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### **Bank Funding, Securitization and Loan Terms: Evidence from Foreign Currency Lending**

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**CROATIAN NATIONAL BANK**

# **Bank Funding, Securitization and Loan Terms: Evidence from Foreign Currency Lending**

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# **Bank Funding, Securitization and Loan Terms: Evidence from Foreign Currency Lending**

## **Abstract**

We examine how bank funding and securitization activity affect the currency denomination of business loans. We analyze a unique dataset that for more than hundred thousand loans granted by one Bulgarian bank to over sixty thousand different firms in the period 2003-2007 includes information on the *requested* and *granted currency* of the loans. This data set coupled with a policy experiment taking place during the sample period allows us to disentangle demand-side from supply-side determinants of foreign currency credit. We find that one third of the *euro* loans disbursed in our sample were actually requested by the firm in Bulgarian *lev*. Our analysis suggests that the bank lends in euro, not only to less risky firms, but also when the bank itself has more (customer) funding in euro, and especially when the bank grants loans that are eligible to be securitized in euro. We find that long-term loans are particularly likely to be granted in euro, but that this is driven by monetary uncertainty rather than by longer-term funding in foreign currency. These results confirm the conjecture that foreign currency borrowing in Eastern Europe is at least partially driven by banks hesitant to lend long-term in local currency and eager to match the current currency structure of their assets and liabilities as well as of their securitization activities.

**Keywords:** foreign currency debt, bank funding, securitization

**JEL classification numbers:** G21, G32, F34

# 1 Introduction

Do banks foist unnecessary loans with unfavorable terms on unsuspecting clients? And does financial innovation such as the securitization of loans amplify such behavior? In the wake of the financial crisis many commentators have argued that banks may have carelessly in some cases maybe even deceitfully “pushed” certain credit products onto their customers,<sup>1</sup> and that securitization may have played a pivotal role in undermining the banks’ usual restraint. To which banks naturally retort they were simply servicing credit demand and that anyway *caveat emptor* applies.

This paper takes a step in disentangling the above claims by analyzing the striking casus of foreign currency lending in Eastern Europe during the run-up to the financial crisis. Foreign currencies and especially the euro played an important role for domestic financial transactions in Eastern Europe. On average, 52% of loans in the region were granted in foreign currencies and 40% of customer deposits were held in foreign currency with the euro being by far the most important currency (ECB 2007). Recent survey evidence suggests that the propensity of retail clients to take foreign currency loans has not declined even in the aftermath of substantial currency depreciations during the financial crisis (Beckmann, Scheiber and Stix 2011).

The risks arising from foreign currency lending to retail clients, i.e. households and small firms, in countries like Hungary, Poland or Ukraine were widely understood before the crisis,<sup>2</sup> and were met by policy makers with a broad set of regulatory instruments (ECB 2010). In the

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<sup>1</sup> For early examples from the U.S. see *Bloomberg Businessweek* (11/09/2006) and *New York Times* (6/6/2009), and recently the \$85 million civil money penalty against Wells Fargo that was levied partly for “steering potential prime borrowers into more costly subprime loans” (*Federal Reserve Board*, Press Release 20/7/2011).

<sup>2</sup> “The point to grasp about Eastern Europe is that ... the debt is plagued by currency mismatches because in recent years households (and to a lesser extent, corporates) have increasingly chosen to borrow in low-interest currencies ... it has shades of the Asian tigers back in 1997.” (*Financial Times*, 29/9/2007).

aftermath of the crisis policy makers in the region have also taken measures to cushion the impact of exchange rate depreciations on unhedged borrowers (Brown and Lane 2011).

Mirroring the debate over irresponsible lending in the US subprime market, the blame for excessive foreign currency borrowing in Eastern Europe has been placed at the door of the lenders. These have been accused of pushing euro loans onto their clients as a result of their substantial funding in euro from their (Western European) parent banks. While recent bank-level evidence questions the role of international funding as a driver of foreign currency lending (Brown and De Haas, 2011), current policy measures e.g. in Hungary, are still based on the premise that the banks are to blame.<sup>3</sup>

In this paper we examine how the currency denomination of loans is determined in the negotiation process that takes place between small firms and their bank in Bulgaria. Our analysis is based on a unique bank dataset that contains all 105,002 business loans granted to 61,285 firms during the period 2003-2007. In contrast to previous studies and crucial for our purposes we observe not only the currency as stated in the loan contract but also the borrower's *requested* currency. We are therefore able to examine to what extent the currency denomination of loans is driven by supply side factors such as foreign currency funding and securitization.

The bank at the heart of our analysis is focused on retail lending making it an interesting object of study, since especially retail clients have been most involved in foreign currency transactions throughout Eastern Europe. As with the majority of banks in the region, the bank is mainly foreign owned and has substantial funding in foreign currency. Similar to other

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<sup>3</sup> Foreign currency debt relief measures recently implemented by Hungarian authorities include the possibility for borrowers to repay their foreign currency loans early at below market exchange rates. In the first three weeks after the measure was introduced Hungarian banks were estimated to have lost 151 Million US dollars due to this policy (*Bloomberg Businessweek*, 3/11/2011).

retail banks in Bulgaria and the Eastern European region as a whole, loans in foreign currency make up a substantial share (27%) of the bank's portfolio.

We analyze if changes in the currency denomination of the bank's own funding and the eligibility of loans for securitization drive switching from requested to granted loan currency denomination. To identify supply-side drivers of foreign currency credit, we rely on an exogenous policy experiment that took place during the sample period. In April 2005 the Bulgarian Government increased reserve requirements to stem a credit boom. The bank reacted by accelerating its existing plans to securitize part of its loan portfolio, but capital market imperfections implied it could only securitize loans denominated in foreign currency, and that were of a certain eligible size and maturity. We compare the switching of loan currency by the bank for eligible and non-eligible loans before and after the initiation of securitization.

On the demand side we first show that in line with theoretical predictions, a firm in our sample is more likely to request a loan in foreign currency (euro) compared to the local currency (Bulgarian lev) if interest rates on foreign currency loans are lower, if the firm has foreign currency income, and if it faces lower distress costs in case of default. We also find that larger firms, older firms and less opaque firms, i.e. those with a longer relationship with the bank, are more likely to request a euro loan. We, however, also find that firms which need larger loans, long-term loans and mortgage loans are more likely to request a foreign currency loan. This result seems to be driven by firms anticipating the reluctance of the bank to extend large or long-term loans in local currency. Indeed, an analysis of panel data for repeat clients of the bank suggests that firms learn over time that long-term and mortgage loans are more likely to be granted in foreign currency.

Comparing the requested and granted currencies of loans in our sample we find that almost one-third of the loans disbursed by the bank in foreign currency were initially requested by the firm in local currency. We find that the bank is more likely to grant a loan in euro if the firm is of lower observable credit risk and less opaque to the bank. However, we also find that the bank is hesitant to offer large and long-term loans in local currency and is more likely to lend in euro when it has more funding in euro.

Finally, we document that the securitization of foreign currency loans from 2006 onwards did lead to a strong supply effect. Indeed the share of loans eligible for securitization which were switched by the bank to euro (when the firm requested lev) increased considerably after the securitization deal started in the second quarter of 2006. No such effect is observed for non-eligible loans. The securitization-induced switch exposes borrowers to foreign currency risk that probably remains unhedged. Therefore it exposes the bank to *indirect* credit risk if the local currency depreciates in the future to the point where the borrower would no longer be able to service the outstanding loan. At the same time, however, our results provide no conclusive evidence that the increase in foreign currency lending induced by securitization led the bank to take on additional *direct* credit risk in the early quarters after the securitization deal started.

In sum, our results show that a substantial share of foreign currency retail loans in Eastern Europe is supply-driven, with banks hesitant to lend long-term in local currency, eager to match the currency structure of their assets and liabilities, and eager to take advantage of the opportunities for securitization.

Our paper aims to contribute to three strands of the literature. First, our paper naturally adds to the existing evidence on the determinants of foreign currency borrowing by firms. While the majority of this literature focuses on the choice of foreign versus local currency

debt by large corporates,<sup>4</sup> more recent evidence has also examined loan currency choice by small firms in emerging markets (Brown, Ongena and Yesin 2011a).<sup>5</sup> In contrast to these studies, our data allows us to disentangle whether the currency denomination of a loan is determined by the clients and / or the bank.

Second, our paper contributes to a broader literature that links the banks' own funding to granted loan terms and credit availability. Berlin and Mester (1999), for example, tie bank funding to bank orientation, i.e. relationship versus transactional lending. In particular, Berlin and Mester show that banks with better access to rate inelastic core deposits engage in more loan rate smoothing (relationship lending) than banks that lack such access. And recently Ivashina and Scharfstein (2010) show that banks with more funding from core deposits reduced their syndicated lending less during the recent financial crisis than banks without access to this stable source of funding.

In our setting the banks' supply of foreign currency loans similarly depends on their own access to foreign currency refinancing (Basso, Calvo-Gonzalez and Jurgilas 2010). Many banks in Emerging Europe have substantial liabilities in euro due to their foreign ownership. Limited by prudential regulations in their currency exposure, and faced with a lack of access in the weakly developed forward markets to instruments that hedge foreign currency positions, banks may lend in foreign currencies to prevent currency mismatches on their own balance sheets (Luca and Petrova 2008, Sorsa, Bakker, Duenwald, Maechler and Tiffin 2007),

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<sup>4</sup> See Keloharju and Niskanen (2001), Martinez and Werner (2002), Allayannis, Brown and Klapper (2003), Benavente, Johnson and Morande (2003), Cowan, Hansen and Herrera (2005), Kedia and Mozumdar (2003), Gelos (2003), and Cowan (2006) for evidence from various countries.

<sup>5</sup> They examine the currency denomination of the most recent loan received by 3,105 small firms in 24 transition countries. They find strong evidence that the choice of a foreign currency loan is related to firm-level foreign currency cash flow, but only weak evidence that foreign currency borrowing is affected by distress costs or financial opaqueness. Interest rate differentials and exchange rate volatility do not explain differences in foreign currency borrowing in their sample. Beer, Ongena and Peter (2010) study loan-level currency denomination choices made by households in Austria.

especially if they expect that they will be bailed out in the case of credit losses due to currency depreciations (Rancierre, Tornell and Vamvakidis 2010).<sup>6</sup>

Finally, our work fits in an important nascent literature that investigates the role played by financial innovation, securitization in particular, in the run-up to the current financial crisis. On the one hand, Keys, Seru and Vig (2011) and Keys, Mukherjee, Seru and Vig (2011) show a connection between the ease of securitization and screening in the low documentation subprime market in the U.S. Similarly, Maddaloni and Peydró (2011) find that the softening of lending standards in the U.S. and Europe following low short-term interest rates was amplified by securitization activity, and Kara, Marqués-Ibáñez and Ongena (2011) show that banks in Europe that were more active at originating asset-backed securities were also more aggressive in their loan pricing practices. On the other hand, Benmelech, Dlugosz and Ivashina (2011) for example find that within a Collateralized Loan Obligation (CLO) portfolio only loans that were originated by the bank that acts as the CLO underwriter underperformed the rest of the loan portfolio. Hence securitization *per se* need not lead to softer lending standards.

Our results are similarly qualified. Securitization on the one hand seemingly incentivizes the bank to switch borrowers to a foreign currency loan entailing immediate foreign currency risk for the borrower though possibly also indirect future credit risk for the bank. On the other hand, the increase in foreign currency lending induced by securitization did not lead the bank to take on additional direct credit risk right after the start of the securitization deal. This

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<sup>6</sup> Luca and Petrova (2008) analyze the aggregate share of foreign currency loans for 21 transition countries between 1990 and 2003. They find that it is positively related to aggregate export activity, interest rate differentials, domestic monetary volatility and deposit dollarization, while it is negatively related to the volatility of the exchange rate. Dollarization is lower in countries with more developed foreign exchange markets, and credit dollarization is affected by prudential regulations which stipulate tighter open position limits. See also Arteta (2002), Barajas and Morales (2003), and Basso, Calvo-Gonzalez and Jurgilas (2010).

implies that the bank expanded its lending in foreign currency by pushing FX loans to the least risky of those clients requesting local currency.

Our findings also complement those of Loutskina and Strahan (2009). They show that securitization reduced the influence of bank financial conditions on loan supply in the U.S., i.e. securitization weakened the link from bank funding conditions to credit supply. While the type of securitization that we observe serves to mitigate the effects of credit controls (and to broaden the refinancing basis), at the same time this securitization also changes the allocation of credit (as in Loutskina 2011) since it leads to more foreign currency lending. Our dataset combined with the bank's securitization program established in response to increased reserve requirements allow us to examine the factors that influence the bank's decision to alter a borrower's currency request gaining insights in the bank's weighing of taking on currency versus credit risks.

The rest of the paper is organized as follows. Section 2 describes our data while section 3 reports results from univariate and multivariate analyses. Section 4 concludes.

## **2 Data**

Our dataset covers all annuity loans, credit lines and overdrafts extended to firms by one Bulgarian bank (henceforth called "the Bank") between April 2003 and September 2007. Bulgaria is representative of the region-wide "eurization" of the banking sector with 47% of loans and 40% of deposits denominated in euro. The Bank is a nationwide bank which focuses on lending to small and medium-sized enterprises. Compared to the aggregate banking system, where only 41% of assets are loans to enterprises, 70% of the assets at the Bank are enterprise loans. The volume of outstanding enterprise loans in foreign currency at the Bank equals approximately 40% and hence is similar to that of many retail banks in

Central and Eastern Europe. As with the majority of banks in Bulgaria and the rest of the region, foreign strategic investors hold a controlling share in the Bank.<sup>7</sup>

In total the Bank extended 106,091 loans during this time period. For each disbursed loan we have information on the loan conditions requested by the firm, the actual loan conditions granted, as well as firm characteristics at the time of the loan disbursement. Crucial to our analysis we observe whether the loan was requested and/or granted in Bulgarian lev (henceforth we use the currency's ISO 4217 alphabetic code, i.e. BGN) or euro (henceforth EUR). We exclude all observations with missing loan-level or firm-level data leaving us with 105,002 loans to 61,285 different firms. Our dataset also includes monthly indicators of the Bank's liability structure as well as indicators of monetary conditions obtained from the Bulgarian National Bank (BNB) and the International Monetary Fund (IMF). Definitions of all variables are provided in Table 1.

[Insert Table 1 here]

## **2.1 The Bank's lending technology and loan portfolio**

At the heart of the Bank's lending technology is a personnel-intensive analysis of the borrower's debt capacity.<sup>8</sup> A prospective borrower first meets a client advisor who assesses whether the borrower meets the Bank's basic requirements. If this is the case, the client fills in a loan application form. On this form the client indicates her preferred loan amount, maturity

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<sup>7</sup> In 2007 82% of bank assets in Bulgaria were in the hands of institutions with majority foreign ownership. In Central and Eastern Europe the average share of foreign bank assets in 2007 was 80%.

<sup>8</sup> To gain insights into the usual loan granting process, we have conducted informal interviews with loan officers and training staff from the Bank's head office.

and *currency* as well as the purpose of the loan. The client also has to provide information about the firm ownership, other bank relations and the free cash flow available for the repayment of the loan.

In a next step, the Bank’s credit administration prepares information on the borrower’s credit history with this Bank and other banks.<sup>9</sup> At the same time, the loan officer conducts a financial analysis of the firm including a personal visit to the firm to confirm its financial situation. The loan officer relays his suggested loan terms together with the information gathered during the financial analysis to the Bank’s credit committee, which then makes the final decision on the loan terms granted. Since the borrower’s repayment capacity is the core figure in the analysis, loan amount, *currency*, and maturity are determined first.

The setting of interest rates and collateral requirements then depends on the loan size. For small loans (up to 50,000 EUR) collateral requirements and interest rates are standardized, i.e. not negotiated on an individual basis. For medium-sized loans (above 50,000 EUR) interest rates and collateral requirements are negotiated individually.

[Insert Table 2 here]

Table 2 provides an overview of the Bank’s lending activities during our observation period. Panel A and B display the number and volume of disbursed loans by year. Most loans in our sample (i.e. 98%) are small, with an amount less than 50,000 EUR. However, considering the volume of lending, medium loans are of sizeable importance in the Bank’s loan portfolio (comprising 32%). Panel A shows that almost two-thirds of the Bank’s loans

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<sup>9</sup> Enterprise loans in Bulgaria are covered both by the public credit registry and a private credit bureau (see [www.doingbusiness.org](http://www.doingbusiness.org)).

are disbursed to repeat clients, i.e. borrowers who take out more than one loan during our observation period. The subsample of loans to *repeat clients* will be important throughout our empirical exercise as it allows us to control for unobserved (time-invariant) firm-level characteristics.

Panel C of Table 2 shows that a substantial share of the Bank's lending is in foreign currency rather than in BGN. Loans denominated in EUR account for 36% of the loan volume disbursed during our observation period.<sup>10</sup> This share decreased considerably between 2003 and 2007, but even in this final year of our observation period more than 30% of the disbursed loan volume was in EUR. Panel C further reveals that the share of EUR loans varies substantially by loan size. EUR loans make up only a minor share of small loans, whereas they dominate medium-sized loans.

## **2.2 Requested and granted loans in foreign currency**

As we have information on the firms' requested currency as well as the actual currency of the loan granted, we are able to establish when the requested currency coincides with the granted currency, and how often the Bank switches the loan currency. Figure 1 shows that overall 32% of the loans (23% of the loan volume) disbursed in EUR were loans initially requested in BGN by the borrower. Looking at it from the borrowers' side, 12% of the loan volume which was requested in local currency (68 Mio EUR out of 571 Mio EUR) was actually disbursed in foreign currency. This finding already suggests that a substantial share of foreign currency lending by the Bank is not demand, but supply driven. By contrast, we

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<sup>10</sup> We focus our analysis on foreign currency loans denominated in EUR, since they account for 97.5% of the Bank's total foreign currency lending.

find that a negligible share of the number and volume of loans disbursed in local currency were requested in foreign currency.

[Insert Figure 1 here]

Figure 2 shows that the propensity of firms to request and the propensity of the Bank to grant EUR loans are strongly related to requested loan size and maturity. Figure 2A reveals that the share of loans which is requested and granted in EUR increases steadily with requested loan size. As the share of loans requested in EUR is negligible for loans below 10,000 EUR, we conduct all our empirical analyses not only for the full sample but also for the subsample of loans with requested amounts exceeding 10,000 EUR to make sure that our results are not mainly driven by the (very) small loans.

The share of loans requested in EUR is low for loans with requested maturities of up to 60 months and then increases rapidly. This may be explained by the fact that the housing market in Bulgaria and therefore mortgage loans are predominantly denominated in EUR. We will consider this in our empirical analysis by separately studying the subsample of non-mortgage loans.

[Insert Figure 2 here]

Figure 2B displays the probability of a firm receiving a loan in euro conditional on its requested currency, loan size and maturity. The figure shows that the probability of being switched to a EUR loan after requesting a BGN loan increases steadily with the requested loan size and sharply when the requested maturity exceeds 60 months. By contrast, and

independent of their requested loan size or maturity, loans requested in EUR are almost exclusively granted in EUR. The supply analysis will therefore concentrate on the factors that affect the Bank's decision to switch a request for local currency into EUR.

### 2.3 Explanatory variables

Our empirical analysis is focused on two dependent variables. We first examine the probability of firm  $i$  taking out a loan  $k$  at time  $t$  to request a foreign currency as opposed to a domestic currency loan (*EUR requested*). We then examine the probability that the Bank switches loan currency, i.e. grants a loan in euro that was requested in local currency (*EUR granted* / *BGN requested*).

$$[1] \Pr(\textit{EUR requested})_{i,k,t} = \alpha_r + \alpha_s + \beta_1 F_{i,t} + \beta_2 L_k + \beta_3 B_t + \beta_4 M_t + \varepsilon_{i,k,t}$$

$$[2] \Pr(\textit{EUR granted} \mid \textit{BGN requested})_{i,k,t} = \alpha_r + \alpha_s + \beta_1 F_{i,t} + \beta_2 L_k + \beta_3 B_t + \beta_4 M_t + \varepsilon_{i,k,t}$$

We relate both dependent variables to an array of firm characteristics  $F_{i,t}$ , loan characteristics  $L_k$ , as well as indicators of the Bank's funding structure  $B_t$  and monetary conditions  $M_t$  when the loan was disbursed. All empirical models include region and industry fixed effects  $(\alpha_r, \alpha_s)$  to account for variation in the risks of foreign currency borrowing associated with a firm's economic activity.

On the basis of the theoretical predictions regarding the demand for foreign currency loans, we expect those firms to be more likely to request a EUR loan which have foreign currency income, low leverage, and lower distress costs in the case of default. Goswami and Shrikhande (2001) show that firms may use foreign currency debt as a hedging instrument for

the exchange rate exposure of their revenues (see Brown 2001 and Mian 1996 on foreign currency hedging). In a model where the uncovered interest rate parity does not hold<sup>11</sup> and hence the cost of foreign currency debt is lower than the cost of local currency debt, Cowan (2006) shows that firms will be more likely to choose foreign currency debt the higher the interest rate differential, the larger their share of income in foreign currency and the lower their distress costs in case of default. The incentive to take foreign currency loans is weaker when the volatility of the exchange rate is higher, as this increases the default risk on unhedged loans. Brown, Ongena and Yesin (2011b) show further that firms with low leverage will be more likely to borrow in foreign currency while information asymmetries about a firm's income structure may increase foreign currency loan demand among unhedged firms.<sup>12</sup>

The supply of foreign currency loans should be higher for firms with lower corresponding credit risk, i.e. firms with income in foreign currency, high income to debt ratios and lower distress costs. Following Stiglitz and Weiss (1983) banks may, however, ration foreign currency lending in the face of adverse selection. This could imply that banks supply foreign currency only to clients who are financially transparent and who they know have foreign currency income. Lenders should also be more willing to offer foreign currency loans when they have increased access to foreign currency liabilities in the form of wholesale funds or customer deposits. Basso, Calvo-Gonzalez and Jurgilas (2010) suggest that banks' supply of foreign currency loans will depend on their access to foreign currency debt through financial markets or from parent-banks abroad. Similarly, Luca and Petrova (2008) suggest that increases in banks' access to foreign currency deposits will lead them to offer more foreign

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<sup>11</sup> See Froot and Thaler 1990 and Isard 2006 for a discussion of the empirical evidence on the uncovered interest rate parity.

<sup>12</sup> They show that in the case when lenders are imperfectly informed about the currency or level of firm revenue (Berger and Udell 1998, Brown, Jappelli and Pagano 2009, Detragiache, Tressel and Gupta 2008), local currency earners may be more likely to choose foreign currency loans.

currency loans.<sup>13</sup> Low credibility of domestic monetary policy may make banks reluctant to lend in local currency, especially at longer maturities (Levy-Yeyati 2006).

As firm-level indicators of benefits and risks associated with foreign currency borrowing  $F_{i,t}$  we include the variables *EUR savings account* (1=yes, 0=no), *Disposable income* (in log EUR), *Leverage* (in %), *Sole proprietorship* (1=yes, 0=no), *Assets* (in log EUR) and firm *Age* (in log years). We further include the duration of the *Bank relationship* as a proxy for information asymmetries between the Bank and the borrower.

With respect to other loan terms we control for the *Requested amount* and *Requested maturity* of the loan as well as for whether the loan purpose was to finance real-estate (*Mortgage*).

Table 3 provides summary statistics for our explanatory variables. The table shows that firms in our sample are predominantly *Sole proprietorships* with mean *Assets* of less than 60,000 EUR and an average *Age* of less than ten years. The loans they receive are on average smaller than 10,000 EUR (*Amount*), with no loan in the sample exceeding 1 million EUR. The average loan *Maturity* is less than three years, while the maximum maturity is twenty years.

[Insert Table 3 here]

As indicators of the bank's funding structure we employ measures of wholesale and retail funding in foreign currency: *EUR interbank funding* and *EUR customer funding* (both measured in % of total liabilities). Table 3 shows that on average during our observation

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<sup>13</sup> For a discussion of deposit dollarization see De Nicolo, Honohan and Ize (2005).

period wholesale funding in foreign currency was a much more important funding source than retail funding in foreign currency.

We employ two indicators of monetary conditions which should affect the supply of foreign currency loans: *Spread differential* and *Inflation volatility*.<sup>14</sup> To minimize concerns of endogeneity we use monthly industry-level rather than bank-specific interest rates to calculate the variable *Spread differential*. We calculate the intermediation spread for EUR and BGN funds separately using industry-level short-term lending rates minus the household term deposit rates for EUR and BGN funds respectively. The spread differential is then calculated as the difference between the intermediation spread on EUR funds and that on BGN funds. *Inflation volatility* is measured as the variance of monthly changes in the consumer price index (CPI) over the 12 months prior to the quarter in which a loan is disbursed. The underlying CPI data is taken from the IMF-International Financial Statistics.

### 3 Results

#### 3.1 The impact of firm and loan characteristics on loan currency

##### A. The request for foreign currency loans by firms

Table 4 displays our estimation results for firms' decisions to request foreign currency rather than local currency loans (*EUR requested*). All models presented in the table include *Industry* and *Region* fixed effects and control for monetary conditions and the Bank's funding structure with year-quarter fixed effects. For the cross-sectional regressions (columns 1-4) we present average marginal effects from logit regressions. The panel estimation for repeat

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<sup>14</sup> In our estimation of foreign currency loan demand we employ time fixed effects in all specifications to account for monetary conditions.

clients (columns 5-6) includes firm-level random effects to account for unobserved firm heterogeneity.<sup>15</sup> Standard errors are presented in brackets and for the cross-sectional models are adjusted for clustering at the industry-region level.

[Insert Table 4 here]

Column (1) of Table 4 presents estimates for the full sample, while column (2) presents estimates for the subsample of loans exceeding 10,000 EUR. From a qualitative perspective the two models yield identical results. However, the negligible share of loans requested in foreign currency among the very small loans (below 10,000 EUR) implies that the estimated impact of our explanatory variables is small in the full sample (column 1). To gauge the economic magnitude of our explanatory variables we therefore rely on the estimates for the subsample of loans exceeding 10,000 EUR (column 2). In this sample the average probability to request a EUR loan is 18%.

The results presented in columns (1-2) of Table 4 suggest that the request for a foreign currency loan is positively related to our indicator of foreign currency revenue: Firms which have a *EUR savings account* are 10.5 percentage points more likely to borrow in foreign currency than firms that do not have a foreign currency savings account. The impact of firm-level distress costs is also in line with theoretical predictions. Froot, Scharfstein and Stein (1993) argue that firms in which the owner or manager have higher private values of continuing their business face higher distress costs in the case of default. Consistently, we

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<sup>15</sup> We use firm random effects rather than fixed effects so as not to exclude the firms which request the same currency for each of their loans. In our analysis of the subsample of repeat clients we drop *Age* as it increases parallel to *Bank relationship* over a sequence of several loans.

find that *Sole proprietorships* are 3.2 percentage points less likely to demand EUR loans than limited liability companies. Further, we find that firms with lower *Leverage* and larger firms (higher *Assets*) are more likely to demand foreign currency loans. Increasing firm leverage by one standard deviation (0.19) reduces the probability of requesting a foreign currency loan by 0.5 percentage points, while increasing firm size by one standard deviation (206,000 EUR) from the sample mean (56,000 EUR) raises the probability of requesting a foreign currency loan by 5.7 percentage points.

Our results do not support the conjecture that opaqueness in the bank-firm relationship encourages (local currency earning) firms to request foreign currency loans. The positive coefficient of *Bank relationship* suggests that more transparent firms (to the Bank) are more likely to request a foreign currency loan. While this finding confirms the results of Brown, Ongena and Yesin (2011a) it is only of minor economic importance: Our estimates suggest that a 12-month increase in the length of the firm-bank relationship increases the probability of requesting a foreign currency loan by a mere 1.2 percentage points.

With respect to loan characteristics we find that *Requested amount* and *Requested maturity* have a significantly positive impact on the probability to request a foreign currency loan. An increase in the requested amount from 10,000 EUR to 100,000 EUR raises this probability by 21.4 percentage points, while increasing the requested loan maturity from 12 to 60 months by 8.3 percentage points. One explanation for these strong findings is that larger and longer-term loans may be particularly used for financing real estate. Thus the observed relation between amount and maturity on the one hand and the foreign currency denomination of loans on the other may be partly driven by the fact that the Bulgarian housing market is denominated in EUR.

However, note that in columns (1-2) we do control for the loans which have the purpose of financing real-estate. As expected, the coefficient of *Mortgage loan* is positive in both models. The finding that the effect of loan maturity on foreign currency loan demand is not primarily driven by mortgage loans is also confirmed in column (3). The model presented in that column displays regression results for the subsample of non-mortgage loans. Not surprisingly the economic magnitude of the coefficients of *Requested amount* and *Requested maturity* are lower in this model as compared to model (2). However, both coefficients remain significant in statistical and economic terms.

An alternative explanation for the strong impact of requested loan amount, maturity, and purpose on the requested loan currency is that firms anticipate that the Bank may be reluctant to offer large, long-term loans in local currency. We use our panel data of repeat clients to study whether “anticipation effects” may be driving the requested loan currency of firms. We conjecture that anticipation effects should be stronger if the firm is actually familiar with the Bank’s loan supply behavior. If this is the case we should see differences in the determinants of requested loan currency for the first loan of a firm compared to its later loans with the Bank.

In columns (5) and (6) of Table 4 we examine whether the determinants of requested loan currency differ between first loans and later loans for our panel of repeat clients. The two columns present estimates from a single OLS estimation,<sup>16</sup> with the main effects of all explanatory variables reported in column (5) and the interaction terms with *Later loan* reported in column (6). The interaction terms in column (6) suggest that anticipation effects do affect the results for loan characteristics. The interaction terms of *Later loan* with

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<sup>16</sup> We resort to OLS estimation because of the difficulties in interpreting marginal effects of interaction terms in non-linear models (Ai and Norton 2003).

*Requested maturity* and *Mortgage loan* are significantly positive suggesting that firms learn over time that long-term and mortgage loans are more likely to be granted in foreign currency. By contrast, we find that the impact of requested loan size (*Requested amount*) on foreign currency loan demand becomes weaker during the course of lending relationships. This result suggests that firms may overestimate the relevance of loan size for the Bank's decision to offer foreign rather than local currency loans.<sup>17</sup>

Column (4) of Table 4 presents results for the subsample of medium-sized loans (exceeding 50,000 EUR). As discussed in section 3.1, loans below 50,000 EUR are standardized products with fixed loan conditions (interest rate, collateral requirements), while for loans above 50,000 EUR the Bank negotiates loan conditions individually. Consequently, the results presented in columns (1-3) may be dominated by the large number of small loans, for which firm characteristics, and other loan terms may have less influence on requested currency. The results presented in column (4) suggest, however, that the qualitative impact of household and loan characteristics on loan currency demand is similar in the sample of medium-sized loans. Due to the substantially lower number of observations in this model the effects of some explanatory variables (*EUR savings account*, *Leverage*) are only imprecisely estimated. However, for most explanatory variables the estimated economic effect is stronger in the sample of medium-sized loans.

In all models presented in Table 4 we include a full set of *Industry* and *Region* fixed effects. For brevity the coefficients of these industry and regional intercepts are not presented

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<sup>17</sup> Corroborating our findings from the panel regression, descriptive statistics show that around one-third of borrowers, whose local currency request was switched to EUR at their last loan, alter their currency choice at the next loan and request EUR, while the majority of borrowers sticks to requesting BGN. A descriptive analysis (not reported here) suggests that this decision is mainly related to the firm's size, its amount and maturity request and the purpose of the loan (mortgage loan).

in the table, but discussed here. Our *Industry* dummies suggest that firms operating in industries that are likely to have foreign currency earnings such as transport, tourism, trade and manufacturing display a larger likelihood to request EUR loans than borrowers from other industries like services or agriculture (the base category). Most of the *Region* dummies are insignificant with the notable exception of the *South-West* region in and around the capital Sofia. This suggests that firms located in the major economic hub of the country are more likely to request EUR loans than firms in all other areas (including the Black Sea tourist destinations).

#### *B. The switching of loans from local to foreign currency by banks*

This section examines how the Bank's decision to grant a foreign currency rather than a local currency loan is related to firm and other loan characteristics. We observe the Bank's currency decision both for those loans which were requested in foreign currency (EUR) and for those which were requested in local currency (BGN). We can therefore examine the Bank's currency choice conditional on the firms' requested currency. As shown in Figure 1, a substantial share of loans which firms request in BGN are switched by the Bank to EUR, while few loans requested in EUR are switched to BGN. Our attention in Table 5 is therefore focused on those loans which are requested in BGN to identify the drivers behind the Bank's switching of loans to foreign currency (EUR).

Table 5 again presents five models based on our full sample of firms (column 1), loans exceeding 10,000 EUR (column 2), non-mortgage loans (column 3), medium-sized loans (column 4) and loans to repeat clients (column 5). In all models we control for the time-varying funding structure of the Bank and monetary conditions with year-quarter fixed effects. In addition we include a full set of *Industry* and *Region* fixed effects. Standard errors

are presented in brackets and for the cross-sectional regressions are adjusted for clustering at the industry-region level.

[Insert Table 5 here]

The results presented in Table 5 suggest that the Bank's currency decision to switch loans from local currency to foreign currency is negatively related to observable indicators of credit risk. In particular, the Bank is more likely to grant a EUR loan to firms which have foreign currency income (*EUR savings account*), to firms which are not a *Sole proprietorship* and to firms which are larger (*Assets*). Referring to the estimates for loans exceeding 10,000 EUR (column 2), we find that the effect of firm-ownership and our proxy of foreign currency income are also significant in economic terms. Firms with a *EUR savings account* are 5 percentage points more likely to be switched to a EUR loan when they ask for a BGN loan than firms without a foreign currency savings account. *Sole proprietorships* are 1.4 percentage points less likely to be switched to a foreign currency loan than limited liability firms. Moreover, a one standard-deviation increase in firm *Assets* from the sample mean increases the probability of being switched to a foreign currency loan by 2.1 percentage points. All these effects are sizeable given that the average propensity of the Bank to switch loans from local to foreign currency (in the sample of loans exceeding 10,000 EUR) is 11%.

The *Requested amount*, the *Requested maturity* and the purpose of the loan (*Mortgage loan*) strongly affect the Bank's currency decision. An increase in the requested amount from 10,000 to 100,000 EUR raises the probability of the Bank switching a loan requested in BGN to EUR by 13.6 percentage points. An increase in the requested loan maturity from 12 to 60 months raises this probability by 10.3 percentage points. The probability that a *Mortgage loan*

requested in local currency is switched to foreign currency is 10 percentage points higher than for a non-mortgage loan.

The column (5) estimates in Table 5 suggest that the strong correlation between loan size, loan maturity and foreign currency loan supply is not primarily driven by unobserved heterogeneity across firms. In this model we employ our sub-sample of repeat clients and control for (time-invariant) firm heterogeneity with firm-random effects. The positive and significant estimates suggest that for a given firm the probability of being switched from local to foreign currency increases when the firm requests a larger or longer-term loan.

The fact that loans with longer maturity are more likely to be switched from BGN to EUR may indicate that the Bank is wary of (future) monetary policy (see Ize and Levy-Yeyati 2003). Alternatively, this result may be driven by the fact that long-term funding for the Bank is more readily available in foreign currency than in local currency. We now turn to the impact of bank funding on loan currency denomination.

### **3.2 The impact of bank funding on loan currency**

In this section we examine the widespread conjecture that foreign currency funding, and in particular cross-border wholesale funding in foreign currency, is a major supply-side determinant of foreign currency lending in Emerging Europe. We relate the propensity of the Bank to switch loans from local to foreign currency to the Bank's (lagged) share of wholesale and customer funding in foreign currency (*EUR interbank funding*, *EUR customer funding*).

Figure 3 displays the Bank's funding structure over our observation period. The figure reveals that the aggregate share of euro funding of our Bank varied substantially over time between 26% (2003:Q3) and 45% (2006:Q1). Moreover the relative share of wholesale to

customer funding in euro decreased over time. The share of *EUR interbank funding* in the Bank's total liabilities varies from 12% (2007:Q3) to 33% (2006:Q1), while the share of *EUR customer funding* varies from 4% (2003:Q2) to 24% (2007:Q3).

[Insert Figure 3 here]

In Table 6 we report our regression results for the impact of bank funding on the Bank's decision to grant foreign currency loans. We re-estimate the regressions from column (2) in Table 5 replacing the year-quarter fixed effects with our bank funding variables. We control hereby for changes in relevant monetary conditions by including proxies of interest rate differentials, spread differentials and inflation volatility.<sup>18</sup> For brevity, we do not report the estimation results for our firm-level and loan-level explanatory variables in Table 6.

The results presented in column (1) of Table 6 suggest that the Bank is more likely to switch loans from BGN to EUR when its share of liabilities in foreign currency (*EUR interbank funding*, *EUR customer funding*) is higher. We find that the economic magnitude of customer funding in foreign currency is greater than that of wholesale funding in foreign currency. Our estimates suggest that going from the lowest to the highest share of *EUR interbank funding* increases the likelihood that the Bank switches the loan currency from BGN to EUR by 4.5 percentage points. By comparison, going from the lowest to the highest

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<sup>18</sup> Bulgaria introduced a currency board in July 1997 which fixed the exchange rate towards the EUR. This currency board held throughout our observation period, so that there was almost no actual exchange rate volatility and we do not include a direct measure of it. However, this by no means implies that firms or banks in Bulgaria were confident that a depreciation of the BGN would not happen. Indeed, Carlson and Valev (2008) report survey evidence suggesting that in 2004 14% of the Bulgarians believed the currency board might collapse with a sharp devaluation within the next twelve months. Considering a period of five years more than 25% of respondents expected the currency board to collapse with a sharp devaluation.

share of *EUR customer funding* increases the likelihood that the Bank switches the loan currency from BGN to EUR by 17.6 percentage points.

While the above results support the conjecture that bank funding is a key supply-side driver of foreign currency lending, they contradict common wisdom that foreign currency borrowing in Eastern Europe is mostly driven by wholesale funding from parent banks and international financial institutions. Rather, our results confirm the findings of Brown and De Haas (2011) who suggest that the “dollarization” of customer deposits is a strong driver of foreign currency lending in the region.

[Insert Table 6 here]

With respect to our macroeconomic control variables column (1) of Table 6 shows that the Bank’s decision to switch a request for BGN into a EUR loan (column 2) does not seem to be systematically related to the intermediation spread it can earn from either currency. However, we find that the Bank is more likely to switch local to foreign currency when the *Inflation volatility* is high. This is in line with the reasoning in Ize and Levy-Yeyati (2003) and shows that banks may prefer to make foreign currency loans in countries where the monetary authority has failed to establish a reputation for pursuing price stability. The estimated coefficient for *Inflation volatility* is also sizeable from an economic point of view. Going from the lowest value of measured inflation volatility in our sample (.45) to the highest value (1.71) would increase the likelihood that the bank switches the loan to foreign currency by 5.4 percentage points.

Our results in Table 5 show that loans with longer maturity are more likely to be switched from BGN to EUR. This finding may be driven by macroeconomic uncertainty, with the Bank wary of (future) monetary policy (see Ize and Levy-Yeyati 2003). Alternatively, this finding

may be driven by the different maturity structures of wholesale foreign currency funding as opposed to customer funding. Indeed the majority of the Bank's "interbank" liabilities are medium-term loans from parent banks and international financial institutions.

In column (2) of Table 6 we examine to what extent bank funding or monetary uncertainty drive the switching of long-term loans from local to foreign currency. To this end we include the interaction terms *EUR interbank funding\*Requested maturity*, *EUR customer funding\*Requested maturity* and *Inflation volatility\*Requested maturity*. The results displayed in column (2) of Table 6 suggest that monetary uncertainty rather than foreign currency funding is responsible for the reluctance of banks to lend long-term in local currency. The estimated coefficient of *Inflation volatility\*Requested maturity* is significant and positive. By contrast the coefficient of *EUR customer funding\*Requested maturity* is not significant while *EUR interbank funding\*Requested maturity* yields a negative coefficient.<sup>19</sup> From an economic viewpoint the effects of monetary uncertainty on loan currency switching is substantially higher for long-term as opposed to short-term loans. Going from the lowest value of measured inflation volatility in our sample to the highest value would increase the likelihood that the bank switches a 1-year loan to foreign currency by just 1 percentage point. By comparison the effect for a 5-year loan is estimated at 8 percentage points.

In columns (3-4) of Table 6 we replicate the analysis presented in columns (1-2) for the subsample of repeat clients, including firm random-effects to account for time-invariant firm heterogeneity. The reported coefficients confirm our findings on the impact of bank funding and monetary uncertainty on loan currency switching.

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<sup>19</sup> In unreported robustness tests we enter each interaction term separately and obtain identical results.

In contrast to the findings of aggregate studies (e.g. Luca and Petrova 2008), the positive correlation between foreign currency funding and foreign currency lending observed in Table 6 cannot be driven by reverse causality. First, we are examining the probability of the Bank to grant loans in foreign currency, which were requested in local currency. Thus, by construction we are examining a sample of loans in which there is no confounding demand for foreign currency. Second, in unreported robustness tests we replicate the model presented in column (1) of Table 6 with *EUR requested* as the dependent variable. The results of that robustness test suggest that the demand for foreign currency loans by firms in our sample is unrelated to the funding structure of the Bank in any case.

### **3.3 Identifying supply-side effects: Securitization and loan currency**

Our results so far suggest that the foreign currency loans disbursed by our Bank are to a significant extent driven by supply-side determinants: The Bank is eager to match the currency composition of its assets with that of its liabilities and is reluctant to extend long-term loans in local currency due to monetary uncertainty.

While our analysis above does allow us to disentangle the firms' requested loan currency from the currency granted by the Bank, one may argue that this does not enable us to identify supply-side effects. First, observed requests for foreign currency loans seem to be at least partly driven by anticipation effects. This implies that we may underestimate the supply-side drivers of loan currency choice. Second, as depicted in Figure 3 there is a time trend in the funding structure of our Bank. Thus, the observed correlation between EUR funding and currency switching by the Bank in Table 6 may be driven by unobserved changes in economic conditions over time. In particular, the negotiations over Bulgaria's accession to the European

Union (which were finalized in October 2006) may have spurred foreign currency lending by our Bank.

In this section we examine the impact of regulatory changes and capital market imperfections which are exogenous to the Bank's activities in order to further identify supply-side drivers of loan currency choice. Bulgaria, as many other Central and Eastern European transition countries, experienced a large credit boom starting in the early 2000s.<sup>20</sup> In the beginning of 2005, the Bulgarian National Bank (BNB) decided to take macroprudential regulatory steps to slow credit growth because of the fear that the credit boom could threaten the stability of the banking system and exacerbate macroeconomic volatility. Increased reserve requirements were introduced in April 2005 to penalize banks whose lending portfolio expansions exceeded certain thresholds (BNB 2005). To circumvent these increased reserve requirements, several banks sold loans off their balance sheets (e.g. to their foreign parent banks) or securitized part of their loan portfolio.

The Bank in our sample securitized a substantial share of its loan portfolio starting from April 2006. In the following set of exercises we exploit the differential ability of the Bank to securitize EUR and BGN loans to identify the supply-side drivers of loan currency choice. Importantly, while the securitization arrangement of our Bank itself may be endogenous, capital market imperfections imply that securitization is only possible for loans denominated in EUR. The securitization deal of our Bank also specified that loans with amounts above 350,000 EUR or maturities longer than 7 years were not eligible for securitization. Thus securitization can be seen as an exogenous supply-side driver of foreign currency lending at least for loans of eligible size and duration.

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<sup>20</sup> Part of this increase may be attributed to a catching-up process to EU levels and a financial deepening consistent with economic fundamentals (e.g. Cottarelli, Dell'Ariccia and Vladkova-Hollar 2003, Faure 2007).

Figure 4 provides first suggestive evidence that the securitization of foreign currency loans from 2006 onwards did lead to a strong supply effect. The share of loans which were switched by the Bank to EUR (when the firm requested BGN) increased considerably after the securitization deal started in the second quarter of 2006. By contrast the share of loans requested in EUR by borrowers decreased steadily during 2006 and 2007.<sup>21</sup>

[Insert Figure 4 here]

Table 7 examines the impact of securitization on the probability that the Bank switches loans requested in local currency to foreign currency. We divide our observation period into four time periods. *Time period 1* ranges from Q3 2004 to Q1 2005 and captures the period before the new macroprudential regulations or securitization were implemented. *Time period 2* starts in Q2 2005 and lasts until Q1 2006 comprising the period when only the macroprudential regulations were in place. *Time period 3* captures the time span between Q2 2006 and Q4 2006 when both macroprudential regulations and securitization were in place. Finally, from Q1 2007 until the end of our observation period (*Time period 4*) macroprudential regulations were removed but the securitization arrangement of our Bank was still active.

Panel A examines the sample of loans requested in local currency. The first row shows that the likelihood that the Bank switches a loan from BGN to EUR decreases somewhat after the implementation of the macroprudential regulations in April 2005 (comparing *Time period 1* and *Time period 2*). By contrast, after the start of the securitization deal in April 2006 the

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<sup>21</sup> Throughout this section we focus on the subsample of loans with loan amounts exceeding 10,000 EUR.

likelihood of currency switches doubles from 5% (*Time period 2*) to 10% (*Time period 3*). This expansion of foreign currency lending continues after the removal of the macroprudential regulations in the beginning of 2007. Thus, comparing the first and the last of our four time periods which both see no tightened macroprudential regulations but differ with respect to whether securitization was in place or not, the likelihood of currency switches has more than doubled from 7% to 15%.

[Insert Table 7 here]

The impact of securitization on foreign currency lending by our Bank may be confounded with other developments which fosters foreign currency lending. As mentioned above, during 2006 the negotiations over accession by Bulgaria to the European Union were completed. The anticipation of EU accession per January 1<sup>st</sup>, 2007, may have reduced the perceived risk associated with foreign currency loans. If many first-time borrowers during this period underestimated their eligibility for foreign currency loans, we would also observe an increase in switching of loans from local to foreign currency, independent of securitization.

To rule out that the effects of the securitization are confounded with the effects of economic and political developments Panel B and Panel C of Table 7 compare the impact of securitization on loans which were eligible for securitization to those which were not. Panel B of Table 7 replicates Panel A for the subsample of loans which were *Eligible* for securitization, i.e. loans with an amount up to 350,000 euro and a maturity of up to 7 years. This panel confirms that the beginning of the securitization arrangement in April 2006 led the Bank to switch a significantly higher share of loans to EUR. The statistical significance and economic magnitude of the securitization effect is identical to that displayed in Panel A.

Panel C of Table 7 examines the effect of securitization on the subsample of loans which were not eligible for securitization, i.e. loans exceeding 350,000 euro or a maturity of 7 years. Given the large size and long duration of these loans, the Bank is in general more likely to switch these loans to EUR than loans which were eligible for securitization. However, the securitization arrangement itself has no impact on the likelihood of the Bank switching the currency of these loans. In unreported robustness tests we find that the securitization arrangement also has no impact on the demand for foreign currency loans.

In Table 8 we provide a multivariate analysis of the impact of the securitization arrangement on the Bank's likelihood to switch loan currency from local to foreign. We study time windows of one, two and three quarters around the start of the securitization deal. Replicating model (2) from Table 5 we include (but do not report) a full set of firm-level and loan-level explanatory variables as well as industry and region fixed effects. In addition we include the dummy variables *Securitization* (1=loan was disbursed after April 1<sup>st</sup> 2006, 0=loan disbursed prior to April 1<sup>st</sup> 2006) and *Eligible* (1=*Requested amount*  $\leq$  350,000 EUR & *Requested maturity*  $\leq$  84 months, 0=otherwise) and the interaction between these two variables. Our main interest lies in the interaction term *Securitization\*Eligible*: If this interaction term is significantly positive, it identifies the securitization arrangement as a supply-side driver of foreign currency lending.

[Insert Table 8 here]

The multivariate results presented in Table 8 confirm that the securitization arrangement of the Bank induced more switching of loans from local to foreign currency. The estimated coefficient of the interaction term *Securitization\*Eligible* suggests that after the securitization

deal commenced the likelihood of a loan currency switch to euro for eligible loans increased by between 6 and 7 percentage points. By contrast, the main effect of *Securitization* confirms that non-eligible loans did not experience a higher propensity of currency switching. When looking at loans disbursed one quarter before and after the start of securitization in column (1) the securitization effect for eligible loans is not statistically significant. This is due to the low number of observations and consequent lack of statistical power. When studying time windows of two and three quarters around the start of securitization in columns (2) and (3), we find the effect to be statistically significant. The observed increase in the switching probability of around 7 percentage points for the potentially *Eligible* loans in the two and three quarters after securitization started is also economically (very) large given that the average share of switched loans is 11%.<sup>22</sup>

[Insert Table 9 here]

Our analyses in Tables 7 and 8 document that capital market imperfectness (i.e. the fact that local currency loans were not eligible for securitization) induced a substantial supply-side driven increase in foreign currency lending by our Bank. We conclude our empirical analysis by examining to what extent this supply-side push of foreign currency loans induced higher risk-taking by the Bank. In particular we are interested in whether the securitization

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<sup>22</sup> In unreported robustness tests we examine how the push of EUR loans to clients after the initiation of the securitization deal is related to the Bank’s organization structure. We hypothesize that if the Bank “ordered” an increase in foreign currency lending, then this may be more likely to be implemented most quickly at the bank headquarters. Indeed, our analysis shows that in the 3 quarters following the start of securitization the increase in loan currency switches from BGN to EUR was significantly higher at the headquarters than at other branches of the Bank.

arrangement led the Bank to grant foreign currency loans to firms which have a higher risk associated with foreign currency debt.

The analysis presented in Table 5 suggests that over our entire observation period the Bank is more likely to switch clients from local currency to foreign currency if they have lower risk of taking on foreign currency debt. Thus firms with a *EUR savings account* and more *Assets* are more likely to be switched from BGN to EUR, while *Sole proprietorships* are less likely to be switched. In Table 9 we examine whether this negative relation between firm risk and loan currency switching becomes weaker following the securitization arrangement.

Column (1) of Table 9 replicates the regression analysis presented in column (3) of Table 8, including interaction terms of our dummy variable *Securitization* with the firm-level explanatory variables *EUR savings account*, *Assets*, and *Sole proprietorship*.<sup>23</sup> A negative coefficient of *EUR savings account\*Securitization* or *Assets\*Securitization* as well as a positive significant coefficient of *Sole proprietorship\*Securitization* would indicate that the Bank became more lax in assessing the credit risk associated with extending foreign currency loans after the securitization arrangement. Interestingly the estimates displayed in column (1) of Table 9 provide no evidence that this is the case. The interaction term *EUR savings account\*Securitization* yields a negative coefficient, but is not significant. Moreover, the interaction term *Assets\*Securitization* yields a significantly positive coefficient, while *Sole proprietorship\*Securitization* yields a significantly negative coefficient. Thus, if anything, the results presented in column (1) suggest that the Bank applied more stringent lending standards to foreign currency loans in the early quarters after securitization commenced.

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<sup>23</sup> Again we resort to OLS estimation because of the difficulties in interpreting marginal effects of interaction terms in non-linear models (Ai and Norton 2003).

In column (2) of Table 9 we examine whether securitization affected the Bank's lending standards in particular for loans which were eligible for securitization. To this end we introduce the triple interaction terms *EUR savings account\*Securitization\*Eligible*, *Assets\*Securitization\*Eligible* and *Sole proprietorship\*Securitization\*Eligible*. The results presented in column (2) provide mixed evidence with regard to the Bank's lending standards for eligible loans after securitization. The interaction term *EUR savings account\*Securitization\*Eligible* now yields a negative significant coefficient suggesting that the Bank may have relaxed its conditions for lending in foreign currency if a loan was eligible for securitization. However, in line with the results displayed in column (1) we yield a negative significant effect of *Sole proprietorship\*Securitization\*Eligible* and a positive (insignificant) effect of *Assets\*Securitization\*Eligible*. These two findings suggest again more stringent lending standards of the Bank when lending in foreign currency even if the loan is eligible for securitization. Overall, therefore our results provide no conclusive evidence that the increase in foreign currency lending induced by securitization led to more lax lending standards by the Bank.

#### **4 Conclusions**

In this paper we examine the currency denomination of loans extended to small firms by one retail bank in Bulgaria. Our analysis is based on credit file data for 105,002 loans over the period 2003-2007. In contrast to existing studies, we observe not only the actual currency denomination of the loan extended, but also the loan currency that was requested by the firms in their loan application. We are therefore able to study to what extent the currency denomination is driven by supply-side factors such as foreign currency funding and securitization. Our results suggest that foreign currency borrowing in Eastern Europe is at

least partly supply-driven, with banks hesitant to lend long-term in local currency and eager to match the currency structure of their assets and liabilities and to make use of off-balance sheet activities.

Our results have implications for policy makers throughout Eastern Europe who have recently taken measures to discourage foreign currency borrowing in the retail sector (Rosenberg and Tirpak 2008). In Hungary, Poland and Latvia, for example, banks are now forced to disclose the exchange rate risks involved in foreign currency borrowing and have had to tighten eligibility criteria for such loans. In Romania and Croatia, on the other hand, supervisory authorities have imposed stronger provisioning requirements on foreign currency compared to local currency loans. As we find that foreign currency borrowing in Emerging Europe seems to a non-negligible part be driven by supply factors, measures that address only the demand side may not be enough to curb foreign currency borrowing.

Our results suggest that wholesale foreign currency funding of banks in Eastern Europe is not the key driver of foreign currency lending in the region. We find that foreign currency deposits by customers have a much stronger impact on foreign currency lending. This finding is in line with the cross-country evidence provided by Brown and De Haas (2011) and suggests that recent proposals to foster local currency wholesale funding in Eastern Europe may not be sufficient to reduce foreign currency lending.<sup>24</sup> Instead, credible macroeconomic policies which encourage customers to save in local currency may be more promising. A credible macroeconomic environment would also make banks less hesitant to extend large and long-term loans in local currency.

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<sup>24</sup> The President of the EBRD, Thomas Mirow, highlighted this proposal in a Speech on May 13 at the 2010 Joint Conference of the IIF and EBRD on Financial Systems in Emerging Europe in Zagreb.

Finally, we document that the securitization of foreign currency loans from 2006 onwards did lead to a strong supply effect. Indeed the share of loans eligible for securitization which were switched by the bank to foreign currency increased considerably while no such effect is observed for non-eligible loans. However, our results provide no conclusive evidence that the increase in foreign currency lending induced by securitization also led the bank to directly take on more credit risk. Nevertheless, future defaults following from adverse movements in foreign exchange rates make securitization also in this case potentially a conduit for more bank risk-taking.

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**Table 1. Variable definitions and data sources**

Variable sources: IFS: International Financial Statistics of the International Monetary Fund. BNB: Bulgarian National Bank.

Variable	Definition	Unit	Source
<i>Dependent variables</i>			
EUR requested	Firm requested EUR loan (1=yes, 0=no)	1/0	Bank
EUR granted	Bank granted EUR loan (1=yes, 0=no)	1/0	Bank
<i>Firm characteristics (at loan disbursement date)</i>			
EUR savings account	Firm holds EUR savings or term account (1=yes, 0=no)	1/0	Bank
Disposable income	Total disposable income per month	log EUR	Bank
Leverage	Total debt as share of total assets of firm	%	Bank
Sole proprietorship	Firm is sole proprietorship (1=yes, 0=no)	1/0	Bank
Bank relationship	Time since first contact between bank and client	months	Bank
Assets	Total assets of firm	log EUR	Bank
Age	Firm age	log years	Bank
Industry	Industry dummies which equal one if firm belongs to one of the following sectors: Construction, Manufacturing, Trade, Transport, Tourism, Other services. Baseline industry is Agriculture	1/0	Bank
<i>Loan characteristics</i>			
Requested amount	Requested loan amount	log EUR	Bank
Requested maturity	Requested loan maturity	log months	Bank
Mortgage loan	Loan is a mortgage loan (1=yes, 0=no)	1/0	Bank
Region	Region dummies which equal one for the region in which the loan was granted	1/0	Bank
<i>Bank funding (at end of month prior to loan disbursement)</i>			
EUR interbank funding	EUR interbank funding (credit lines) as share of bank's total liabilities	%	Bank
EUR customer funding	EUR customer funding (deposits) as share of bank's total liabilities	%	Bank
<i>Macroeconomic conditions (in month of loan disbursement)</i>			
Spread differential	Intermediation spread (short-term lending rate minus household deposit rate) in EUR minus spread in BGN	%	BNB
Inflation volatility	Variance of monthly changes in the consumer price index over 12 months prior to beginning of the quarter in which loan is disbursed	%	IFS

**Table 2. Loan disbursements**

This table displays statistics on the bank's loan portfolio. Results are provided for the full sample and the following subsamples: *Small loans*: Loans with an amount up to 50,000 EUR. *Medium loans*: Loans with an amount over 50,000 EUR. *Repeat clients*: Loans disbursed to firms that take out more than one loan from the bank during the observation period.

Panel A. Number of loans disbursed

	Full sample	Small loans	Medium loans	Repeat clients
2003	10,752	10,540	212	7,543
2004	18,607	18,243	364	14,268
2005	23,175	22,648	527	17,702
2006	28,048	27,476	527	18,484
2007	24,420	23,953	467	10,857
Total	105,002	102,860	2,142	68,854

Panel B. Volume of loans disbursed (in million EUR)

	Full sample	Small loans	Medium loans	Repeat clients
2003	68	43	26	48
2004	122	77	45	96
2005	187	121	66	143
2006	217	151	66	156
2007	206	151	55	111
Total	800	543	257	554

Panel C. Share of loan volume disbursed in EUR (%)

	Full sample	Small loans	Medium loans	Repeat clients
2003	43.7	23.7	77.0	44.4
2004	42.3	21.1	79.0	42.1
2005	37.6	16.4	76.6	36.9
2006	33.4	15.1	75.3	36.2
2007	32.4	18.7	70.2	40.8
Total	36.4	17.9	75.4	39.0

**Table 3. Descriptive statistics**

This table reports summary statistics for all explanatory variables. See Table 1 for definitions and sources of the variables. For all log-transformed variables the statistics are calculated by using the original values.

	N	Mean	Std. Dev.	Minimum	Maximum
<i>Firm characteristics</i>					
EUR savings account	105,002	0.01	0.09	0	1
Disposable income	105,002	835	5,798	0	1,154,455
Leverage	105,002	0.15	0.19	0	1
Sole proprietorship	105,002	0.90	0.31	0	1
Bank relationship	105,002	9.77	13.27	0	71
Assets	105,002	56,057	206,115	2	12,835,983
Age	105,002	8.44	5.50	0	107
<i>Loan characteristics</i>					
Requested amount	105,002	8,525	27,016	51	1,700,000
Requested maturity	105,002	32	21	1	240
Mortgage loan	105,002	0.09	0.29	0	1
<i>Bank funding</i>					
EUR interbank funding	54	0.24	0.06	0.12	0.33
EUR customer funding	54	0.13	0.05	0.04	0.24
<i>Macroeconomic conditions</i>					
Interest differential	54	1.36	0.64	0.36	3.22
Spread differential	54	-0.36	0.95	-2.40	2.08
Inflation volatility	54	0.98	0.35	0.45	1.71

**Table 4. Foreign currency loan demand**

The dependent variable *EUR requested* equals one if the firm requested a EUR loan and equals zero otherwise, while all explanatory variables are defined in Table 1. Columns (1) to (4) report average marginal effects from logit estimations and columns (5) and (6) report OLS estimates. Standard errors are reported in brackets and account for clustering at the branch-industry level. \*\*\*, \*\*, \* denote significance at the 0.01, 0.05 and 0.10-level.

Coefficients	(1)	(2)	(3)	(4)	(5) (6)	
	All clients				Repeat clients	
	Full sample	Amount > 10,000 EUR	Without mortgages (Amount > 10,000 EUR)	Medium loans (Amount > 50,000 EUR)	Including interaction terms with <i>Later loan</i> (Amount > 10,000 EUR)	
					Main effects	Interactions
EUR savings account	0.030*** [0.008]	0.105*** [0.029]	0.031 [0.028]	0.039 [0.091]	0.091 [0.093]	-0.000 [0.097]
Disposable income	-0.004*** [0.001]	-0.020*** [0.003]	-0.009*** [0.002]	-0.062*** [0.011]	-0.033*** [0.007]	0.004 [0.008]
Leverage	-0.008*** [0.003]	-0.029*** [0.011]	-0.031*** [0.011]	-0.068 [0.045]	-0.041 [0.039]	0.012 [0.043]
Sole proprietorship	-0.010*** [0.001]	-0.032*** [0.005]	-0.031*** [0.004]	0.027 [0.028]	-0.045*** [0.016]	0.004 [0.018]
Bank relationship	0.000*** [0.000]	0.001*** [0.000]	0.001*** [0.000]	0.002** [0.001]	0.002** [0.001]	-0.001 [0.001]
Assets	0.010*** [0.001]	0.037*** [0.004]	0.023*** [0.003]	0.061*** [0.011]	0.040*** [0.009]	0.011 [0.010]
Age	-0.001 [0.001]	-0.003 [0.004]	0.006 [0.005]	-0.056** [0.023]		
Requested amount	0.023*** [0.001]	0.093*** [0.004]	0.057*** [0.006]	0.176*** [0.016]	0.178*** [0.013]	-0.032** [0.014]
Requested maturity	0.010*** [0.001]	0.052*** [0.005]	0.020*** [0.006]	0.134*** [0.014]	0.035*** [0.012]	0.045*** [0.013]
Mortgage loan	0.031*** [0.004]	0.097*** [0.012]		0.094 [0.063]	0.036** [0.016]	0.074*** [0.018]
Later loan					0.004 [0.120]	
Observations	105,002	18,303	11,183	2,142		11,916
Method	Logit	Logit	Logit	Logit		OLS
R <sup>2</sup> (pseudo/overall)	0.458	0.311	0.268	0.169		0.303
Industry fixed effects	yes	yes	yes	yes		yes
Region fixed effects	yes	yes	yes	yes		yes
Year-Quarter fixed effects	yes	yes	yes	yes		yes
Firm random effects	no	no	no	no		yes

**Table 5. Foreign currency loan supply: Switching loans from BGN to EUR**

This table reports average marginal effects for firm and loan characteristics from logit estimations for the sample of loans requested in BGN only. The dependent variable *EUR granted* equals one if the firm received a EUR loan and equals zero otherwise, while all explanatory variables are defined in Table 1. Standard errors are reported in brackets and account for clustering at the industry-branch level. \*\*\*, \*\*, \* denote significance at the 0.01, 0.05 and 0.10-level.

	(1)	(2)	(3)	(4)	(5)
	Full sample	Amount > 10,000 EUR	Without mortgages (Amount > 10,000 EUR)	Medium loans (Amount > 50,000 EUR)	Repeat clients (Amount > 10,000 EUR)
EUR savings account	0.019*** [0.007]	0.059* [0.031]	0.036 [0.034]	0.025 [0.111]	0.004 [0.024]
Disposable income	0.001 [0.000]	0.000 [0.002]	-0.001 [0.002]	0.006 [0.016]	-0.000 [0.003]
Leverage	-0.003 [0.002]	-0.017 [0.013]	-0.025** [0.010]	-0.070 [0.065]	0.008 [0.014]
Sole proprietorship	-0.003*** [0.001]	-0.014** [0.006]	-0.017*** [0.005]	-0.003 [0.031]	-0.017*** [0.006]
Bank relationship	0.000 [0.000]	0.000 [0.000]	-0.000 [0.000]	0.001 [0.001]	-0.000 [0.000]
Assets	0.004*** [0.001]	0.014*** [0.003]	0.013*** [0.003]	0.010 [0.017]	0.019*** [0.003]
Age	-0.000 [0.001]	-0.003 [0.004]	0.003 [0.004]	-0.029 [0.032]	
Requested amount	0.013*** [0.001]	0.059*** [0.005]	0.063*** [0.008]	0.027 [0.028]	0.041*** [0.004]
Requested maturity	0.012*** [0.001]	0.064*** [0.004]	0.041*** [0.005]	0.226*** [0.016]	0.061*** [0.005]
Mortgage loan	0.025*** [0.003]	0.101*** [0.012]		0.099*** [0.036]	0.080*** [0.010]
Observations	100,860	14,953	10,423	980	9,390
Method	Logit	Logit	Logit	Logit	Logit
R <sup>2</sup> (pseudo)	0.416	0.245	0.225	0.226	
Wald Chi <sup>2</sup> -statistic for model goodness-of-fit					502.69***
Industry fixed effects	yes	yes	yes	yes	yes
Region fixed effects	yes	yes	yes	yes	yes
Quarter fixed effects	yes	yes	yes	yes	yes
Firm random effects	no	no	no	no	yes

**Table 6. Bank funding, monetary conditions and loan currency**

This table reports average marginal effects from logit estimations in columns (1) and (3) and OLS estimates in columns (2) and (4). In columns (1) and (2) we report estimates for the subsample of loans with amounts > 10,000 EUR that are requested in BGN. In columns (3) and (4) the sample is further restricted to repeat clients. All variables are defined in Table 1. Standard errors are reported in brackets and account for clustering at the industry-branch level. \*\*\*, \*\*, \* denote significance at the 0.01, 0.05

	(1)	(2)	(3)	(4)
Sample:	Amount > 10,000 EUR		Repeat clients and Amount > 10,000 EUR	
Dependent variable:	<i>EUR granted</i>		<i>EUR granted</i>	
EUR interbank funding	0.216** [0.085]	0.985*** [0.262]	0.071 [0.108]	0.790** [0.372]
EUR customer funding	0.880*** [0.185]	1.038** [0.452]	0.810*** [0.178]	0.618 [0.531]
Requested maturity		0.112*** [0.036]		0.081 [0.050]
Spread differential	0.003 [0.003]	0.002 [0.003]	0.002 [0.003]	-0.001 [0.004]
Inflation volatility	0.041*** [0.014]	-0.067* [0.040]	0.048*** [0.014]	-0.087 [0.054]
EUR interbank funding*Requested maturity		-0.247*** [0.077]		-0.226** [0.107]
EUR customer funding*Requested maturity		-0.093 [0.118]		0.072 [0.147]
Inflation volatility*Requested maturity		0.031** [0.012]		0.041*** [0.015]
Observations	14,953	14,953	9,390	9,390
Method	Logit	OLS	Logit	OLS
R <sup>2</sup> (pseudo/adjusted/overall)	0.231	0.162		0.175
Wald Chi <sup>2</sup> -statistic for model goodness-of-fit			497.74***	
Firm and loan characteristics	yes	yes	yes	yes
Industry fixed effects	yes	yes	yes	yes
Region fixed effect	yes	yes	yes	yes
Year fixed effects	yes	yes	yes	yes
Firm random effects	no	no	yes	yes

**Table 7. Securitization and currency switches: Univariate tests**

This table reports the average likelihood that a loan is granted in EUR after it was requested in BGN (EUR granted if BGN requested) depending on whether macroprudential regulations and/or securitization were in place for all loans with amounts > 10,000 EUR and for the respective subsamples of loans that are Eligible for the Bank's securitization deal and that are Not-eligible. The table also reports the time spans for the respective periods. Macroprudential regulations were introduced in April 2005 and lifted in December 2006. The Bank started securitizing loans in April 2006 and continued to do this until the end of our observation period. The table also provides T-tests for differences between groups. \*\*\*, \*\*, \* denote significance at the 0.01-, 0.05- and 0.1-level.

## Panel A. All loans (with amount &gt; 10,000 EUR)

		Macroprudential regulations		Difference
		no N = 6,496	yes N = 6,866	
Securitization	no N = 4,996	Q3 2004 - Q1 2005 0.07	Q2 2005 - Q1 2006 0.05	0.02**
	yes N = 8,366	Q1 2007 - Q3 2007 0.15	Q2 2006 - Q4 2006 0.10	0.05***
Difference		-0.08***	-0.04***	

## Panel B. Eligible loans for securitization (with amount &gt; 10,000 EUR)

		Macroprudential regulations		Difference
		no N = 6,373	yes N = 6,638	
Securitization	no N = 4,871	Q3 2004 - Q1 2005 0.07	Q2 2005 - Q1 2006 0.05	0.02***
	yes N = 8,140	Q1 2007 - Q3 2007 0.15	Q2 2006 - Q4 2006 0.09	0.06***
Difference		-0.08***	-0.05***	

## Panel C. Non-eligible loans for securitization

		Macroprudential regulations		Difference
		no N = 123	yes N = 228	
Securitization	no N = 125	Q3 2004 - Q1 2005 0.38	Q2 2005 - Q1 2006 0.31	0.07
	yes N = 226	Q1 2007 - Q3 2007 0.36	Q2 2006 - Q4 2006 0.25	0.11*
Difference		0.02	0.06	

**Table 8. Securitization and currency switches: Multivariate analysis**

This table reports marginal effects from logit estimations for the sample of loans requested in BGN and with amounts > 10,000 EUR only for the periods of one, two and three quarters, respectively, before and after the Bank started securitizing loans (in April 2006). The dependent variable *EUR granted* equals one if the firm received a EUR loan and equals zero otherwise, while all explanatory variables are defined in Table 1. Standard errors are reported in brackets and account for clustering at the industry-branch level. \*\*\*, \*\*, \* denote significance at the 0.01, 0.05 and 0.10-level.

	(1)	(2)	(3)
	One quarter before / after securitization starts	Two quarters before /after securitization starts	Three quarters before / after securitization starts
Securitization	-0.016 [0.014]	-0.019** [0.009]	-0.013 [0.010]
Eligible	-0.003 [0.012]	-0.008 [0.011]	-0.017 [0.015]
Securitization*Eligible	0.063 [0.021]	0.067* [0.023]	0.068*** [0.023]
Observations	2,055	4,268	6,419
Method	Logit	Logit	Logit
R <sup>2</sup> (pseudo)	0.340	0.320	0.304
Firm and loan characteristics	yes	yes	yes
Industry fixed effects	yes	yes	yes
Region fixed effects	yes	yes	yes

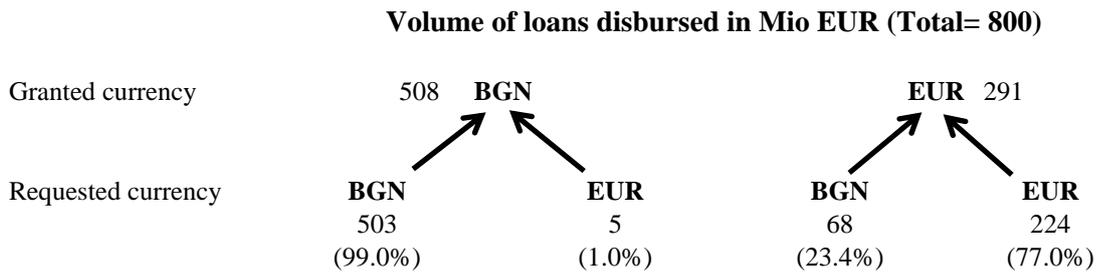
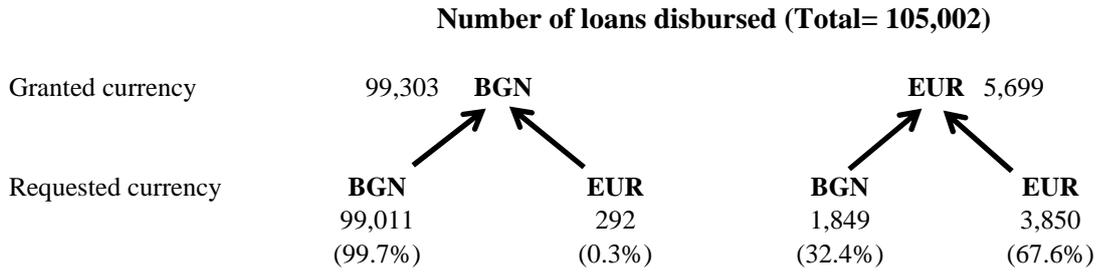
**Table 9. Securitization, switching and credit risk**

This table reports OLS estimation results for the subsample of loans with amount > 10,000 EUR only. The dependent variable *EUR granted* equals one if the firm received a EUR loan and equals zero otherwise, while all explanatory variables are defined in Table 1. Standard errors are reported in brackets and account for clustering at the branch-industry level. \*\*\*, \*\*, \* denote significance at the 0.01, 0.05 and 0.10-level.

	(1)	(2)
	Three quarters before / after securitization starts	Three quarters before / after securitization starts
Securitization	-0.057 [0.057]	-0.068 [0.058]
EUR savings account*Securitization	-0.065 [0.060]	
Sole proprietorship*Securitization	-0.027* [0.015]	
Assets*Securitization	0.011** [0.005]	
Eligible		-0.074 [0.054]
Securitization*Eligible		0.080 [0.088]
EUR savings account*Securitization*Eligible		-0.116* [0.060]
Sole proprietorship*Securitization*Eligible		-0.032** [0.016]
Assets*Securitization*Eligible		0.005 [0.005]
Observations	6,419	6,419
Method	OLS	OLS
R <sup>2</sup> (adjusted)	0.188	0.189
Industry fixed effects	yes	yes
Region fixed effects	yes	yes

**Figure 1. Requested vs. granted loan currency**

This figure displays share of requested and granted loan currencies in number of loans and volume of loans disbursed.



**Figure 2. Requested and granted currency by loan size and maturity**

Figure 2A. Share of loans requested in EUR

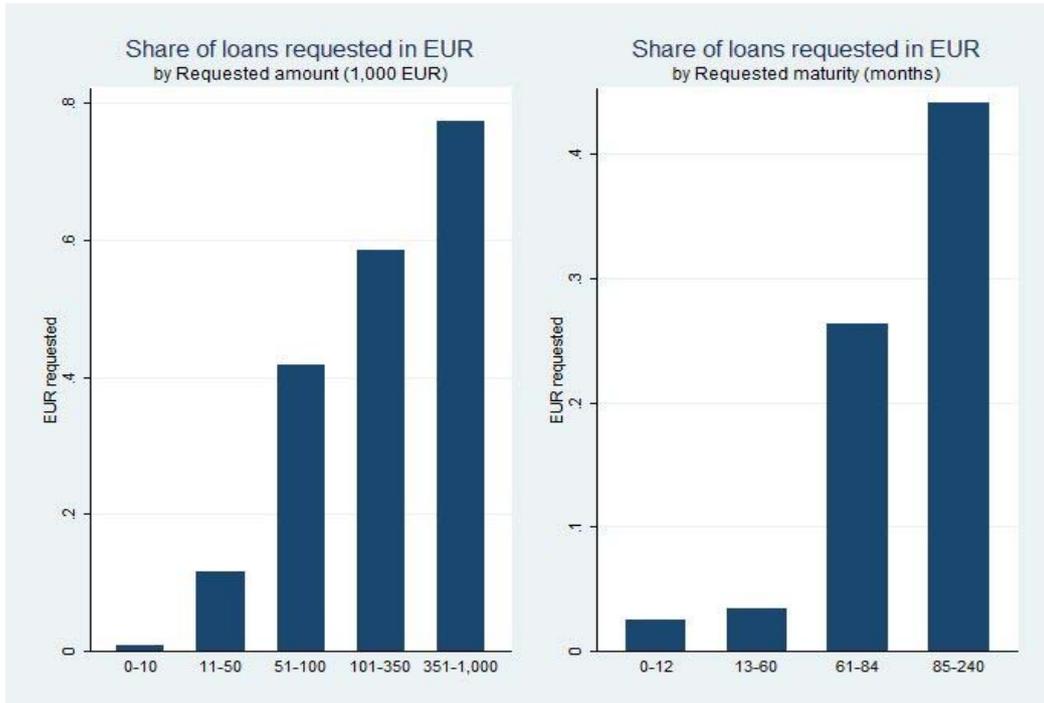
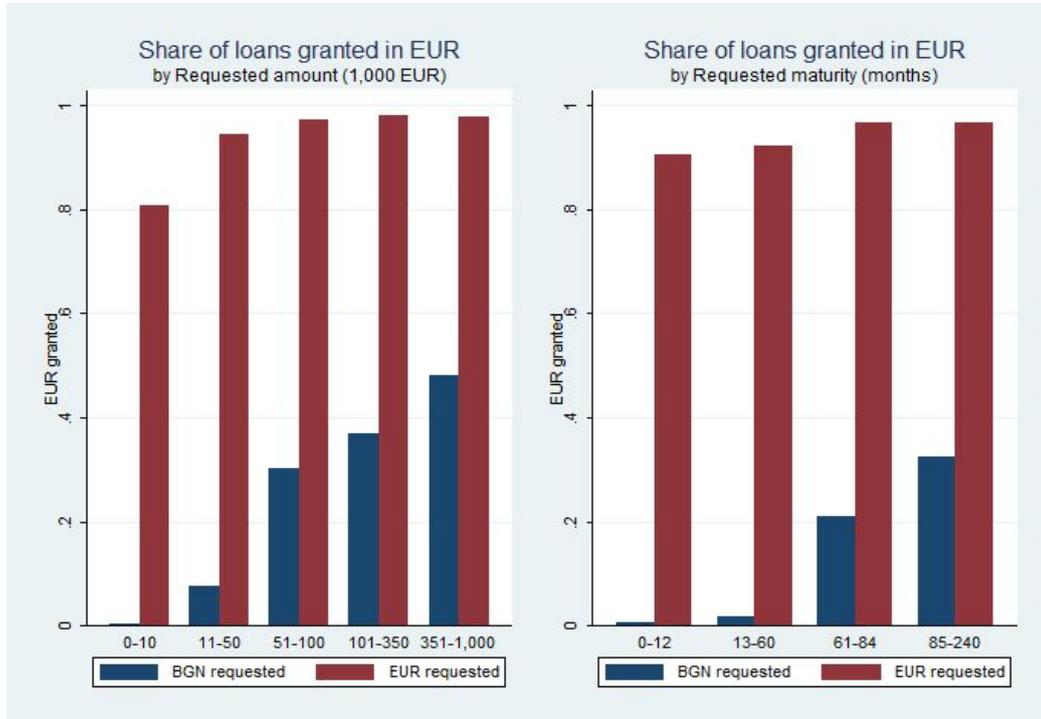
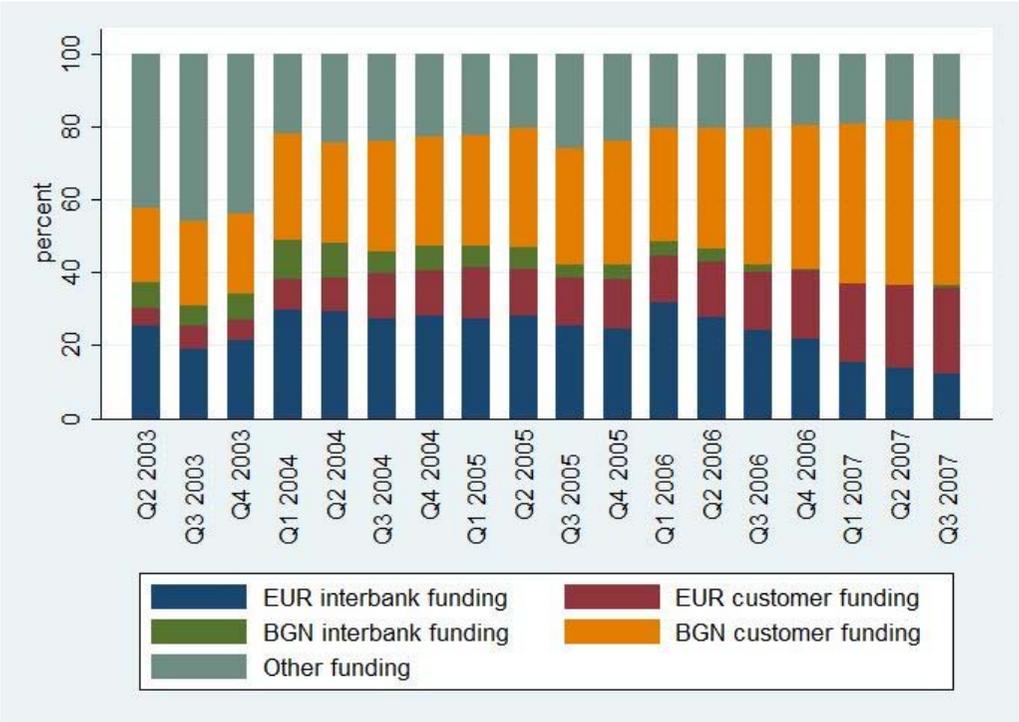


Figure 2B. Probability of being granted EUR



**Figure 3. Fundings structure of the Bank**



#### Figure 4. Loans requested in EUR and switched loans over time

This figure displays the quarterly average share of loans which was requested in EUR and the quarterly average share of loans that were requested in BGN and granted in EUR (switched loans) for the subsample of loans with amounts > 10,000 EUR. The vertical lines indicate the introduction of macroprudential regulations (beginning of Q2 2005), the start of the securitization deal (beginning of Q2 2006) and the removal of the macroprudential regulations (end of Q4 2006).

