.5919*** (4.07)	0.6047*** (4.14)			
Δ GDP * Credit is Granted in Foreign Currency * Below median education (subregion)	0.3006*** (14.04)						
Δ GDP * Bank Capital Ratio * Credit is Granted in Foreign Currency * Below median education (subregion)	-2.8937*** (-13.56)	-2.9165*** (-13.27)	-2.9165*** (-13.27)	-2.9358*** (-13.32)	-2.9358*** (-13.32)		
Δ GDP * Bank Capital Ratio * Credit is Granted in Foreign Currency * Below median education (locality)						-3.7304*** (-11.71)	-108.6** (-3.24)
Δ CPI	0.0216*** (3.45)	0.0332*** (3.51)					
Δ CPI * Bank Capital Ratio	-0.7472*** (-11.74)	-0.8049*** (-12.09)	-0.7550*** (-11.32)	-0.7634*** (-11.39)			
Δ CPI * Credit is Granted in Foreign Currency	-0.0653*** (-7.02)	-0.1300*** (-8.98)	-0.1300*** (-8.98)				
Δ CPI * Bank Capital Ratio * Credit is Granted in Foreign Currency	1.1879*** (12.52)	1.4880*** (14.95)	1.4880*** (14.95)	1.5125*** (15.11)	1.5125*** (15.11)	1.3866*** (14.47)	
Δ CPI * Below median education (subregion)	-0.0331** (-2.22)	-0.0380* (-1.74)	-0.0398* (-1.82)				
Δ CPI * Bank Capital Ratio * Below median education (subregion)	0.7924*** (5.30)	0.8288*** (5.34)	0.8437*** (5.44)	0.8605*** (5.51)			
Δ CPI * Credit is Granted in Foreign Currency * Below median education (subregion)	0.1022*** (4.47)	0.0902*** (2.73)	0.0902*** (2.73)				
Δ CPI * Bank Capital Ratio * Credit is Granted in Foreign Currency * Below median education (subregion)	-1.9252*** (-8.57)	-1.7768*** (-7.59)	-1.7768*** (-7.59)	-1.8253*** (-7.75)	-1.8253*** (-7.75)		
Δ CPI * Bank Capital Ratio * Credit is Granted in Foreign Currency * Below median education (locality)						-2.3771*** (-6.87)	41.37*** (4.45)
Δ Credit Default Swap Spread	0.0010*** (10.00)	-0.0011*** (-3.63)					
Δ Nominal Effective Exchange Rate	0.0101*** (13.42)	0.0094*** (4.57)					
Δ Yield Curve	-0.1448*** (-20.78)	0.0217* (1.89)					
Foreign Direct Investment	0.0000*** (8.49)						
Bank Capital Ratio	0.0450*** (7.59)	0.0377*** (6.13)	0.0351*** (5.70)	0.0359*** (5.80)			
Bank Total Assets	0.0077*** (59.69)	0.0060*** (33.75)	0.0061*** (34.29)	0.0061*** (34.27)			
Bank Liquidity Ratio	-0.0010 (-1.18)	0.0000 (0.01)	-0.0008 (-0.86)	-0.0007 (-0.83)			
Bank Return on Assets	-0.0124*** (-6.58)	-0.0006 (-0.30)	0.0188*** (6.78)	0.0190*** (6.78)			
Bank Doubtful Loan Ratio	-0.0329*** (-53.28)	-0.0365*** (-56.01)	-0.0364*** (-55.76)	-0.0364*** (-55.75)			
Log Income in Subregion	0.0056 (1.02)						
Log Population in Subregion	-0.0006 (-1.46)						
Unemployment in Subregion	0.0318* (1.76)						
Credit is Granted in Foreign Currency	0.0335*** (42.28)						
Bank Capital Ratio * Credit is Granted in Foreign Currency	-0.2051*** (-24.82)	-0.2268*** (-26.48)	-0.2268*** (-26.48)	-0.2290*** (-26.61)	-0.2290*** (-26.61)	-0.2112*** (-25.77)	-6.69*** (-9.06)
Credit is Granted in Foreign Currency * Below median education, (subregion)	-0.0211*** (-11.07)						
Bank Capital Ratio * Credit is Granted in Foreign Currency * Below median education, (subregion)	0.2600*** (13.69)	0.2517*** (12.80)	0.2517*** (12.80)	0.2552*** (12.90)	0.2552*** (12.90)		
Bank Capital Ratio * Credit is Granted in Foreign Currency * Below median education, (locality)						0.3348*** (11.50)	12.62*** (4.47)
Below median education, (subregion)	0.0044** (2.43)						
Bank Capital Ratio * Below median education, (subregion)	-0.0785*** (-5.87)	-0.0866*** (-6.26)	-0.0881*** (-6.37)	-0.0898*** (-6.45)			
constant	-0.1225*** (-3.51)	-0.0502*** (-18.91)	-0.0501*** (-18.92)	-0.0538*** (-20.49)	0.0119*** (223.50)	0.0119*** (222.11)	0.663*** (163.45)
Borrower Fixed Effects	Yes	Yes	Yes	Yes	--	--	--
Borrower-Year:Month Fixed Effects	No	No	No	No	Yes	Yes	Yes
Region-Year:Quarter-Currency Fixed Effects	No	Yes	Yes	--	--	--	--
Region-Year:Month-Currency Fixed Effects	No	No	No	Yes	Yes	--	--
Locality-Year:Month-Currency Fixed Effects	No	No	No	No	No	Yes	Yes
Month Fixed Effects	No	No	Yes	--	--	--	--
Number of Observations	21 893 838	21 893 838	21 893 838	21 893 838	21 893 838	21 872 776	332 992
<i>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 (t =2 Standard Deviations)</i>							
in Hungarian Forint when Borrower is Not Risky	0,0629	0,1697	0,1642	0,1652			
in Foreign Currency when Borrower is Not Risky	-0,0333	-0,0908	-0,0963	-0,0973			
in Hungarian Forint when Borrower is Risky	-0,0545	0,0563	0,0488	0,0487			
in Foreign Currency when Borrower is Risky	0,0241	-0,1234	-0,1309	-0,1250			
Difference in Impact between Foreign Currency and Hungarian Forint, when Borrower is Not Risky	-0,0962	-0,2604	-0,2604	-0,2625	-0,2625	-0,2620	-8,2034
Difference in Impact between Foreign Currency and Hungarian Forint, when Borrower is Risky	0,0786	-0,1797	-0,1797	-0,1737	-0,1737	-0,0889	-10,3158
<i>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 (t =2 Standard Deviations) as Percent of Unconditional Probability of Granting a Mortgage in Sample (= 0.92%)</i>							
in Hungarian Forint when Borrower is Not Risky	7%	18%	18%	18%			
in Foreign Currency when Borrower is Not Risky	-4%	-10%	-10%	-11%			
in Hungarian Forint when Borrower is Risky	-6%	6%	5%	5%			
in Foreign Currency when Borrower is Risky	3%	-13%	-14%	-14%			
Difference in Impact between Foreign Currency and Hungarian Forint, when Borrower is Not Risky	-10%	-28%	-28%	-29%	-29%	-28%	-13%
Difference in Impact between Foreign Currency and Hungarian Forint, when Borrower is Risky	9%	-20%	-20%	-19%	-19%	-10%	-17%

NOTE. -- The table reports selected 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 lives in a community (region or zip code) with a level of education below the median level of education in the country, 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 21,893,838 and this sample is based on the entire population 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 VI Domestic and foreign bank risk-taking channel in the domestic and the foreign currency with "ex-post default within 6 years" as risk measure, asymmetric effects						
Model	(1)	(2)	(3)	(4)	(5)	(6)
Δ Interest rate	-0.1051*** (-12.13)	0.0229 (1.50)				
Δ Interest rate Positive	0.1294*** (10.96)	-0.1963*** (-10.56)				
Δ Interest rate Positive * Bank Capital Ratio	1.2317*** (16.61)	1.3592*** (17.03)	1.3146*** (16.54)	1.3195*** (16.56)		
Δ Interest rate Negative * Bank Capital Ratio	-0.4349*** (-5.05)	-0.2525*** (-2.87)	-0.2329*** (-2.65)	-0.2257** (-2.56)		
Δ Interest rate Positive * Credit is Granted in Foreign Currency	-0.3754*** (-50.14)	0.1416*** (10.87)	0.1416*** (10.87)			
Δ Interest rate Negative * Credit is Granted in Foreign Currency	0.3210*** (29.67)	0.2401*** (11.93)	0.2401*** (11.93)			
Δ Interest rate Positive * Bank Capital Ratio * Credit is Granted in Foreign Currency	-0.2818*** (-3.31)	-0.3738*** (-4.04)	-0.3738*** (-4.04)	-0.3695*** (-3.98)	-0.3695*** (-3.98)	-0.3905*** (-4.10)
Δ Interest rate Negative * Bank Capital Ratio * Credit is Granted in Foreign Currency	-1.6650*** (-14.41)	-1.8371*** (-15.70)	-1.8371*** (-15.70)	-1.8571*** (-15.81)	-1.8571*** (-15.81)	-1.8584*** (-15.63)
Δ Interest rate Positive * Person defaulted on loan (in HUF/CHF) within 6 years	-0.1283*** (-11.43)	-0.1197*** (-10.53)	-0.1186*** (-10.46)	-0.1193*** (-10.52)		
Δ Interest rate Negative * Person defaulted on loan (in HUF/CHF) within 6 years	-0.0099 (-0.63)	-0.0082 (-0.52)	-0.0087 (-0.55)	-0.0079 (-0.50)		
Δ Interest rate Positive * Bank Capital Ratio * Person defaulted on loan (in HUF/CHF) within 6 years	-0.9888*** (-7.80)	-0.9405*** (-7.31)	-0.9540*** (-7.43)	-0.9519*** (-7.42)		
Δ Interest rate Negative * Bank Capital Ratio * Person defaulted on loan (in HUF/CHF) within 6 years	0.5753*** (3.39)	0.5526*** (3.26)	0.5578*** (3.29)	0.5543*** (3.27)		
Δ Interest rate Positive * Credit is Granted in Foreign Currency * Person defaulted on loan (in HUF/CHF) within 6 years	0.0680*** (4.37)	0.0699*** (4.31)	0.0699*** (4.31)	0.0706*** (4.35)	0.0706*** (4.35)	0.0657*** (3.93)
Δ Interest rate Negative * Credit is Granted in Foreign Currency * Person defaulted on loan (in HUF/CHF) within 6 years	-0.0285 (-1.14)	-0.0385 (-1.54)	-0.0385 (-1.54)	-0.0397 (-1.59)	-0.0397 (-1.59)	-0.0424* (-1.69)
Δ Interest rate Positive * Bank Capital Ratio * Credit is Granted in Foreign Currency * Person defaulted on loan (in HUF/CHF) within 6 years	0.5044*** (2.89)	0.3599** (1.96)	0.3599** (1.96)	0.3537* (1.93)	0.3537* (1.93)	0.3585* (1.90)
Δ Interest rate Negative * Bank Capital Ratio * Credit is Granted in Foreign Currency * Person defaulted on loan (in HUF/CHF) within 6 years	1.4031*** (5.37)	1.4960*** (5.73)	1.4960*** (5.73)	1.5046*** (5.76)	1.5046*** (5.76)	1.5279*** (5.78)
Δ GDP	0.0724*** (10.84)					
Δ GDP * Bank Capital Ratio	-0.3397*** (-4.70)	-0.0655 (-0.87)	-0.0389 (-0.52)	-0.0425 (-0.57)		
Δ GDP * Credit is Granted in Foreign Currency	-0.3707*** (-39.25)					
Δ GDP * Bank Capital Ratio * Credit is Granted in Foreign Currency	1.9024*** (19.32)	1.3746*** (13.51)	1.3746*** (13.51)	1.3834*** (13.57)	1.3834*** (13.57)	1.4448*** (13.95)
Δ GDP * Person defaulted on loan (in HUF/CHF) within 6 years	0.0232* (1.69)	0.0187 (1.36)	0.0165 (1.20)	0.0168 (1.22)		
Δ GDP * Bank Capital Ratio * Person defaulted on loan (in HUF/CHF) within 6 years	-0.3858*** (-2.59)	-0.3793** (-2.53)	-0.3542** (-2.37)	-0.3561** (-2.38)		
Δ GDP * Credit is Granted in Foreign Currency * Person defaulted on loan (in HUF/CHF) within 6 years	-0.0585** (-2.31)	-0.0632** (-2.49)	-0.0632** (-2.49)	-0.0639** (-2.52)	-0.0639** (-2.52)	-0.0619** (-2.41)
Δ GDP * Bank Capital Ratio * Credit is Granted in Foreign Currency * Person defaulted on loan (in HUF/CHF) within 6 years	-1.6974*** (-6.52)	-1.5979*** (-6.11)	-1.5979*** (-6.11)	-1.5896*** (-6.08)	-1.5896*** (-6.08)	-1.6130*** (-6.12)
Δ CPI	0.0081 (1.24)	0.0176* (1.95)				
Δ CPI * Bank Capital Ratio	-0.6910*** (-10.41)	-0.5905*** (-8.61)	-0.5503*** (-8.02)	-0.5594*** (-8.12)		
Δ CPI * Credit is Granted in Foreign Currency	-0.0929*** (-9.62)	-0.1510*** (-11.06)	-0.1510*** (-11.06)			
Δ CPI * Bank Capital Ratio * Credit is Granted in Foreign Currency	1.5409*** (15.63)	1.4998*** (14.83)	1.4998*** (14.83)	1.5260*** (15.02)	1.5260*** (15.02)	1.5732*** (15.28)
Δ CPI * Person defaulted on loan (in HUF/CHF) within 6 years	0.0685*** (5.53)	0.0647*** (5.20)	0.0636*** (5.12)	0.0631*** (5.07)		
Δ CPI * Bank Capital Ratio * Person defaulted on loan (in HUF/CHF) within 6 years	0.0712 (0.56)	0.0604 (0.47)	0.0728 (0.57)	0.0760 (0.59)		
Δ CPI * Credit is Granted in Foreign Currency * Person defaulted on loan (in HUF/CHF) within 6 years	0.2345*** (10.38)	0.2373*** (10.46)	0.2373*** (10.46)	0.2382*** (10.49)	0.2382*** (10.49)	0.2444*** (10.65)
Δ CPI * Bank Capital Ratio * Credit is Granted in Foreign Currency * Person defaulted on loan (in HUF/CHF) within 6 years	-2.5414*** (-11.37)	-2.4763*** (-11.02)	-2.4763*** (-11.02)	-2.4800*** (-11.04)	-2.4800*** (-11.04)	-2.5193*** (-11.08)
Δ Credit Default Swap Spread	0.0011*** (11.05)	-0.0011*** (-3.60)				
Δ Nominal Effective Exchange Rate	0.0107*** (14.14)	0.0077*** (3.70)				
Δ Yield Curve	-0.1824*** (-24.52)	0.0235** (2.05)				
Foreign Direct Investment	0.0001*** (12.59)					
Bank Capital Ratio	0.0238*** (3.92)	0.0055 (0.88)	0.0034 (0.54)	0.0041 (0.65)		
Bank Total Assets	0.0063*** (43.32)	0.0053*** (30.05)	0.0055*** (30.88)	0.0055*** (30.83)		
Bank Liquidity Ratio	-0.0038*** (-4.42)	-0.0030*** (-3.43)	-0.0041*** (-4.50)	-0.0041*** (-4.51)		
Bank Return on Assets	-0.0117*** (-6.19)	-0.0016 (-0.85)	0.0155*** (5.60)	0.0156*** (5.57)		
Bank Doubtful Loan Ratio	-0.0348*** (-55.51)	-0.0370*** (-57.03)	-0.0368*** (-56.64)	-0.0368*** (-56.63)		
Log Income in Subregion	0.0068 (1.29)					
Log Population in Subregion	-0.0007 (-1.49)					
Unemployment in Subregion	0.0296* (1.83)					
Credit is Granted in Foreign Currency	0.0339*** (41.87)					
Bank Capital Ratio * Credit is Granted in Foreign Currency	-0.2272*** (-27.23)	-0.2187*** (-25.65)	-0.2187*** (-25.65)	-0.2212*** (-25.82)	-0.2212*** (-25.82)	-0.2275*** (-26.22)
Credit is Granted in Foreign Currency * Person defaulted on loan (in HUF/CHF) within 6 years	-0.0090*** (-4.44)	-0.0093*** (-4.58)	-0.0093*** (-4.58)	-0.0093*** (-4.61)	-0.0093*** (-4.61)	-0.0099*** (-4.83)
Bank Capital Ratio * Credit is Granted in Foreign Currency * Person defaulted on loan (in HUF/CHF) within 6 years	0.2657*** (12.91)	0.2626*** (12.75)	0.2626*** (12.75)	0.2628*** (12.75)	0.2628*** (12.75)	0.2668*** (12.83)
Bank Capital Ratio * Person defaulted on loan (in HUF/CHF) within 6 years	0.0270** (2.18)	0.0264** (2.13)	0.0253** (2.04)	0.0251** (2.02)		
constant	-0.1073*** (-3.20)	-0.0360*** (-13.49)	-0.0398*** (-14.99)	-0.0447*** (-17.09)	0.0117*** (200.61)	0.0118*** (200.05)
Borrower Fixed Effects	Yes	Yes	Yes	Yes	--	--
Borrower-Year:Month Fixed Effects	No	No	No	No	Yes	Yes
Region-Year:Quarter-Currency Fixed Effects	No	Yes	Yes	--	--	--
Region-Year:Month-Currency Fixed Effects	No	No	No	Yes	Yes	--
Locality-Year:Month-Currency Fixed Effects	No	No	No	No	No	Yes
Month Fixed Effects	No	No	Yes	--	--	--
Number of Observations	21 893 838	21 893 838	21 893 838	21 893 838	21 893 838	21 872 776

NOTE. -- The table reports selected estimates from ordinary least squares regressions (an accompanying 'full' table in appendix reports all estimated coefficients). 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 21,893,838 and it accounts for the full population 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 VII

Domestic and foreign bank risk-taking channel in the domestic and the foreign currency with "ex-post default within 6 years" as risk measure

Model	(1)	(2)	(3)	(4)	(5)	(6)
Δ Interest rate	-0.0069 (-1.14)	-0.0847*** (-7.63)				
Δ Interest rate * Bank Capital Ratio	-0.0354 (-0.70)	0.0939* (1.78)	0.0651 (1.23)	0.0621 (1.17)		
Δ Interest rate * Credit is Granted in Foreign Currency	0.0067 (1.09)	0.1736*** (15.79)	0.1736*** (15.79)			
Δ Interest rate * Bank Capital Ratio * Credit is Granted in Foreign Currency	-0.6837*** (-10.36)	-0.8346*** (-12.15)	-0.8346*** (-12.15)	-0.8295*** (-12.02)	-0.8295*** (-12.02)	-0.8338*** (-11.91)
Δ Interest rate * Person defaulted on loan (in HUF/CHF) within 6 years	-0.0485*** (-5.34)	-0.0462*** (-5.02)	-0.0465*** (-5.06)	-0.0467*** (-5.08)		
Δ Interest rate * Bank Capital Ratio * Person defaulted on loan (in HUF/CHF) within 6 years	-0.1164 (-1.20)	-0.0967 (-0.98)	-0.0943 (-0.96)	-0.0917 (-0.93)		
Δ Interest rate * Credit is Granted in Foreign Currency * Person defaulted on loan (in HUF/CHF) within 6 years	0.0153 (1.10)	0.0108 (0.77)	0.0108 (0.77)	0.0108 (0.77)	0.0108 (0.77)	0.0064 (0.45)
Δ Interest rate * Bank Capital Ratio * Credit is Granted in Foreign Currency * Person defaulted on loan (in HUF/CHF) within 6 years	0.7954*** (5.49)	0.7859*** (5.36)	0.7859*** (5.36)	0.7832*** (5.34)	0.7832*** (5.34)	0.8024*** (5.39)
Δ Swiss Interest rate	0.0017 (0.08)	0.6345*** (14.51)				
Δ Swiss Interest rate * Bank Capital Ratio	-5.0215*** (-23.06)	-6.6639*** (-28.47)	-6.7390*** (-28.87)	-6.8147*** (-29.12)		
Δ Swiss Interest rate * Credit is Granted in Foreign Currency	1.2051*** (39.13)	0.4843*** (6.19)	0.4843*** (6.19)			
Δ Swiss Interest rate * Bank Capital Ratio * Credit is Granted in Foreign Currency	0.1646 (0.54)	2.8678*** (8.81)	2.8678*** (8.81)	2.9780*** (9.12)	2.9780*** (9.12)	3.0897*** (9.31)
Δ Swiss Interest rate * Person defaulted on loan (in HUF/CHF) within 6 years	0.5038*** (11.45)	0.4556*** (9.95)	0.4483*** (9.79)	0.4469*** (9.75)		
Δ Swiss Interest rate * Bank Capital Ratio * Person defaulted on loan (in HUF/CHF) within 6 years	0.1623 (0.36)	0.3414 (0.72)	0.4215 (0.88)	0.4334 (0.91)		
Δ Swiss Interest rate * Credit is Granted in Foreign Currency * Person defaulted on loan (in HUF/CHF) within 6 years	-0.2428*** (-3.27)	-0.2350*** (-3.13)	-0.2350*** (-3.13)	-0.2355*** (-3.13)	-0.2355*** (-3.13)	-0.2432*** (-3.19)
Δ Swiss Interest rate * Bank Capital Ratio * Credit is Granted in Foreign Currency * Person defaulted on loan (in HUF/CHF) within 6 years	-2.7495*** (-3.88)	-2.8237*** (-3.92)	-2.8237*** (-3.92)	-2.8244*** (-3.91)	-2.8244*** (-3.91)	-2.8291*** (-3.86)
Δ GDP	0.0753*** (12.26)					
Δ GDP * Bank Capital Ratio	0.0126 (0.19)	0.0350 (0.52)	0.0433 (0.65)	0.0358 (0.53)		
Δ GDP * Credit is Granted in Foreign Currency	-0.4283*** (-46.92)					
Δ GDP * Bank Capital Ratio * Credit is Granted in Foreign Currency	1.9433*** (21.01)	1.8609*** (19.61)	1.8609*** (19.61)	1.8806*** (19.78)	1.8806*** (19.78)	1.9395*** (20.10)
Δ GDP * Person defaulted on loan (in HUF/CHF) within 6 years	0.0427*** (3.22)	0.0288** (2.16)	0.0261** (1.96)	0.0258* (1.94)		
Δ GDP * Bank Capital Ratio * Person defaulted on loan (in HUF/CHF) within 6 years	-0.9098*** (-6.40)	-0.7898*** (-5.52)	-0.7610*** (-5.31)	-0.7595*** (-5.30)		
Δ GDP * Credit is Granted in Foreign Currency * Person defaulted on loan (in HUF/CHF) within 6 years	-0.0879*** (-3.47)	-0.0763*** (-3.02)	-0.0763*** (-3.02)	-0.0762*** (-3.01)	-0.0762*** (-3.01)	-0.0756*** (-2.97)
Δ GDP * Bank Capital Ratio * Credit is Granted in Foreign Currency * Person defaulted on loan (in HUF/CHF) within 6 years	-1.8477*** (-7.27)	-1.9649*** (-7.74)	-1.9649*** (-7.74)	-1.9627*** (-7.73)	-1.9627*** (-7.73)	-1.9930*** (-7.80)
Δ CPI	-0.0277*** (-3.82)	-0.0525*** (-5.52)				
Δ CPI * Bank Capital Ratio	0.1103 (1.45)	0.2110*** (2.72)	0.2729*** (3.51)	0.2779*** (3.56)		
Δ CPI * Credit is Granted in Foreign Currency	-0.1349*** (-12.44)	-0.1215*** (-8.34)	-0.1215*** (-8.34)			
Δ CPI * Bank Capital Ratio * Credit is Granted in Foreign Currency	1.0126*** (8.98)	0.9974*** (8.73)	0.9974*** (8.73)	1.0006*** (8.71)	1.0006*** (8.71)	1.0309*** (8.88)
Δ CPI * Person defaulted on loan (in HUF/CHF) within 6 years	0.0539*** (3.82)	0.0494*** (3.50)	0.0489*** (3.46)	0.0487*** (3.44)		
Δ CPI * Bank Capital Ratio * Person defaulted on loan (in HUF/CHF) within 6 years	-0.2226 (-1.50)	-0.1969 (-1.32)	-0.1916 (-1.28)	-0.1910 (-1.28)		
Δ CPI * Credit is Granted in Foreign Currency * Person defaulted on loan (in HUF/CHF) within 6 years	0.2122*** (8.20)	0.2206*** (8.52)	0.2206*** (8.52)	0.2213*** (8.54)	0.2213*** (8.54)	0.2281*** (8.72)
Δ CPI * Bank Capital Ratio * Credit is Granted in Foreign Currency * Person defaulted on loan (in HUF/CHF) within 6 years	-1.9763*** (-7.51)	-1.9882*** (-7.55)	-1.9882*** (-7.55)	-1.9898*** (-7.55)	-1.9898*** (-7.55)	-2.0315*** (-7.63)
Δ Credit Default Swap Spread	0.0022*** (19.64)	-0.0009*** (-2.98)				
Δ Nominal Effective Exchange Rate	0.0077*** (10.09)	0.0129*** (6.20)				
Δ Yield Curve	-0.1492*** (-21.41)	-0.0104 (-0.88)				
Foreign Direct Investment	0.0001*** (16.72)					
Bank Capital Ratio	0.0182*** (3.03)	0.0216*** (3.44)	0.0191*** (3.05)	0.0196*** (3.11)		
Bank Total Assets	0.0052*** (33.01)	0.0053*** (29.63)	0.0054*** (30.26)	0.0054*** (30.22)		
Bank Liquidity Ratio	-0.0013 (-1.54)	-0.0021** (-2.37)	-0.0030*** (-3.35)	-0.0030*** (-3.36)		
Bank Return on Assets	-0.0141*** (-7.45)	-0.0012 (-0.61)	0.0201*** (7.28)	0.0204*** (7.27)		
Bank Doubtful Loan Ratio	-0.0388*** (-61.11)	-0.0399*** (-60.97)	-0.0396*** (-60.55)	-0.0396*** (-60.55)		
Log Income in Subregion	0.0067 (1.27)					
Log Population in Subregion	-0.0007 (-1.49)					
Unemployment in Subregion	0.0293* (1.81)					
Credit is Granted in Foreign Currency	0.0239*** (30.02)					
Bank Capital Ratio * Credit is Granted in Foreign Currency	-0.1859*** (-22.61)	-0.2071*** (-24.52)	-0.2071*** (-24.52)	-0.2090*** (-24.62)	-0.2090*** (-24.62)	-0.2152*** (-25.02)
Credit is Granted in Foreign Currency * Person defaulted on loan (in HUF/CHF) within 6 years	-0.0048** (-2.39)	-0.0058*** (-2.88)	-0.0058*** (-2.88)	-0.0058*** (-2.90)	-0.0058*** (-2.90)	-0.0063*** (-3.12)
Bank Capital Ratio * Credit is Granted in Foreign Currency * Person defaulted on loan (in HUF/CHF) within 6 years	0.2474*** (12.21)	0.2525*** (12.48)	0.2525*** (12.48)	0.2525*** (12.48)	0.2525*** (12.48)	0.2567*** (12.57)
Bank Capital Ratio * Person defaulted on loan (in HUF/CHF) within 6 years	0.0486*** (3.86)	0.0425*** (3.31)	0.0408*** (3.19)	0.0406*** (3.17)		
constant	-0.0876*** (-2.61)	-0.0398*** (-14.93)	-0.0417*** (-15.63)	-0.0439*** (-16.68)	0.0119*** (197.60)	0.0119*** (197.00)
Borrower Fixed Effects	Yes	Yes	Yes	Yes	--	--
Borrower-Year:Month Fixed Effects	No	No	No	No	Yes	Yes
Region-Year:Quarter-Currency Fixed Effects	No	Yes	Yes	--	--	--
Region-Year:Month-Currency Fixed Effects	No	No	No	Yes	Yes	--
Locality-Year:Month-Currency Fixed Effects	No	No	No	No	No	Yes
Month Fixed Effects	No	No	Yes	--	--	--
Number of Observations	21 893 838	21 893 838	21 893 838	21 893 838	21 893 838	21 872 776

NOTE. -- The table reports selected estimates from ordinary least squares regressions (an accompanying 'full' table in appendix reports all estimated coefficients). 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 21,893,838 and it accounts for the full population 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. "--" indicates that the coefficient is insignificant and hence that no economic relevancy is calculated. *** Significant at 1%, ** significant at 5%, * significant at 10%.

Appendix table VIII					
The granting of credit in the domestic and foreign currency, bank risk-taking channel, default within 6 years as risk measure, banks with different swap to assets ratios (economic mechanism)					
Model	(1)	(2)	(3)	(4)	(5)
Δ Interest rate CHF - HUF	2.6898*** (10.20)	-4.4377*** (-10.43)			
Δ Interest rate CHF - HUF * Bank Capital Ratio	19.8745*** (9.25)	25.3142*** (11.60)	26.6436*** (12.08)	26.7400*** (11.90)	27.4850*** (10.53)
Δ Interest rate CHF - HUF * High Net Swap Ratio	-0.0153 (-0.04)	3.7407*** (9.90)	4.0410*** (10.65)	4.1018*** (10.58)	4.2598*** (9.70)
Δ Interest rate CHF - HUF * Bank Capital Ratio * High Net Swap Ratio	40.1094*** (8.58)	-4.5509 (-0.96)	-8.6760* (-1.82)	-9.3628* (-1.92)	-10.7757* (-1.95)
Δ Interest rate CHF - HUF * Person defaulted on loan (in HUF/CHF) within 6 years	4.5912*** (4.64)	5.3916*** (7.76)	5.5086*** (8.00)	5.3090*** (7.63)	5.5542*** (6.90)
Δ Interest rate CHF - HUF * Bank Capital Ratio * Person defaulted on loan (in HUF/CHF) within 6 years	-39.0850*** (-3.88)	-45.6146*** (-6.53)	-46.6616*** (-6.74)	-45.0969*** (-6.45)	-45.6274*** (-5.63)
Δ Interest rate CHF - HUF * Person defaulted on loan (in HUF/CHF) within 6 years * High Net Swap Ratio	-1.6075 (-1.06)	-5.5835*** (-4.33)	-5.6259*** (-4.37)	-5.3427*** (-4.07)	-5.1646*** (-3.59)
Δ Interest rate CHF - HUF * Bank Capital Ratio * Person defaulted on loan (in HUF/CHF) within 6 years * High Net Swap Ratio	-18.7628 (-1.04)	37.1006** (2.34)	37.9507** (2.39)	35.1844** (2.16)	30.7705* (1.73)
Δ GDP	0.6173* (1.88)				
Δ GDP * Bank Capital Ratio	-25.8367*** (-7.72)	-11.8038*** (-3.52)	-10.1486*** (-3.02)	-9.3695*** (-2.74)	-7.3004* (-1.89)
Δ GDP * High Net Swap Ratio	9.3127*** (15.31)	9.6021*** (15.91)	10.1158*** (16.71)	10.1230*** (16.33)	10.0835*** (14.31)
Δ GDP * Bank Capital Ratio * High Net Swap Ratio	-75.3237*** (-10.34)	-71.3768*** (-9.86)	-76.6830*** (-10.59)	-78.0247*** (-10.53)	-80.3564*** (-9.50)
Δ GDP * Person defaulted on loan (in HUF/CHF) within 6 years	6.0652*** (7.52)	6.1402*** (8.48)	6.0943*** (8.42)	5.9610*** (8.01)	6.0717*** (6.16)
Δ GDP * Bank Capital Ratio * Person defaulted on loan (in HUF/CHF) within 6 years	-46.8024*** (-5.63)	-50.4556*** (-6.82)	-49.9700*** (-6.76)	-49.1234*** (-6.45)	-48.4756*** (-4.71)
Δ GDP * Person defaulted on loan (in HUF/CHF) within 6 years * High Net Swap Ratio	-6.9875*** (-4.79)	-7.8564*** (-5.68)	-7.6877*** (-5.56)	-7.4079*** (-5.22)	-7.8034*** (-4.63)
Δ GDP * Bank Capital Ratio * Person defaulted on loan (in HUF/CHF) within 6 years * High Net Swap Ratio	63.6600*** (3.74)	75.0860*** (4.63)	73.2505*** (4.52)	70.9237*** (4.25)	75.5653*** (3.85)
Δ CPI	1.6342*** (4.93)	-0.9395** (-2.36)			
Δ CPI * Bank Capital Ratio	-37.5720*** (-10.98)	-8.6076** (-2.50)	-5.6751 (-1.64)	-3.8628 (-1.09)	0.7923 (0.20)
Δ CPI * High Net Swap Ratio	-3.4152*** (-5.96)	1.1809** (2.00)	1.8184*** (3.04)	1.9869*** (3.23)	2.0823*** (2.97)
Δ CPI * Bank Capital Ratio * High Net Swap Ratio	98.6116*** (13.66)	32.6030*** (4.40)	23.4256*** (3.14)	20.4771*** (2.66)	16.0425* (1.82)
Δ CPI * Person defaulted on loan (in HUF/CHF) within 6 years	6.5267*** (6.41)	6.6099*** (8.44)	6.6314*** (8.55)	6.6331*** (8.40)	6.0584*** (5.92)
Δ CPI * Bank Capital Ratio * Person defaulted on loan (in HUF/CHF) within 6 years	-61.2611*** (-5.94)	-64.2115*** (-8.20)	-64.4041*** (-8.33)	-64.9267*** (-8.21)	-60.0803*** (-5.71)
Δ CPI * Person defaulted on loan (in HUF/CHF) within 6 years * High Net Swap Ratio	-8.1945*** (-5.78)	-9.4354*** (-7.58)	-9.3314*** (-7.51)	-9.4754*** (-7.43)	-8.3355*** (-5.44)
Δ CPI * Bank Capital Ratio * Person defaulted on loan (in HUF/CHF) within 6 years * High Net Swap Ratio	59.4628*** (3.68)	80.7142*** (5.58)	79.7689*** (5.53)	81.9214*** (5.52)	72.3425*** (4.09)
Δ Credit Default Swap Spread	0.0294*** (6.94)	0.0308*** (3.54)			
Δ Nominal Effective Exchange Rate	-0.0552** (-2.04)	0.0884 (1.24)			
Δ Yield Curve	-6.8619*** (-21.56)	1.8644*** (3.58)			
Foreign Direct Investment	-0.0007*** (-3.71)				
Bank Capital Ratio	7.1308*** (22.02)	2.1178*** (6.30)	1.7412*** (5.15)	1.5472*** (4.48)	1.0730*** (2.73)
Bank Total Assets	0.6489*** (76.30)	0.2149*** (17.63)	0.2076*** (16.85)	0.1997*** (16.03)	0.1938*** (13.90)
Bank Liquidity Ratio	-0.4832*** (-11.67)	-0.1643*** (-3.89)	-0.1063** (-2.38)	-0.1045** (-2.28)	-0.0328 (-0.63)
Bank Return on Assets	0.1943** (2.40)	0.0703 (0.87)	0.0791 (0.67)	0.0455 (0.37)	0.0129 (0.09)
Bank Doubtful Loan Ratio	0.0536* (1.82)	-0.4132*** (-13.13)	-0.4357*** (-13.80)	-0.4402*** (-13.67)	-0.4746*** (-12.78)
Log Income in Subregion	-0.0515*** (-5.09)				0.1049* (1.91)
Log Population in Subregion	-0.0027*** (-2.71)				-0.0058 (-1.34)
Unemployment in Subregion	0.4524*** (13.60)				0.3476* (1.78)
High Net Swap Ratio	0.1165** (2.44)	-0.3022*** (-6.14)	-0.3567*** (-7.17)	-0.3700*** (-7.24)	-0.3736*** (-6.41)
Bank Capital Ratio * High Net Swap Ratio	-6.1418*** (-10.27)	-0.6536 (-1.07)	0.1036 (0.17)	0.3554 (0.56)	0.6907 (0.95)
Person defaulted on loan (in HUF/CHF) within 6 years	-0.6336*** (-7.48)	-0.6475** (-9.82)	-0.6487*** (-9.91)	-0.6463*** (-9.71)	-0.6114*** (-7.06)
Bank Capital Ratio * Person defaulted on loan (in HUF/CHF) within 6 years	6.9246*** (8.02)	7.1915*** (10.79)	7.1995*** (10.90)	7.2221*** (10.70)	6.9811*** (7.79)
Person defaulted on loan (in HUF/CHF) within 6 years * High Net Swap Ratio	0.6469*** (5.41)	0.7670*** (7.26)	0.7580*** (7.18)	0.7638*** (7.07)	0.6892*** (5.29)
Bank Capital Ratio * Person defaulted on loan (in HUF/CHF) within 6 years * High Net Swap Ratio	-4.7750*** (-3.51)	-6.6125*** (-5.41)	-6.5276*** (-5.35)	-6.6307*** (-5.30)	-6.0869*** (-4.07)
constant	-8.8851*** (-61.93)	-2.2930*** (-12.23)	-2.2387*** (-11.97)	-2.1158*** (-11.19)	-2.6721*** (-6.52)
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes
Region-Year:Quarter Fixed Effects	No	Yes	Yes	--	--
Region-Year:Month Fixed Effects	No	No	No	Yes	--
Locality-Year:Month Fixed Effects	No	No	No	No	Yes
Month Fixed Effects	No	No	Yes	--	--
Number of Observations	186 574	186 561	186 561	186 222	160 718

NOTE. -- The table reports selected estimates from ordinary least squares regressions (an accompanying 'full' table in appendix reports all estimated coefficients). 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. 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 IX

BANK GROUP CAPITALIZATION AND OTHER BANK CHARACTERISTICS

Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Δ Interest rate *Bank Capital Ratio	0.3928*** (10.14)			0.5183*** (10.88)			0.3898*** (8.75)		
Δ Interest rate *Bank Liquidity Ratio				0.3060*** (11.69)					
Δ Interest rate *Bank Total Assets							0.0145*** (9.80)		
Δ Interest rate *Bank Capital Ratio *Credit is Granted in Foreign Currency	-0.9247*** (-17.44)	-0.9247*** (-17.44)	-0.9247*** (-17.44)	-1.0466*** (-16.73)	-1.0466*** (-16.73)	-1.0496*** (-16.48)	-0.6834*** (-11.54)	-0.6834*** (-11.54)	-0.7007*** (-11.62)
D Interest Rate * Bank Liquidity Ratio * Credit Is Granted in Foreign Currency				-0.2590*** (-9.41)	-0.2590*** (-9.41)	-0.2892*** (-10.27)			
D Interest Rate * Bank Total Assets * Credit Is Granted in Foreign Currency							-0.0190*** (-12.12)	-0.0190*** (-12.12)	-0.0191*** (-11.89)
Δ Interest rate *Person defaulted on loan (in HUF/CHF) within 6 years	-0.0649*** (-13.13)			-0.0379*** (-3.51)			0.2180*** (4.16)		
Δ Interest rate *Bank Capital Ratio *Person defaulted on loan (in HUF/CHF) within 6 years	-0.1161* (-1.81)			0.0717 (0.81)			-0.3259*** (-4.05)		
Δ Interest rate *Bank Liquidity Ratio *Person defaulted on loan (in HUF/CHF) within 6 years				-0.2907*** (-4.30)					
Δ Interest rate *Bank Total Assets *Person defaulted on loan (in HUF/CHF) within 6 years							-0.0182*** (-4.99)		
Δ Interest rate *Credit is Granted in Foreign Currency *Person defaulted on loan (in HUF/CHF) within 6 years	0.0277*** (3.12)	0.0277*** (3.12)	0.0277*** (3.12)	-0.0264* (-1.79)	-0.0264* (-1.79)	-0.0284* (-1.90)	-0.2428*** (-4.32)	-0.2428*** (-4.32)	-0.2383*** (-4.19)
Δ Interest rate *Bank Capital Ratio *Credit is Granted in Foreign Currency *Person defaulted on loan (in HUF/CHF) within 6 years	0.8581*** (8.10)	0.8581*** (8.10)	0.8581*** (8.10)	0.8457*** (6.42)	0.8457*** (6.42)	0.8680*** (6.46)	0.5755*** (4.50)	0.5755*** (4.50)	0.6059*** (4.64)
Δ Interest rate *Bank Liquidity Ratio *Credit is Granted in Foreign Currency *Person defaulted on loan (in HUF/CHF) within 6 years				0.3675*** (5.06)	0.3675*** (5.06)	0.3473*** (4.71)			
Δ Interest rate *Bank Total Assets *Credit is Granted in Foreign Currency *Person defaulted on loan (in HUF/CHF) within 6 years							0.0210*** (5.30)	0.0210*** (5.30)	0.0203*** (5.07)
Δ GDP *Bank Capital Ratio	0.6620*** (12.56)			-0.1461** (-2.16)			-0.2621*** (-3.71)		
Δ GDP *Bank Liquidity Ratio				-0.2016*** (-5.34)					
Δ GDP *Bank Total Assets							0.0197*** (9.05)		
Δ GDP *Bank Capital Ratio *Credit is Granted in Foreign Currency	2.0254*** (26.03)	2.0254*** (26.03)	2.0254*** (26.03)	2.8002*** (29.35)	2.8002*** (29.35)	2.8010*** (28.95)	3.5192*** (34.52)	3.5192*** (34.52)	3.4977*** (33.77)
Δ GDP *Bank Liquidity Ratio *Credit is Granted in Foreign Currency				1.2304*** (29.69)	1.2304*** (29.69)	1.2196*** (28.77)			
Δ GDP *Bank Total Assets *Credit is Granted in Foreign Currency							-0.0731*** (-29.64)	-0.0731*** (-29.64)	-0.0726*** (-28.63)
Δ GDP *Person defaulted on loan (in HUF/CHF) within 6 years	-0.0041 (-0.50)			-0.0675*** (-3.68)			0.0894 (1.13)		
Δ GDP *Bank Capital Ratio *Person defaulted on loan (in HUF/CHF) within 6 years	-1.0914*** (-10.67)			-0.2924** (-1.98)			-1.2807*** (-8.22)		
Δ GDP *Bank Liquidity Ratio *Person defaulted on loan (in HUF/CHF) within 6 years				0.0785 (0.71)					
Δ GDP *Bank Total Assets *Person defaulted on loan (in HUF/CHF) within 6 years							0.0058 (1.02)		
Δ GDP *Credit is Granted in Foreign Currency *Person defaulted on loan (in HUF/CHF) within 6 years	-0.1209*** (-6.79)	-0.1209*** (-6.79)	-0.1209*** (-6.79)	-0.0492 (-1.64)	-0.0492 (-1.64)	-0.0493 (-1.63)	0.2409*** (2.60)	0.2409*** (2.60)	0.2302** (2.46)
Δ GDP *Bank Capital Ratio *Credit is Granted in Foreign Currency *Person defaulted on loan (in HUF/CHF) within 6 years	-0.9668*** (-4.92)	-0.9668*** (-4.92)	-0.9668*** (-4.92)	-1.7145*** (-6.76)	-1.7145*** (-6.76)	-1.7447*** (-6.83)	-1.5306*** (-5.81)	-1.5306*** (-5.81)	-1.5712*** (-5.91)
Δ GDP *Bank Liquidity Ratio *Credit is Granted in Foreign Currency *Person defaulted on loan (in HUF/CHF) within 6 years				0.1009 (0.78)	0.1009 (0.78)	0.1167 (0.88)			
Δ GDP *Bank Total Assets *Credit is Granted in Foreign Currency *Person defaulted on loan (in HUF/CHF) within 6 years							-0.0205*** (-3.05)	-0.0205*** (-3.05)	-0.0196*** (-2.87)
Δ CPI *Bank Capital Ratio	-0.7192*** (-12.55)			-0.6566*** (-9.67)			-1.2526*** (-18.83)		
Δ CPI *Bank Liquidity Ratio				-0.3519*** (-7.71)					
Δ CPI *Bank Total Assets							0.0209*** (8.11)		
Δ CPI *Bank Capital Ratio *Credit is Granted in Foreign Currency	1.5186*** (17.08)	1.5186*** (17.08)	1.5186*** (17.08)	1.5880*** (15.76)	1.5880*** (15.76)	1.6204*** (15.86)	3.0187*** (29.27)	3.0187*** (29.27)	3.0342*** (29.10)
Δ CPI *Bank Liquidity Ratio *Credit is Granted in Foreign Currency				0.4084*** (8.25)	0.4084*** (8.25)	0.4225*** (8.35)			
Δ CPI *Bank Total Assets *Credit is Granted in Foreign Currency							-0.0595*** (-21.10)	-0.0595*** (-21.10)	-0.0616*** (-21.31)
Δ CPI *Person defaulted on loan (in HUF/CHF) within 6 years	0.0601*** (7.18)			0.0023 (0.12)			-0.0626 (-0.66)		
Δ CPI *Bank Capital Ratio *Person defaulted on loan (in HUF/CHF) within 6 years	-0.0415 (-0.41)			0.2315* (1.80)			-0.2556** (-1.97)		
Δ CPI *Bank Liquidity Ratio *Person defaulted on loan (in HUF/CHF) within 6 years				0.3646*** (2.87)					
Δ CPI *Bank Total Assets *Person defaulted on loan (in HUF/CHF) within 6 years							0.0112* (1.68)		
Δ CPI *Credit is Granted in Foreign Currency *Person defaulted on loan (in HUF/CHF) within 6 years	0.1864*** (10.43)	0.1864*** (10.43)	0.1864*** (10.43)	0.3978*** (13.76)	0.3978*** (13.76)	0.3992*** (13.67)	0.1106 (1.04)	0.1106 (1.04)	0.0980 (0.91)
Δ CPI *Bank Capital Ratio *Credit is Granted in Foreign Currency *Person defaulted on loan (in HUF/CHF) within 6 years	-2.1010*** (-11.02)	-2.1010*** (-11.02)	-2.1010*** (-11.02)	-2.5151*** (-11.44)	-2.5151*** (-11.44)	-2.5528*** (-11.46)	-2.1136*** (-9.28)	-2.1136*** (-9.28)	-2.1829*** (-9.47)
Δ CPI *Bank Liquidity Ratio *Credit is Granted in Foreign Currency *Person defaulted on loan (in HUF/CHF) within 6 years				-1.1221*** (-7.80)	-1.1221*** (-7.80)	-1.0881*** (-7.47)			
Δ CPI *Bank Total Assets *Credit is Granted in Foreign Currency *Person defaulted on loan (in HUF/CHF) within 6 years							0.0067 (0.89)	0.0067 (0.89)	0.0082 (1.09)
Bank Capital Ratio	0.0232*** (4.56)			0.0349*** (5.63)			0.0855*** (13.84)		
Bank Total Assets	0.0065*** (36.90)			0.0052*** (28.99)			0.0010*** (3.55)		
Bank Liquidity Ratio	-0.0035*** (-3.87)			0.0522*** (14.31)			-0.0002 (-0.25)		
Bank Return on Assets	0.0103*** (3.66)			0.0201*** (7.19)			0.0212*** (7.58)		
Bank Doubtful Loan Ratio	-0.0360*** (-55.28)			-0.0415*** (-60.21)			-0.0356*** (-54.87)		
Bank Capital Ratio *Credit is Granted in Foreign Currency	-0.2523*** (-35.08)	-0.2523*** (-35.08)	-0.2523*** (-35.08)	-0.2620*** (-30.96)	-0.2620*** (-30.96)	-0.2652*** (-30.91)	-0.4083*** (-47.49)	-0.4083*** (-47.49)	-0.4085*** (-46.85)
Bank Liquidity Ratio *Credit is Granted in Foreign Currency				-0.1062*** (-27.16)	-0.1062*** (-27.16)	-0.1053*** (-26.31)			
Bank Total Assets *Credit is Granted in Foreign Currency							0.0087*** (38.80)	0.0087*** (38.80)	0.0087*** (37.88)
Credit is Granted in Foreign Currency *Person defaulted on loan (in HUF/CHF) within 6 years	-0.0027* (-1.79)	-0.0027* (-1.79)	-0.0027* (-1.79)	-0.0154*** (-6.24)	-0.0154*** (-6.24)	-0.0157*** (-6.27)	-0.0227*** (-2.67)	-0.0227*** (-2.67)	-0.0217** (-2.52)
Bank Capital Ratio *Credit is Granted in Foreign Currency *Person defaulted on loan (in HUF/CHF) within 6 years	0.2076*** (12.67)	0.2076*** (12.67)	0.2076*** (12.67)	0.2578*** (12.84)	0.2578*** (12.84)	0.2616*** (12.90)	0.2323*** (11.13)	0.2323*** (11.13)	0.2381*** (11.26)
Bank Liquidity Ratio *Credit is Granted in Foreign Currency *Person defaulted on loan (in HUF/CHF) within 6 years				0.0410*** (3.54)	0.0410*** (3.54)	0.0387*** (3.29)			
Bank Total Assets *Credit is Granted in Foreign Currency *Person defaulted on loan (in HUF/CHF) within 6 years							0.0011* (1.77)	0.0011* (1.77)	0.0010 (1.55)
Bank Capital Ratio *Person defaulted on loan (in HUF/CHF) within 6 years	0.0442*** (4.68)			-0.0117 (-0.93)			0.0890*** (6.73)		
Bank Liquidity Ratio *Person defaulted on loan (in HUF/CHF) within 6 years				-0.0554*** (-5.44)					
Bank Total Assets *Person defaulted on loan (in HUF/CHF) within 6 years							0.0108*** (17.53)		
constant	-0.0603*** (-23.33)	0.0125*** (301.23)	0.0125*** (301.23)	-0.0383*** (-14.38)	0.0150*** (206.38)	0.0150*** (203.34)	-0.0517*** (-18.24)	-0.0067*** (-39.09)	-0.0061*** (-33.37)
Borrower Fixed Effects	Yes	--	--	Yes	--	--	Yes	--	Yes
Borrower-Year:Month Fixed Effects	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Region-Year:Month-Currency Fixed Effects	Yes	Yes	--	Yes	Yes	--	Yes	Yes	--
Locality-Year:Month-Currency Fixed Effects	No	No	Yes	No	No	Yes	No	No	Yes
Number of Observations	21 893 838	21 893 838	21 893 838	21 893 838	21 893 838	21 872 776	21 893 838	21 893 838	21 872 776

NOTE. -- The table reports selected 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 21,893,838 and it accounts for the full population 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%.