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Cross-border capital flows and bank risk-taking

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ABSTRACT

This paper explores the impact of cross-border capital flows on bank lending volumes and risk. Employing bank-level data from the euro area, we show that capital inflows are associated with higher bank credit supply and lower average loan quality. By showing that the lending patterns of smaller domestic banks are also affected, we present evidence that the impact of international capital flows is not limited to large banks with international exposure. Nevertheless, the observed effects are stronger for large banks as well as for banks with low levels of capitalisation, suggesting that agency issues reinforce the link between capital flows and bank lending.

1. Introduction

Numerous theoretical (Dell' Ariccia and Marquez, 2006; Acharya and Naqvi, 2012) and empirical (Delis and Kouretas, 2011; Maddaloni and Peydró, 2011; Bekaert et al., 2013; Jiménez et al., 2014; Ioannidou et al., 2015) studies have documented that lax monetary policy is associated with higher riskiness of bank lending. This relation is driven by the so called bank risk-taking channel of monetary policy transmission, which is based on the argument that lax monetary policy affects bank lending behaviour by expanding the quantity and reducing the price of loanable funds.

International capital inflows, similar to lax monetary policy, increase the quantity and reduce the price of loanable funds with potential effects on the dynamics of both bank lending and risk-taking (Martinez-Miera and Repullo, 2017). Yet, whereas a few empirical papers examine the impact of cross-border capital flows on the dynamics of bank loan volumes (e.g., Reis, 2013; Benigno and Fornaro, 2014; Benigno et al., 2015; Samarina and Bezemer, 2016; Baskaya et al., 2017a; Baskaya et al., 2017b), scant attention has been devoted to the effects of foreign capital flows on credit risk-taking. In particular, no empirical analysis evaluates the relation between capital inflows and the riskiness of bank lending.

This paper presents a first step towards the empirical exploration of this relation. The tests we present rest upon the theoretical argument that cross-border capital inflows can affect bank risk by increasing the supply of loanable funds, reducing domestic interest rates and aggravating bank agency problems. Specifically, Keeton (1999) argues that the rise in loanable funds is associated with increased credit supply, which can, in turn, generate a deterioration of average loan quality since banks expand the range of loans by providing loans to borrowers, which might otherwise have been rejected. Further, Martinez-Miera and Repullo (2017) relate the link between the rise in loanable funds and the riskiness of loans to agency problems. These authors set up a general equilibrium model of the relationship between real interest rates and bank risk-taking incentives, which is based on the presumption that bank investors cannot observe the intensity of banks' monitoring and/or screening efforts, giving rise to a moral hazard problem. They show that lower interest rates suppress bank interest margins and are therefore associated with lower bank income. In order to (at least partially) preserve their profitability, banks optimally respond to the reduction in income by reducing their costs, in particular the costs of monitoring and screening borrowers. The model, therefore, predicts that capital inflows, by reducing domestic interest rates, can generate a decrease in banks' monitoring and

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screening intensity, which is, in turn, reflected in a deteriorating quality of bank loan portfolios.[1]

We empirically explore the link between cross-border capital flows and the patterns of bank lending and risk-taking, estimating panel data models for a sample of roughly 4000 banks from ten euro area countries. We focus on euro area banks because the intertemporal variation in foreign capital flows in that region was far-reaching and displayed considerable cross-country variation through the 2000s, aiding identification of its effects on bank balance sheets using panel data. An additional advantage of euro area banks is that they operate within a monetary union so that we can disentangle fluctuations in international capital flows from changes in the stance of monetary policy.

Our analysis investigates two dimensions of bank lending. First, we provide evidence that cross-border capital inflows are associated with both higher bank loan volumes and higher loan-to-asset ratios. This relation is not only statistically, but also economically, significant: a 1-percentage point (henceforth pp) increase in capital inflows over GDP corresponds to 0.95 pp higher loan growth and 0.85 pp higher growth rates of the loan-to-asset ratios. Second, we explicitly focus on the impact of foreign capital flows on the dynamics of banks' credit risk-taking and show that banks' ratios of impaired loans over gross loans and loan loss provisions over net interest income rise with higher capital inflows. These results are robust to employing different gross and net measures of cross-border capital flows and dropping multinational banks, which can use funds raised by the parent bank or by branches in other countries, from the sample.

Having established these key results, we focus on some additional tests, which strengthen the identification and allow a better understanding of the channels generating the positive relation between capital inflows and bank credit riskiness. We begin by showing that our results are not driven by shifts in local credit demand, which could both lead to an increase in the amount of observable lending volumes and attract cross-border capital inflows. For this purpose, we identify country-specific episodes when cross-border capital flows are driven by supply factors and re-estimate the models for only those episodes. For the identification of these periods, we lean on Ghosh et al. (2014); Baskaya et al. (2017b); Martinez-Miera and Repullo (2017), among others, who argue that the domestic risk-free interest rate decreases during episodes of supply-driven international capital flows, whereas interest rates rise when demand-driven local pull factors affect the dynamics of cross-border capital flows. We, therefore, define country-specific episodes when cross-border capital flows are driven by supply factors as those episodes in which higher inflows of foreign capital are associated with reductions in the spread of 10-year sovereign bonds. The results of re-estimating the model using only these episodes are qualitative the same as the ones using all observations, suggesting that our baseline results are not driven by demand factors. We also show that our results are driven by forms of capital inflows which have a closer link to bank liquidity, such as debt inflows.

Next, we explore the role of agency problems as highlighted by Martinez-Miera and Repullo (2017). For this purpose, we examine how the magnitude of the effects of capital flows on lending and risk-taking depends on whether the bank is more or less susceptible to agency issues. More specifically, we find that better capitalised banks are less likely to increase their lending and credit risk-taking as a result of higher cross-border capital inflows. Since better capitalisation eases agency problems (Holmstrom and Tirole, 1997), this result is consistent with the theoretical argument that the effect of capital inflows on bank lending is exacerbated by agency issues. Further, we establish that capital flows affect both large and small banks, but the relation is more pronounced for larger ones. This is true even for large banks, which, in terms of the scope of their operations and the structure of their liabilities, are not expected to have easier access to cross-border capital inflows relative to small banks. We, therefore, imply that the over-proportional reaction to capital inflows of larger banks is at least partially related to the fact that they are more prone to agency problems, e.g., because of their higher bailout probabilities. This result again highlights the impact of agency cost issues. Our results also illustrate that smaller banks, which typically have no access to international funds, are still affected by capital inflows. Focusing on the channels through which capital inflows reach smaller banks, we find that at least some of the impact is driven by the fact that, when larger banks get access to additional funding, they compete less severely for retail deposits (Park and Pennacchi, 2009), which allows smaller banks to attract additional volumes of retail deposits and potentially shifts their loan supply. Clearly, there could be other channels through which capital flows can affect lending and risk-taking of smaller banks, apart from increasing their access to deposits. Identifying all of these channels, however, lies beyond the scope of this paper.

As the first empirical study to comprehensively examine the effect of international capital flows on bank-level risk-taking, this paper contributes to the understanding of the risk-taking channel as a function of the macroeconomic environment (e.g., Bernanke and Blinder, 1992; Kashyap and Stein, 2000; Jiménez et al., 2012; Jiménez et al., 2014; Ioannidou et al., 2015 by identifying a strong effect of a so far underexplored macroeconomic variable. Specifically, while the relation between cross-border capital flows and bank loan volume dynamics has already been documented (Reis, 2013; Benigno and Fornaro, 2014; Benigno et al., 2015; Samarina and Bezemer, 2016; Baskaya et al., 2017a; 2017b), we contribute to this line of research by presenting evidence that foreign capital inflows do not only affect bank lending volumes, but also reduce the average quality of bank loans.

This paper is structured as follows. The data and empirical methodology are the focus of Section 2. In Section 3, we present the results. Section 4 performs several robustness checks and Section 5 concludes.

2. Data and empirical methodology

2.1. Data

Our data consist of bank balance sheet information from banks in the following ten euro area countries over the period 2001–2012: Austria, Belgium, Finland, France, Germany, Ireland, Italy, Netherlands, Portugal and Spain.[2] Banks in these countries are an ideal laboratory because the intertemporal variation in cross-border capital flows in the euro area was far-reaching and displayed considerable cross-country heterogeneity through the 2000s, aiding identification of its effects on bank balance sheets using panel data. An additional advantage of euro area banks is

[1] A similar prediction about the relation between capital inflows and bank risk-taking can be obtained by the model of Acharya and Naqvi (2012), which derives its results by assuming agency problems between bank owners and managers, which arise from a compensation scheme where managers' compensation is positively related to the volume of loans, but a compensation penalty is imposed if the bank experiences a liquidity shortfall. As a consequence, bank managers are incentivised to expand the supply of loans when capital inflows generate excess liquidity.

[2] Starting in 1995, these countries had to meet several convergence criteria and also coordinated their monetary policy stance. As Greece failed to meet the criteria, it entered the euro at a later stage. We thus exclude Greece from the sample. We also drop Luxembourg from our sample as it serves as an international financial centre. However, our results are robust to including banks from Greece and Luxembourg.

that they operate within a monetary union, allowing us to disentangle changes in international capital flows, which vary a lot across countries, from changes in the stance of monetary policy, which are uniform across countries.

Our bank-level data are drawn from the Bankscope database, provided by Bureau van Dijk. We mostly include unconsolidated balance sheet data (i.e., Bankscope codes U1 and U2) because consolidated statements might be affected by subsidiaries, operating in countries which have different intensities of international capital flows relative to the headquarter's country. Yet, when banks only report consolidated statements, we include those in our regressions. We correct our data set for implausible observations, such as negative loan volumes, negative capital-to-asset ratios and negative liquidity ratios. We then match the bank-level data with a rich set of macroeconomic variables from the IMF's World Economic Outlook Database and International Financial Statistics, including different measures of capital flows, as discussed in more detail below.

2.2. Econometric specification

We estimate the following regression equation:

$$Y_{ijt} = \alpha_t + \mu_j + \beta * CAPITALINFLOWS_{j,t-1} + \delta * MACRO_{j,t-1} + \theta * BANK_{i,j,t-1} + \epsilon_{ijt} \quad (1)$$

where i indexes banks, j countries and t years. Y contains the following outcome variables: (i) banks' credit growth and growth in the loan-to-asset ratios to examine the dynamics of bank loan volumes; and (ii) the shares of loan loss provisions over net interest income and, for a sub-set of banks in our sample where the data are available, the shares of impaired loans relative to total loans, enabling us to examine the impact of cross-border capital flows on credit risk-taking.[3]

Our main regressor are cross-border capital flows, proxied by the negative of the current account balance (*CAPITALINFLOWS*) over current GDP. We scale capital flows by current GDP, following the recent international finance literature (e.g., Samarina and Bezemer, 2016). Yet, as we show in Section 5, all results are robust to dividing by the trend-value of GDP. The current account balance is a broad measure of cross-border capital flows. It includes both the liquidity flowing into the banking systems and the liquidity flowing into the capital markets in general. Our presumption is that the effects of capital flows on the banking systems are not limited to the liquidity directly flowing to banks, since capital flows into other segments of the capital market can also affect bank behaviour by shifting the supply of funds and thus affecting the yield of various types of financial instruments. In order to identify those capital flows that affect the domestic banking system most significantly, we also dis-aggregate the current account balance into gross inflows and outflows of debt, portfolio equity and FDI (Section 3.3). Our hypothesis is that especially gross debt flows are linked to changes in bank lending behaviour, since they are arguably more closely related to the international supply of bank funding and changes in the domestic interest rate than equity flows or FDI.

The vector *MACRO* includes the following standard macroeconomic covariates, which have been shown to affect bank lending behaviour (e.g., Dinger and von Hagen, 2009; Jiménez et al., 2014; Ioannidou et al., 2015): real GDP growth (*GROWTH*), the log difference in the 10-year sovereign bond yields (*YIELD*) and per capita GDP (*PERCAPITAGDP*). Our expectation regarding the sign of these variables is that bank lending is positively associated with economic growth, lower interest rates and higher per capita GDP (as a general index of economic development). In preliminary regressions, we also included additional macroeconomic variables, such as inflation, government expenditures (as a proxy for fiscal policy), and the output gap (as a measure for the current business cycle). The estimated coefficients were mostly insignificant and, therefore, we exclude them from our regressions.

At the individual bank level, we control for the following variables, subsumed in the vector *BANK*. First, we control for the impact of bank size on lending and risk-taking by adding the logarithm of total assets (*SIZE*). Second, we include the ratio of liquid assets in total assets (*LIQUIDITY*), as especially high-liquidity banks should increase their loan supply. Third, we add the unweighted capital-to-asset ratio (*CAPITAL*). It is a proxy for the capacity of banks to extend loans as well as for agency problems between bank owners and managers, which theory has shown to have significant effects on bank lending behaviour.[4] Finally, we include the return on assets to account for the differences in bank lending between high and low performing banks (*PROFITABILITY*). For banks' credit growth and growth in the loan-to-asset ratios, the regressors are lagged by one year to minimise endogeneity concerns. For the analysis of loan loss provisions and impaired loans, the regressors enter with a two-year lag to account for the fact that an easing of credit standards is reflected in the risk of a bank's balance sheet only with some delay.

As some of our regressors exhibit low time variation, fixed effects regressions could lead to inflated standard errors. Therefore, we use a random effects model that—as time-invariant bank effects are unlikely to be correlated with aggregate capital flow measures—produces unbiased and consistent estimates. The random effects estimator has also been shown to be more efficient than a fixed effects model or pooled OLS regressions in this context (see Wooldridge, 2010, Chapter 10).

We include time dummies, α_t, in our regressions to control for unobserved time-varying heterogeneity. Country dummies, μ_j, absorb any heterogeneity across countries that is constant over time, such as long-run demographic characteristics or the institutional framework and quality. Moreover, the standard errors are clustered at the country level to account for the within-country correlation across banks.

2.3. Summary statistics

The summary statistics of the variables included in our analysis are presented in Table 1. The positive median of $\Delta LOANS$ indicates that banks increase their loan volumes during our sample period. Further, the average change in the loan-to-asset ratio is negative. This means that, on average throughout our sample period, banks increase the share of assets other than loans. The median share of loan loss provisions over net interest income in the euro area is equal to 14.3%—a value similar to the one obtained in Claessens et al. (2001).

The negative median of *CAPITALINFLOWS* implies that most banks in our sample are located in countries with capital outflows/external surpluses, as can also be seen from Table 2, which

[3] Since the latter only takes on values between 0 and 1, typical linear regression models might deliver predictions that are outside the unit interval. Hence, following Baum (2008), we implement a logit transformation, allowing us to employ usual linear regression models. As the Bankscope database for a large number of German banks only reports data on impaired loans starting in 2011, we require a bank observation, in order to be included in this analysis, to have non-missing data on impaired loans also at time $t-2$. i.e., a bank should report data on impaired loans for at least three years. We thereby ensure that our results are not affected by this or similar jumps in data coverage. As we show in Section 4, our results on impaired loans ratios are also robust to dropping German banks from the sample altogether.

[4] We use banks' actual capital ratio, rather than their regulatory capital ratio, since it is a better proxy for the prevalence of agency problems. In addition, regulatory capital ratios are only reported by a small fraction of banks in our sample.

Table 1
Summary statistics.

Dependent Variables	Unit	Obs.	Median	S.D.	25th	75th	Description
ΔLOANS	%	38,832	3.47	41.19	−0.76	9.69	Growth rate of the loan volumes
ΔLOANS/ASSETS	%	38,832	−0.05	33.67	−3.91	3.73	Growth rate of the loan-to-asset ratios
LOAN LOSS PROVISIONS	%	42,653	14.29	46.54	5.56	24.84	Loan loss provisions / net interest income
IMPAIRED LOANS	%	12,959	−2.90	1.13	−3.51	−2.30	Impaired loans / total loans
Macroeconomic Regressors							
CAPITAL INFLOWS	%	46,913	−1.78	3.96	−5.96	1.00	(−1) * Current account balance over GDP
GROWTH	%	46,913	1.64	2.33	0.45	3.30	Growth rate of real GDP
PER CAPITA GDP	thousand	46,913	30.22	4.44	27.49	34.59	PPP adjusted per capita GDP in current international dollars
YIELD	%	46,913	−4.92	15.28	−14.89	11.29	Growth rate of the 10-year sovereign bond yield
DEBT INFLOWS	%	39,977	6.24	14.19	2.51	20.80	The change in portfolio debt and other liabilities over GDP
EQUITY INFLOWS	%	39,977	1.37	11.21	−2.43	5.29	The change in portfolio equity liabilities over GDP
FDI INFLOWS	%	39,977	2.27	6.27	−0.06	6.52	The change in FDI liabilities over GDP
DEBT OUTFLOWS	%	39,977	6.78	14.88	−0.15	22.39	The change in portfolio debt and other assets over GDP
EQUITY OUTFLOWS	%	39,977	2.60	7.25	−2.55	3.87	The change in portfolio equity assets over GDP
FDI OUTFLOWS	%	39,977	3.76	6.45	0.90	6.37	The change in FDI assets over GDP
Bank-Level Regressors							
CAPITAL	%	46,879	6.95	14.82	5.13	10.47	Capital / total assets
PROFITABILITY	%	46,723	0.33	4.38	0.15	0.71	Return on assets
SIZE	ln(x)	46,913	6.37	1.93	5.32	7.68	Logarithm of total assets
LIQUIDITY	%	45,495	39.04	22.01	28.34	53.13	(total assets - loans) / total assets

The table shows the summary statistics of all variables emplyoed in our analysis. The dependent variables are credit growth, the growth rate in the loan-to-asset ratio, the share of loan loss provisions over net interest income and impaired loans over total loans (log transformed). The macro regressors are capital inflows (the negative of the current account over GDP), real GDP growth, per capita GDP, growth in 10-year government bond yields, as well as gross inflows and outflows of debt, equity and FDI. The bank-level controls include the capital-to-asset ratio, the return on assets, the log of total assets (size) and liquid assets over total assets.

Table 2
The distribution of sample banks over time.

Country	2001	2006	2012
Austria	208	308	268
Belgium	97	84	71
Finland	14	20	24
France	480	418	376
Germany	1803	1873	1805
Ireland	60	57	32
Italy	782	733	622
Netherlands	79	74	71
Portugal	39	48	34
Spain	158	238	154
Σ	3720	3853	3457

depicts the distribution of banks over time and across countries. Table 2 further shows that larger countries that typically have a higher number of small/regional banks (i.e., Germany) are overrepresented in our sample. In a robustness test of Section 4, we therefore drop Germany from the sample to show that our results are unaffected by the high number of German banks.

On average, the GDP growth rate in our sample is equal to 1.6%, per capita GDP has a value of 30,220 € and long-term interest rates decrease by 4.92% per annum, reflecting the fact that the early 2000s were a period of expansionary monetary policy and decreasing interest rates. Turning to the covariates at the bank level, the median bank has a capital-to-asset ratio of 6.95%, a return on asset of 0.33% and a liquidity ratio of 39.04%. The country-by-country summary statistics of the continuous bank-level variables are appended in Tables A.1 and A.2.

Table 3 displays the simple pairwise correlation between our main measure of cross-border capital flows (the negative of the current account to GDP) and the median of the four dependent variables at the country-year level (a correlation table with all of the variables employed in our baseline regressions can be found in Table A.3). In line with the theoretical arguments presented in the introduction, the positive correlation coefficients suggest that higher inflows of foreign capital are associated with higher loan volumes, higher loan-to-asset ratios and greater credit risk-taking. Section 3 will evaluate this evidence on the relationship between cross-border capital flows and bank lending, using the panel data model outlined in Section 2.2.

3. Results

3.1. Baseline results

In this section, we present our baseline results, establishing the general relationship between international capital inflows, bank lending and the average riskiness of bank loans. The results are presented in Table 4 and underline that higher inflows of foreign capital are associated with significantly higher bank loan volumes and increased loan-to-asset ratios. These effects are not only statistically but also economically significant: a 1-pp increase in international capital flows is related to 0.95 pp higher loan growth rates and 0.85 pp higher growth rates of the loan-to-asset ratio. In other words, the average bank increases its loan volume by 0.0023 € for each additional € of capital inflows. At the country level, each additional € of capital inflows thus generates an average rise in loan volumes of 0.79–0.89 €.[5] Moreover, foreign capital flows also banks' shares of loan loss provisions and impaired loans, indicating that banks that operate in countries with high capital inflows increase the risks in their loan portfolios. In economic terms, a 1-pp increase in capital inflows raises banks' loan loss provisions relative to net interest income by 0.96 pp and the ratios of impaired loans, for the average bank in the sample, by 0.37 pp.[6]

[5] Average GDP is equal to about 1693.2 billion € in our sample. Therefore, one additional € of capital inflows raises loan volumes by 1/1693200000000*0.950 (= coefficient in column (1)) percent. Evaluated at the mean of bank-level loan volumes (equal to 4161.4 million €), this implies an increase in credit volumes of the average bank by 1/1693000000000*0.950*4161400000 = 0.0023 €. As the average country in our sample hosts 345–385 banks (see Table 2), this sums up to a country-level increase in loan volumes by 0.79–0.89 €.

[6] For the impaired loans ratio, as it only takes on values between 0 and 1, we implemented the following logit transformation (see also Section 2.2): $\ln(\frac{x}{1-x})$. Thus, a 1-pp increase in capital inflows raises $x/(1-x)$ by $100*(\exp(\text{coefficient})-1) = 100*(\exp(0.052)-1) = 5.338\%$. Evaluated for the average bank with an impaired loans ratio of 0.0701 (7.01%), this results in an approximate increase in the share of non-performing loans to a value of 7.01%*1.05338 = 7.38%, which is equal to a 0.37 pp change in the shares of non-performing loans.

Table 3
The correlation between capital flows, bank lending and risk-taking.

	CAPITAL INFLOWS	ΔLOANS	ΔLOANS/ASSETS	LOAN LOSS PROVISIONS	IMPAIRED LOANS
CAPITAL INFLOWS	1.000				
ΔLOANS	0.507	1.000			
ΔLOANS/ASSETS	0.182	0.652	1.000		
LOAN LOSS PROVISIONS	0.070	−0.494	−0.551	1.000	
IMPAIRED LOANS	0.163	0.050	0.077	0.030	1.000

This table depicts the correlation coefficients between capital inflows (the negative of the current account over GDP), credit growth, the growth in the loan-to-asset ratio, loan loss provisions over net interest income and impaired loans in total loans.

Table 4
Baseline results.

	(1) ΔLOANS	(2) ΔLOANS/ASSETS	(3) LOAN LOSS PROVISIONS	(4) IMPAIRED LOANS
CAPITAL INFLOWS	0.950**	0.850***	0.958***	0.052***
	(2.57)	(2.95)	(3.03)	(4.34)
CAPITAL	0.157	−0.211**	0.219*	−0.005
	(1.19)	(−2.07)	(1.81)	(−0.79)
PROFITABILITY	−0.655**	−0.509***	0.607	−0.000
	(−2.54)	(−4.49)	(0.76)	(−0.01)
SIZE	−2.730***	−0.425**	1.950***	−0.088***
	(−8.24)	(−2.02)	(3.57)	(−3.88)
LIQUIDITY	0.454***	0.447***	−0.097	−0.004***
	(6.12)	(7.24)	(−1.23)	(−3.39)
GROWTH	2.389*	0.738	−0.134	−0.054
	(1.87)	(0.95)	(−0.10)	(−1.53)
YIELD	−0.257***	−0.200*	1.653***	0.017***
	(−2.83)	(−1.90)	(4.03)	(5.08)
PER CAPITA GDP	−0.006	0.497	−3.784	−0.096*
	(−0.01)	(0.86)	(−1.41)	(−1.73)
Year FE	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Obs	38,691	38,691	31,212	7526
R-squared	0.016	0.012	0.054	0.186

This table presents our baseline regression results. The dependent variables are the growth rates of loans and the loan-to-asset ratios, the shares of loan loss provisions over net interest income and the shares of impaired loans in total loans. The main regressor is the negative of the current account balance over GDP. We also add the following bank-level controls: the capital-to-asset ratios, the returns on assets, size (the logarithm of total assets) and liquid assets over total assets. We further control for the following macro variables: GDP growth, growth rates in 10-year sovereign interest rates and per capita GDP. Our regressions include country and time fixed effects. The standard errors are clustered at the country level. The *t*-statistics are shown in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

From the set of macroeconomic covariates, especially one variable has a significant effect on banks—the growth in 10-year sovereign bond yields. Consistent with the literature on the effects of monetary policy on bank lending (e.g., Jiménez et al., 2014; Ioannidou et al., 2015), we find decreasing interest rates to increase bank lending. However, despite the importance of interest rates for bank lending behaviour, we document that capital inflows affect banks significantly even after controlling for changes in interest rates.

The effects of the bank-level controls on lending and risk-taking are in line with the extant banking literature. In line with Bouvatier and Lepetit (2012), we document that smaller, high-liquidity and low-profitability banks have higher loan growth rates. Further, consistent with Altunbas et al. (2012), we find bank liquidity to be negatively associated with bank risk.

Overall, the results of Section 3.1 uncover that banks, in the wake of capital inflows, increase their lending, especially so to risky borrowers, indicated by rising ratios of impaired loans and loan loss provisions. In the remainder of this paper, we focus on loan growth and the impaired loans ratio as the dependent variables. We use the share of impaired loans in total loans, rather than loan loss provisions over net interest income, as the proxy for credit risk in all subsequent regressions because they only increase if banks increase lending to risky borrowers. The share of loan loss provisions, in contrast, can also increase if banks merely increase the share of loans in their aggregate balance sheet, as documented above. A further advantage of impaired loans, relative to loan loss provisions, is that they are, as argued in Ahmed et al. (1999); Hanweck and Ryu (2005), less vulnerable to changes in accounting policy and more specifically to accounting manipulations. The main disadvantage of the impaired loans ratio is that it is only provided by a sub-set of banks in our sample. We achieve similar results when employing the share of loan loss provisions over net interest income as the dependent variable. For the ease of presentation, these results are not reported.

3.2. Can the results be confirmed in a sample excluding multinational banks?

The previous analysis includes subsidiaries of multinational banks and treats them just as any other bank located in the respective country. Given the well-documented existence of internal capital markets within multinational banks (Jeon et al., 2013; de Haas and van Lelyveld, 2014; Frey and Kerl, 2015), which implies that these banks can shift funds across subsidiaries, the link between country-level capital inflows and the lending behaviour of multinational bank subsidiaries may be different. As a result, including multinational banks might introduce noise in our estimations.

To address this issue, we restrict the sample to domestic/local banks. To classify banks as local vs multinational, we use the ECB's list of significant supervised entities that contains systemically relevant banks and their subsidiaries, which are directly supervised

Table 5
Excluding multinational banks.

	(1) ΔLOANS	(2) IMPAIRED LOANS
CAPITAL INFLOWS	1.028**	0.064***
	(2.37)	(4.63)
Bank-Level Controls	Yes	Yes
Macro Controls	Yes	Yes
Year FE	Yes	Yes
Country FE	Yes	Yes
Obs	36,921	7056
R-squared	0.016	0.190

In this table, we drop multinational banks from our sample which can use funds raised by the parent bank or by branches in other countries subject to other intensities of capital flows. The dependent variable is the loan growth rate and the share of impaired loans in total loans. The key regressor is the negative of the current account balance over GDP. Further we include a set of bank (size, capital-to-asset ratios, liquidity ratios, returns on assets) and macro controls (GDP growth, growth in 10-year sovereign bond yields, per capita GDP) that are not reported for reasons of space.We add country and time fixed effects in order to control for (unobserved) heterogeneity over time and across countries. The *t*-statistics are depicted in parentheses and the standard errors are clustered at the country level
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

by the ECB. For each of these banks, we hand-collect information on whether they have a foreign parent and/or a branch abroad, using banks' annual reports, banks' webpages and internet news reports. This approach allows us to classify 305 banks as multinational. For the remaining set of banks in our sample (also those which are not on the ECB's list), we assume that they are local/domestic.

The attendant results, presented in Table 5, show that cross-border capital inflows increase local banks' lending and risk-taking. In addition, the coefficients are economically even more meaningful than the corresponding estimates for the entire sample, suggesting that domestic banks are indeed more affected by capital inflows in the particular economy relative to subsidiaries of multinational banks, which can reshuffle funds across borders.

3.3. Are the results robust to alternative measures of capital flows?

3.3.1. Capital flows driven by demand vs supply factors

Cross-border capital flows can be driven either by global supply (push) factors, such as expansionary monetary policy in the US or low global risk aversion, which shift upward the supply of loanable funds across borders, or by local demand (pull) factors, which are associated with improved expectations about the returns of domestic projects, thus shifting upward the demand for domestic credit and resulting in capital inflows (Calvo et al., 1996; Fratzscher, 2012; Bluedorn et al., 2013; Rey, 2013; Bruno and Shin, 2015). In this framework, since shifts in credit demand can increase both international capital inflows and the observable levels of bank credit, demand (pull)-driven capital flows are clearly endogenous to bank lending behaviour (as, for instance, argued by Baskaya et al. (2017b)). Thus, our estimates could be biased if we include both periods of supply- and periods of demand-driven changes in capital inflows. To improve identification, in this sub-section, we therefore examine the relation between capital inflows and the riskiness of bank lending by disentangling country-specific episodes during which the dynamics of cross-border capital flows are driven by global supply factors, rather than local demand factors. We identify these episodes, consistent with Ghosh et al. (2014); Baskaya et al. (2017b); Martinez-Miera and Repullo (2017), as the periods when the domestic risk-free interest rate decreases. The idea is that the domestic risk-free interest rate only decreases when the supply of loananble funds goes up, while the demand stays relatively constant. In contrary, should capital flows be driven by shifts in domestic credit demand, it is especially the demand for loanable funds that increases, resulting in higher domestic interest rates. We thus define country-specific episodes when cross-border capital flows are driven by supply (push) factors as those episodes in which increases in the inflows (outflows) of foreign capital are associated with reductions (increases) in the domestic spread of 10-year sovereign bonds (relative to the US rate) and re-estimate the models for only those episodes. For the sake of comparison, we also re-estimate the models for the subsample in which the above argument implies that capital inflows are demand-driven, that is periods when higher inflows of foreign capital are associated with increases in the domestic spread.

Columns (1) and (2) of Table 6 show that the effects of international capital flows—in terms of both economic magnitude and statistical significance—during these sub-periods are similar to the previous results. In contrast, as can be seen from columns (3) and (4), capital flows do not have a significant effect on the dynamics of bank lending during episodes in which demand factors dominate, i.e., when higher inflows of foreign capital are associated with rises in the spread of 10-year sovereign bonds. In sum, we find that cross-border capital flows are only associated with more lending and a higher average riskiness of loans when they come with a reduction in domestic interest rates, suggesting a dominance of supply, rather than demand, effects.

3.3.2. Gross capital inflows vs outflows

In a next set of regressions, we provide further evidence that the shift in bank lending associated with cross-border capital flows is supply-driven by showing that, across various types of cross-border capital flows, those which arguably increase the supply of loanable funds to banks most significantly have a stronger impact on bank lending volumes and risk. In particular, our presumption is that cross-border debt flows are more closely related to the international supply of bank funding and to changes in the domestic interest rate than equity flows or FDI. Further, we presume that the supply of loanable funds is mostly affected by gross rather than net debt flows, as discussed below. We thus proceed by differentiating between gross inflows and outflows of debt (portfolio debt and other assets that mostly comprise interbank credit, see (Baskaya et al., 2017a)), portfolio equity and FDI. For this purpose, we employ the capital flow data provided in Lane and Milesi-Ferretti (2007) and calculate gross inflows as the change in the domestic stock of debt, portfolio equity and FDI liabilities over GDP. Equivalently, we define gross outflows as the relative change in the stock of the respective foreign assets.[7]

Columns (1) and (2) of Table 7 provide evidence that especially gross debt inflows increase bank loan volumes and credit risk-taking significantly. Gross debt outflows have no effect on bank lending behaviour, and FDI and equity inflows only affect the volume, but not the average risk, of credit weakly significantly, with an economic magnitude smaller than for debt inflows. Therefore, consistent with our hypothesis, gross cross-border debt inflows seem to be most closely linked to the international supply of bank funding, thus affecting bank lending behaviour. The overproportional effect of gross debt **in**flows relative to gross debt **out**flows could be driven by a higher sensitivity of this type of capital flows to agency problems. Specifically, it has been shown that gross capital**in**flows are subject to stronger information asymmetries relative to capital **out**flows (Brennan and Cao, 1997; Tille and van Wincoop, 2010). This is because gross capital**in**flows increase the shares of

[7] The top 1% of gross debt flows are winsorised because of extreme outliers, especially in Ireland.

Table 6
Capital flows driven by supply vs demand factors.

	Supply factors dominate		Demand factors dominate	
	(1) ΔLOANS	(2) IMPAIRED LOANS	(3) ΔLOANS	(4) IMPAIRED LOANS
CAPITAL INFLOWS	0.931***	0.033**	−0.831	−0.006
	(2.63)	(2.01)	(−0.82)	(−0.08)
Bank-Level Controls	Yes	Yes	Yes	Yes
Macro Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Obs	17,708	4240	15,072	2362
R-squared	0.024	0.209	0.013	0.194

This table extends our baseline model. The dependent variable is the loan growth rate and the shares of impaired loans in total loans. The key regressor is the negative of the current account balance over GDP. We further incorporate several bank (size,capital-to-asset ratio, liquid asset ratio, returns on assets) and macro covariates (GDP growth, growth rate in 10-year government bond yield, per capita GDP) which are not reported for reasons of space. We add country and time fixed effects in order to control for (unobservable) heterogeneity over time and across countries.Columns (1) and (2) restrict the data set to episodes during which more foreign capital inflows (outflows) are associated with a decrease (increase) in the sovereign debt spread.Columns (3) and (4) accordingly restrict the dataset to episodes where higher foreign capital inflows (outflows) are associated with an increase (decrease) in the spread of sovereign credit.The standard errors are clustered at the country level and the *t*-statistics are shown in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 7
Gross capital inflows vs outflows.

	(1) ΔLOANS	(2) IMPAIRED LOANS
DEBT INFLOWS	0.362*	0.006***
	(1.96)	(2.75)
DEBT OUTFLOWS	−0.317	−0.006
	(−1.62)	(−1.30)
EQUITY INFLOWS	0.290*	0.004
	(1.84)	(1.56)
EQUITY OUTFLOWS	0.016	−0.005
	(0.11)	(−0.84)
FDI INFLOWS	0.194*	0.001
	(1.82)	(0.08)
FDI OUTFLOWS	−0.182	−0.002
	(−1.42)	(−1.02)
Bank-Level Controls	Yes	Yes
Macro Controls	Yes	Yes
Year FE	Yes	Yes
Country FE	Yes	Yes
Obs	32,780	6602
R-squared	0.015	0.190

In these regressions, we test whether gross inflows differ from gross outflows in their effect on loan growth and the share of impaired loans over total loans. The regressions add a set of macro (GDP growth, the growth rate in 10-year government bond yields, per capita GDP) and bank controls (size, capital-to-asset ratio, liquidity ratio, return on asset) that are not reported for reasons of space, in addition to year and country fixed effects. The *t*-statistics are shown in parentheses, using standard errors that are clustered at the country level.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

foreign investors holding bank liabilities. Foreign investors are less informed about the quality of domestic (bank) assets and, thus, have inferior monitoring abilities. As a result, the agency problems between banks managers and outside investors are intensified. This is in contrast to a reduction in gross capital outflows, which typically reflects an upward shift in the stakes of domestic investors.

3.4. Is the effect of capital flows driven by agency problems?

The results presented so far illustrate a strong positive relation between cross-border capital flows and an increase in both the volume and the average risk of bank loans. They also show that this relation is strongly associated with the supply of loans, rather than the demand. These results are consistent with a situation where, under the presumption that banks always fund high quality (low risk) loans and lend to riskier borrowers only when the amount of loanable funds rises, cross-border capital flows increase both loan volumes and average loan risk by shifting up the amount of loanable funds. This line of argument reflects a rather mechanical link between the increase in funds' availability and the supply and average quality of loans and is not related to any shifts in bank risk-taking incentives. In this section, we show that higher bank capitalisation as a proxy for lower agency problems significantly reduces the observed relation between capital flows and the riskiness of bank loans, suggesting that this relation is not of a purely mechanical nature, but rather also reflects that cross-border capital flows generate a shift in the risk-taking behaviour of banks that are subject to agency problems, as suggested by Acharya and Naqvi (2012); Martinez-Miera and Repullo (2017) theories (Section 3.4.1). To corroborate the role of agency problems in shaping the relation between capital flows and shifts in bank lending, in Section 3.4.2, we further differentiate between small and larger banks, presuming that agency problems are less pronounced for small banks, which are not subject to "too-big-to-fail" considerations.

3.4.1. Bank capitalisation

Bank capital is widely recognised as a main determinant of bank agency problems: only well-capitalised banks sufficiently internalise the risk of default of borrowers. As a result, these banks exhibit less agency problems and are characterised by lower credit risk-taking incentives (Holmstrom and Tirole, 1997; Jiménez et al., 2014; Ioannidou et al., 2015). Leaning on this evidence, we examine whether more bank equity indeed helps reduce banks' credit risk-taking incentives following cross-border capital inflows. For this purpose, we split our sample into a sub-sample of highly capitalised banks, which have a capital ratio in the top 33% of the distribution and the rest of the banks.[8] We expect the effects of

[8] We determine the 67% threshold of capital ratios separately for the distribution of banks with non-missing credit growth data (columns (1) and (3) of Table 8) and the distribution of banks with non-missing data on impaired loans ratios (columns (2) and (4) of Table 8), as the distributions in both samples differ significantly. Note that our results are broadly robust to alternative thresholds, e.g., the lowest 75% vs the highest 25% of capital ratios. However, highly capitalised banks indeed need

Table 8
Low vs high capitalisation.

	Lower capitalisation		High capitalisation	
	(1) ΔLOANS	(2) IMPAIRED LOANS	(3) ΔLOANS	(4) IMPAIRED LOANS
CAPITAL INFLOWS	1.261**	0.052***	0.191	0.087
	(2.21)	(4.44)	(0.41)	(1.33)
Bank-Level Controls	Yes	Yes	Yes	Yes
Macro Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Obs	25,906	4666	12,785	2860
R-squared	0.016	0.220	0.017	0.100

These regressions examine the effect of cross - border capital flows proxied by the negative of the current account balance over GDP on credit growth and the ratio of impaired in total loans, separately for banks with low and high capitalisation, in order to account for agency problems. We also include several bank (bank size, capital-to-asset ratio, liquidity ratio, returns on assets) and macro (real GDP growth, growth rate in 10-year government bond yields, per capita GDP) controls, which are not reported for reasons of space, as well as time and country fixed effects. The *t*-statistics are shown in parentheses, using standard errors clustered at the country level.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

cross-border capital flows to be weaker in the sub-set of well capitalised banks.

The results presented in Table 8 indicate that the effects of cross-border capital inflows on bank lending volumes indeed do not hold for well capitalised banks. Particularly, a 1-pp increase in capital inflows raises the loan growth of not highly capitalised banks by 1.26 pp, while the corresponding coefficient for highly capitalised banks is not statistically significant and much lower (0.19 pp). Table 8 further shows that cross-border capital flows have a statistically significant relation with the shares of impaired loans of banks with normal/lower capitalisation only, indicated by the highly statistically significant capital flow coefficient in column (2). Again, the corresponding estimate, presented in column (4), for well capitalised banks is not statistically different from zero.

Overall, these results indicate that the effects of cross-border capital flows on credit risk-taking are attenuated by banks with high capitalisation, confirming the role of agency problems and the existence of risk-shifting associated with cross-border capital flows. One possible policy implication arising from this result is that regulators can curb the risks of risk-shifting following a surge in capital flows by imposing stricter capital adequacy rules, e.g., including cross-border capital flows in the set of variables used in shaping countercyclical capital regulation.

3.4.2. Bank size

Another easily observable indicator of how prone a bank is to agency problems is bank size. This is the case both because larger banks are organizationally more complex (Laeven et al., 2016) and thus harder to monitor and because they are typically protected by "too-big-to-fail" implicit bailout guarantees (Boyd and Gertler, 1993; Stern and Feldman, 2009; Hovakimian et al., 2012; Wheelock and Wilson, 2012; Kaufman, 2015). We can thus expect that cross-border capital flows have stronger effects on the risk-taking of larger banks and more muted effects on the risk-taking of small banks. To evaluate this hypothesis, we define banks as small if their total assets are in the lowest 33% of the country-year specific distribution. Larger banks have total assets in the top 67%.[9] The following analysis thus focuses on the difference between very small and larger banks, as the former are far from being organizationally complex or from being protected by "too-big-to-fail" implicit bailout guarantees. Then, we estimate Eq. (1) separately for both sub-samples.

As is apparent from columns (1)–(4) of Table 9, cross-border capital flows have the economically and statistically most significant impact in the sub-sample of larger banks. Whereas the impact of capital flows on bank loan volumes is statistically insignificant and economically small (0.587) for small banks, larger banks increase their loan amounts significantly with a corresponding coefficient of 1.237. In addition, although the economic magnitude of the increase in impaired loans ratios is similar for small and larger banks, the coefficient on cross-border capital flows is statistically more significant for the latter relative to the former.

The different reaction of small and larger banks to cross-border capital flows, especially in terms of lending volumes, might not only be related to higher agency problems of larger banks, but also to the fact that larger banks are better connected to international financial markets, thus receiving a larger surplus of loanable funds whenever cross-border capital flows rise. In particular, as shown by Hahm et al. (2013); Baskaya et al. (2017a), capital inflows raise aggregate credit growth mainly by increasing the non-core liabilities (i.e., interbank liabilities) of the banking sector, as retail deposits are sticky and grow in line with the size of the economy and the wealth of the household sector. Since larger banks, on average, have a higher reliance on non-core funds than small banks that typically rely disproportionately more on retail deposits, they are likely to be more exposed to capital inflows/international financial markets. In the following set of regressions, we investigate whether capital inflows still raise bank lending and the average riskiness of loans for larger banks when they have a low reliance on interbank credit (i.e., high reliance on retail deposits). In this case, the impact of capital flows is unlikely to be driven by an overproportional reliance on non-core funding, but rather by a greater sensitivity to agency problems. To do so, we drop larger banks with an interbank funding ratio, as our proxy for non-core funds, in the highest 50% of the in-sample distribution from the following regressions, so as to focus on larger banks with a low interbank dependence. Columns (5) and (6) provide evidence that cross-border capital flows are still significantly associated with higher bank lending and risk-taking. Therefore, larger banks are not only affected most significantly by capital flows due to the higher share of non-core funding on their balance sheet, which have been shown to be more exposed to international capital markets and cross-border capital flows, but also because they are arguably subject to greater agency problems.

to be very well capitalised. A median split (the highest 50% vs the lowest 50% of capital ratios) would not yield the same results.

[9] The results are materially unchanged when employing alternative thresholds, e.g., the lowest 75% vs the highest 25% of the distribution of total assets.

Table 9
Small vs larger banks.

	All small banks		All larger banks		Larger banks with few interbank funding	
	(1) ΔLOANS	(2) IMPAIRED LOANS	(3) ΔLOANS	(4) IMPAIRED LOANS	(5) ΔLOANS	(6) IMPAIRED LOANS
CAPITAL INFLOWS	0.587	0.058**	1.237**	0.054***	1.431**	0.033*
	(1.45)	(1.98)	(2.41)	(3.88)	(2.32)	(1.90)
Bank-Level Controls	Yes	Yes	Yes	Yes	Yes	Yes
Macro Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Obs	12,180	2208	26,511	5318	12,531	3579
R-squared	0.026	0.085	0.014	0.181	0.025	0.223

In these regressions, we explore whether small and large banks are impacted differently by capital flows (current account relative to GDP multiplied by (−1)). The dependent variables are credit growth and the impaired loans ratios. Small banks are banks in the lowest 33% of the distribution of total assets. We add bank (size, capital-to-asset ratio, liquidity ratio, the return on assets) and macro (GDP growth, the growth in 10-year government bond yields and per capita GDP) controls, which are not reported for reasons of space, in addition to time and country fixed effects. In columns (5) and (6), we drop larger banks with an interbank funding ratio in the highest 50% of the distribution, as well as small banks, from the sample. The *t*-statistics are shown in parentheses, using standard errors clustered at the country level.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Although the evidence presented in Section 3.4.2 suggests that cross-border capital flows affect larger banks disproportionately more, columns (1) and (2) of Table 9 also show that small banks' lending (with a statistical significance just above the 10% level for the loan growth regressions) and risk-taking is still significantly affected by international capital flows. This result is important from a policy perspective because it shows that cross-border capital flows' impact penetrates to tiers of the banking system which are assumed to be not directly exposed to foreign funding. In the next sub-section, we will elaborate on one channel through which this penetration materialises.

3.5. The transmission of international liquidity to small banks

Previous regressions have shown that the relation between cross-border capital flows, bank lending and the average risk of banks' loan portfolios is related to an increase in the supply, instead of the demand, of bank loans. We have also shown that, although Section 3.4.2 suggests that capital flows have a stronger impact on larger banks, the average riskiness of small banks' loan portfolios also increases with higher capital inflows. This result is puzzling because small banks with their overproportional reliance on retail deposits should be less exposed to international capital flows and increases in bank liquidity—in contrast to large banks that typically have a high share of non-core (interbank) funding that is supplied more with higher cross-border capital inflows (Hahm et al., 2013; Baskaya et al., 2017a). Therefore, the significant effect on the impaired loans ratios of small banks, in turn, raises the questions of whether the relation between capital flows and smaller banks' risk-taking is also driven by a greater access to liquidity, and how the additional liquidity generated by cross-border capital flows reaches small banks.

To answer this question, in this sub-section, we identify one particular channel through which international liquidity spills over to small banks, thereby affecting their lending and risk-taking. This channel is based on the following line of arguments. When cross-border capital flows rise, larger banks get easier access to liquidity through the market for non-core bank liabilities. As a result, their incentives to compete for retail deposits are diminished (Park and Pennacchi, 2009), thus allowing small banks, which typically depend heavily on retail deposits, to acquire more of these, e.g., by marginally increasing their deposit rates (e.g., Barros, 1999; Hannan and Prager, 2006; Park and Pennacchi, 2009).

To illustrate this channel, we first regress the two-year change in deposit interest rates (computed as interest expenses on customer deposits over deposits) as well as the two-year growth in deposit-to-asset ratios at the bank level on our lagged measure of international capital inflows, separately for the sub-samples of small banks and larger banks (defined as in Section 3.4).[10] Consistent with the literature cited above, our results, shown in Table 10, suggest that small banks indeed increase their deposit rates as well as their deposit volumes. The deposit interest rates and deposit volumes of larger banks are, in contrast, not affected by cross-border capital flows.

We thus conjecture that the relation between cross-border capital flows and shifts in the lending behaviour of small banks, documented in Section 3.4.2, is (at least partially) driven by higher bank liquidity following a greater access to retail deposits. To further elaborate on this hypothesis, we re-run the specification of Table 9, columns (1) and (2), and differentiate between small banks with low and high growth in the deposit-to-asset ratios, where low-deposit growth banks have an average two-year growth rate of deposit ratios below the median of small banks' distribution. As is apparent from Table 11, small banks are entirely unaffected by international capital flows if they have low deposit growth. These are likely to be banks in regions with low population density and lower bank concentration—regions where it is difficult to attract additional retail funding. In contrast, small banks with high deposit growth, which we assume are those most able to access additional liquidity in times of cross-border capital flows, raise their lending and credit risk-taking, as can be seen from the *t*-statistics of 1.78 and 4.82 on the respective variable (CAPITALINFLOWS) in columns (3) and (4).

The results presented in this sub-section thus suggest that cross-border capital flows can affect the lending behaviour of small banks by allowing them to acquire additional retail deposits. Certainly, there are other channels through which capital flows can affect lending and risk-taking of small financial institutions, apart from increasing their access to additional deposits. For instance, large banks can react to foreign capital flows by entering markets typically served by smaller banks, such as lending to small and opaque firms (e.g., Petersen and Rajan, 1994; Goldberg and White, 1998; Berger and Udell, 2002), leading to increased competition that induces small banks to be less tight in providing credit to opaque and risky customers. Studying more comprehensively the channels through which capital flows affect large vs small banks is an interesting avenue for future research, but lies beyond the scope of this paper.

[10] In order to make sure that our results are not driven by unrepresentative outliers, we winsorise the variables at the 3% and 97% level. We calculate these variables over a two-year horizon because of their low time variation/higher stickiness.

Table 10
The impact of capital flows on bank deposits.

	Small banks		Larger banks	
	(1) ΔDEPOSITRATE	(2) ΔDEPOSITS	(3) ΔDEPOSITRATE	(4) ΔDEPOSITS
CAPITAL INFLOWS	0.280**	0.142*	−0.029	0.025
	(2.01)	(1.66)	(−0.33)	(0.77)
Bank-Level Controls	Yes	Yes	Yes	Yes
Macro Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Obs	1468	8489	4634	20,173
R-squared	0.139	0.026	0.109	0.020

The dependent variables are the two-year change in the deposit rate and two-year growth in the deposit-to-asset ratio. The key regressor are capital flows proxied by the negative of the current account balance over GDP. We include bank (size, capital-to-asset ratio,liquidity ratio, return on asset) and macro (GDP growth, the growth in 10-year government bond yields, per capita GDP) covariates that are not reported for reasons of space. In addition, we add country and time fixed effects. The *t*-statistics are shown in parentheses; the standard errors are clustered at the country level.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 11
The transmission of international liquidity to small banks.

	Low deposit growth		High deposit growth	
	(1) ΔLOANS	(2) IMPAIRED LOANS	(3) ΔLOANS	(4) IMPAIRED LOANS
CAPITAL INFLOWS	−0.283	−0.027	0.788*	0.341***
	(−0.35)	(−0.31)	(1.78)	(4.82)
Bank-Level Controls	Yes	Yes	Yes	Yes
Macro Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Obs	3283	467	3383	412
R-squared	0.009	0.190	0.007	0.190

In these regressions,we test whether small banks are affected by capital inflows via an increased access to retail deposits, splitting the sample into small banks with low (below median) vs. high deposit-over-assets growth. The dependent variables are the credit growth rate and the impaired loans ratios. The main regressor are foreign capital flows, proxied by the negative of the current account balance over GDP. We include bank (size, capital-to-asset ratio,liquidity ratio, return on asset) and macro (GDP growth, the growth in 10-year government bond yields, per capita GDP) covariates that are not reported for reasons of space. In addition, we add country and time fixed effects. The *t*-statistics are shown in parentheses; the standard errors are clustered at the country level.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

4. Robustness checks

This section presents the results of several robustness checks. In particular, we alter our econometric model, adjust the time, bank and country coverage of our sample and employ alternative dependent and independent variables.

We first alter the econometric model by saturating our regressions with bank fixed effects. The main advantage of estimating the model using bank fixed effects is the ability to control for unobserved time-invariant bank heterogeneity. As mentioned above, in our baseline regressions, we refrain from including bank fixed effects because several of our regressors (e.g., bank size and the current account balance over GDP) exhibit low time variation, which will generate inflated standard errors (Wooldridge, 2010). The attendant results are presented in the first two columns of Table A.4. They show that the sign and statistical significance of the estimated coefficients of capital inflows are robust to including bank fixed effects.

In a next step, we prove the robustness of our results to excluding German banks from the sample. This is important because Germany experienced significant capital outflows during the sample period, while it went through only one relatively short period of economic recession, so that impaired loan levels of German banks are relatively low. By excluding German banks from the sample, we ensure that, given the overrepresentation of German banks in our data set (Table 2), our results are not driven by this peculiarity of a single country. As can be seen from the corresponding estimates of columns (3) and (4), our results are robust to this adjustment. Thus, even after restricting our sample to non-German banks, cross-border capital inflows are associated with higher bank lending and credit risk-taking.

Further, using the foreign ownership data of Claessens and van Horen (2014); Claessens and Horen (2015), we drop foreign-owned banks, i.e., banks where more than 50% of the shares are held by foreigners, from the sample. This test serves as a robustness check to the evidence presented in Section 3.2 that, even excluding multinational banks that either have a foreign parent or a branch abroad, we identify a significant relation between capital flows and both bank lending and risk. As in the case of multinational banks, foreign-owned banks can, presumably, more easily shift funds across borders, implying that the link between country-level capital inflows and the lending behaviour of foreign-owned banks may be different and, therefore, including those banks might introduce noise in our estimations. Columns (5) and (6) show that cross-border capital flows are still significantly linked to both higher credit growth and risk-taking.

In a next set of regressions, we present evidence that our results are not driven by the post-crisis period nor by the euro area sovereign debt crisis and related changes in credit risk-taking incentives. For this purpose, we first re-estimate our baseline model

on a sub-sample excluding the sovereign debt crisis (i.e., all years after 2010). The corresponding results are presented in columns (1) and (2) of Table A.5. Next, we re-estimate the model without the crisis and post-crisis period by excluding the years of 2008–2012. The results of this re-estimation are illustrated in columns (3) and (4) of Table A.5. Except for the specification of column (4), where the effect of capital flows is statistically insignificant, cross-border capital flows are significantly associated with higher bank loan volumes and a greater average riskiness of banks' loan portfolios.

We continue by providing a robustness test employing alternative dependent variables, in particular regarding the riskiness of bank lending. In our baseline analysis, we focus on banks' loan loss provisions and impaired loans to establish the relationship between capital flows and credit risk-taking. In the following regressions, we explore the effects of global capital flows on banks' z-score, which is a more general measure of bank risk and not only constrained to loan risks. Specifically, we calculate the z-score as follows:

$$ZSCORE_{ijt} = \frac{PROFITABILITY_{ijt} + CAPITAL_{ijt}}{sd(PROFITABILITY)_{ij}}, \quad (2)$$

where *PROFITABILITY* is the return on assets of bank i in country j at time t, *CAPITAL* is the capital-to-asset ratio and $sd(PROFITABILITY)$ is the bank-specific standard deviation of *PROFITABILITY*, calculated over the entire sample period. The z-score is a widely used measure of bank risk in the empirical banking literature (e.g., Beck et al., 2009; Laeven and Levine, 2009; Köhler, 2012; Bhagat et al., 2015; Chen et al., 2017; Lepetit and Strobel, 2013; Lepetit and Strobel, 2015). Following these papers, we take the natural logarithm of the z-score, thus accounting for the skewness of this variable. The attendant results are presented in column (1) of Table A.6. We further dis-aggregate the z-score in columns (2) and (3) of Table A.6 by exploring the effect of capital flows on the returns on assets and the capital-to-asset ratios, scaled by $sd(PROFITABILITY)$. This specification allows us to identify the main component driving the dynamics of the z-score. The analysis of the z-score and its components not only allows us to establish the robustness of our finding with regard to the average risk of bank lending, but also confirms that capital inflows are related to shifts in the average riskiness of banks. The first column of Table A.6 demonstrates that capital inflows are associated with highly significantly lower bank z-scores. Specifically, a 1-pp increase in capital inflows reduces the z-score by 1.1%. This result implies that banks in countries with surges in foreign capital inflows are closer to default. Columns (2) and (3) underline that this effect is mainly driven by reductions in the capital-to-asset ratios, consistent with Bhagat et al. (2015), who also find the dynamics of banks' z-scores to be mainly driven by changes in capital ratios.

Finally, we calculate our main regressor, capital inflows, as the negative of the current account balance divided by the trend-value of GDP, instead of the current value, employing the Hodrick-Prescott filter to remove short-term fluctuations and to extract the trend from our GDP data. The idea behind this exercise is that our baseline definition of capital inflows could also be affected by short-term changes in GDP, as opposed to differences in the amount of capital flowing into the economy. By dividing by the trend-value of GDP, we ensure that we identify a relation between capital flows (and not short-term changes in GDP) and bank lending behaviour. As can be seen from Table A.7, our results are robust to scaling the current account balance by the trend-value of GDP.

5. Conclusion

In the extant literature, scant attention has been devoted to relating cross-border capital flows to bank lending and risk-taking. In this paper, we fill some of this gap by examining the effects of international capital flows on euro area bank lending and risk-taking. Euro area banks are an ideal laboratory because intertemporal changes in cross-border capital flows in the euro area were far-reaching and displayed considerable cross-country heterogeneity through the 2000s, aiding identification of their effects on bank balance sheets using panel data. In addition, studying countries within a monetary union allows us to disentangle fluctuations in international capital flows from changes in the monetary policy stance.

We find that cross-border capital inflows are associated with increased bank loan volumes, higher loan-to-asset ratios and both higher shares of impaired loans and loan loss provisions. These results are robust to employing different gross and net measures of cross-border capital flows, disentangling episodes during which capital flows are driven by global push vs domestic pull factors and restricting the sample to domestic/local banks.

We further document that the magnitude of these effects varies across banks. In particular, our results are attenuated by high bank capitalisation. This result confirms that the observed risk effects of cross-border capital flows are related to agency problems and are thus not simply the result of a lending expansion, which mechanically involves not only lending to safe, but also to riskier, borrowers. We also find that smaller banks, which are not prone to "too-big-to-fail" concerns and are thus subject to a lower degree of agency problems, exhibit less changes in lending relative to larger banks. We next dig deeper into the channels through which the lending behaviour of small banks that typically only rely on retail deposits and are thus less likely to be affected by a surge of foreign capital is modified by cross-border funds. We find that one of the channels at work is based on a shift of the intensity of competition for retail deposits: once larger banks get more liquidity related to cross-border capital, they compete less aggressively for domestic retail deposits, which enables smaller banks to attract more retail funds.

These results have important policy implications. The evidence that additional liquidity at the disposal of banks during cross-border capital inflow episodes has a similar effect on bank lending and risk-taking as expansionary monetary policy calls for an optimal monetary policy that involves a "leaning against liquidity" approach (see Acharya and Naqvi, 2012 for a similar argument). In other words, our results call for a contractionary policy when the banking system is awash with liquidity (e.g., due to cross-border capital inflows), so as to draw out its reserves and reduce its risk-taking incentives. Yet, within a monetary union, an independent monetary policy across the different member countries is impossible, highlighting the challenges to a monetary union when some countries experience international capital inflows, while others do not. An alternative approach to countervail the risk-increasing effects of capital inflows, even in a monetary union, is to increase bank capital requirements, thereby reducing the severity of bank agency problems and reducing banks' risk-taking incentives. In particular, our result of an amplified effect of capital flows on larger banks' credit risk-taking might justify the introduction of systemic risk buffers, which raise the capital requirements of the largest domestic (other systemically important institutions, O-SIIs) and internationally most-connected (global systemically important institutions, G-SIIs) institutions. Our results also suggest that capital requirements might be linked not only to aggregate business cycle conditions, but also to the intensity of cross-border capital flows.

Some limitations of our study uncover several areas where more research is needed. To start with, the dynamics of cross-border capital flows in our sample are not only exogenously driven. An interesting avenue for future research could be to identify the exogenous variation in the dynamics of cross-border capital flows and examine its causal impact on bank lending and risk-taking. Further research is also needed on the identification of the chan-

nels through which capital inflows affect small banks' lending. And last but not least, the understanding of the role of agency problems in shaping the relation between cross-border capital inflows and bank risk-taking can be improved by exploring cases of exogenous shocks which affect the magnitude of various types of agency problems.

CRediT authorship contribution statement

Valeriya Dinger: Conceptualization, Supervision, Methodology, Writing - review & editing. **Daniel Marcel te Kaat:** Conceptualization, Data curation, Formal analysis, Writing - original draft.

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Appendix A

Table A.1
Summary statistics by country.

	Obs.	Median	S.D.	25th	75th
Austria					
ΔLOANS	2863	4.53	41.71	0.18	9.17
ΔLOANS/ASSETS	2863	0.25	30.59	−3.58	3.75
LOAN LOSS PROV.	3154	17.65	55.95	7.06	28.87
IMPAIRED LOANS	73	−3.45	1.43	−4.45	−2.37
CAPITAL	3448	6.93	14.04	5.03	9.92
PROFITABILITY	3429	0.35	7.15	0.11	0.63
SIZE	3448	5.94	1.89	5.07	7.15
LIQUIDITY	3304	41.87	21.70	30.73	56.19
Belgium					
ΔLOANS	722	5.12	62.51	−5.86	16.24
ΔLOANS/ASSETS	722	0.41	56.77	−9.55	9.74
LOAN LOSS PROV.	657	3.23	52.22	0	11.25
IMPAIRED LOANS	48	−3.91	0.81	−4.45	−3.46
CAPITAL	1086	9.07	29.69	5.07	20.55
PROFITABILITY	1114	0.62	8.76	0.19	1.90
SIZE	1114	6.89	2.37	5.45	8.22
LIQUIDITY	912	60.05	29.11	37.70	86.58
Finland					
ΔLOANS	182	9.21	70.16	2.88	16.69
ΔLOANS/ASSETS	182	−0.08	55.48	−4.64	4.69
LOAN LOSS PROV.	173	2.95	85.24	0.39	13.97
IMPAIRED LOANS	49	−4.94	1.25	−5.88	−4.30
CAPITAL	264	8.58	33.51	4.59	28.44
PROFITABILITY	264	0.49	8.69	0.12	1.33
SIZE	264	7.65	2.27	6.15	8.89
LIQUIDITY	226	28.37	28.85	19.16	61.08
France					
ΔLOANS	4315	5.77	52.74	−1.99	12.00
ΔLOANS/ASSETS	4315	0.31	47.43	−5.15	5.22
LOAN LOSS PROV.	4586	8.72	61.50	0.78	17.51
IMPAIRED LOANS	2403	−3.18	1.18	−3.80	−2.61
CAPITAL	5385	8.52	18.29	5.18	13.30
PROFITABILITY	5359	0.65	5.99	0.27	1.18
SIZE	5390	7.59	2.10	6.29	8.97
LIQUIDITY	5132	38.30	30.24	19.76	69.96
Germany					
ΔLOANS	19,788	1.82	27.05	−1.20	5.24
ΔLOANS/ASSETS	19,788	−0.54	21.79	−3.73	2.38
LOAN LOSS PROV.	22,226	16.80	38.23	7.58	26.12
IMPAIRED LOANS	1567	−3.28	0.92	−3.85	−2.82
CAPITAL	22,888	5.90	10.06	4.83	7.46
PROFITABILITY	22,829	0.23	2.50	0.13	0.38
SIZE	22,888	6.26	1.64	5.37	7.23
LIQUIDITY	22,654	40.02	17.53	31.99	50.06

The first four variables (the dependent variables) are credit growth, growth in the loan-to-asset ratio, loan loss provisions over net interest income and impaired loans over total loans. The bank covariates are the capital-to-asset ratios, the returns on assets, the logarithm of total assets (size) and liquid assets over total assets.

Table A.2
Summary statistics by country.

	Obs.	Median	S.D.	25th	75th
Ireland					
ΔLOANS	454	0.00	75.31	−20.66	21.77
ΔLOANS/ASSETS	454	−1.45	70.22	−18.21	6.58
LOAN LOSS PROV.	194	5.42	118.09	0.12	22.37
IMPAIRED LOANS	116	−3.73	2.14	−4.89	−2.06
CAPITAL	657	5.97	19.72	3.26	13.98
PROFITABILITY	614	0.47	8.38	0.12	1.03
SIZE	657	8.40	2.09	7.33	9.72
LIQUIDITY	577	59.99	29.68	32.83	89.98
Italy					
ΔLOANS	7848	9.06	35.85	3.17	15.60
ΔLOANS/ASSETS	7848	1.54	29.96	−3.14	6.38
LOAN LOSS PROV.	8926	11.54	44.23	5.56	20.93
IMPAIRED LOANS	7785	−2.66	0.97	−3.17	−2.12
CAPITAL	9366	10.79	12.13	8.27	14.13
PROFITABILITY	9358	0.63	2.81	0.29	0.97
SIZE	9366	5.82	1.86	4.79	7.21
LIQUIDITY	9189	34.56	20.66	24.39	48.49
Netherlands					
ΔLOANS	637	4.19	86.24	−12.86	20.86
ΔLOANS/ASSETS	637	0.14	70.24	−10.45	9.17
LOAN LOSS PROV.	259	6.25	51.72	0.00	20.40
IMPAIRED LOANS	85	−4.31	1.34	−5.03	−3.41
CAPITAL	981	7.66	31.08	3.29	23.77
PROFITABILITY	966	0.48	11.87	0.08	1.60
SIZE	982	7.94	2.13	6.59	9.08
LIQUIDITY	823	50.45	31.27	22.57	75.68
Portugal					
ΔLOANS	377	6.91	40.50	−5.06	18.62
ΔLOANS/ASSETS	377	−0.22	29.97	−7.81	6.92
LOAN LOSS PROV.	450	19.59	65.95	7.08	35.60
IMPAIRED LOANS	315	−3.79	1.31	−4.49	−3.10
CAPITAL	533	7.99	20.59	5.33	16.88
PROFITABILITY	532	0.64	2.59	0.21	1.27
SIZE	533	7.40	1.99	5.85	8.67
LIQUIDITY	502	42.96	27.61	23.74	71.84
Spain					
ΔLOANS	1646	8.29	86.32	−1.91	17.10
ΔLOANS/ASSETS	1646	0.20	63.03	−5.01	5.04
LOAN LOSS PROV.	2028	15.45	54.81	8.63	26.87
IMPAIRED LOANS	545	−3.95	1.22	−4.76	−3.00
CAPITAL	2271	7.72	18.20	5.39	10.98
PROFITABILITY	2258	0.59	2.64	0.24	0.92
SIZE	2271	7.44	2.24	5.77	9.03
LIQUIDITY	2176	29.72	26.22	20.17	46.92

The first four variables (the dependent variables) are credit growth, growth in the loan-to-asset ratio, loan loss provisions over net interest income and impaired loans over total loans. The bank covariates are the capital-to-asset ratios, the returns on assets, the logarithm of total assets (size) and liquid assets over total assets.

Table A.3
The full correlation matrix.

	CAPITAL INFLOWS	ΔLOANS	ΔLOANS/ ASSETS	LOAN LOSS PROV.	IMPAIRED LOANS	GROWTH	PER CAPITA GDP	YIELD	CAPITAL	PROFITABILITY	SIZE	LIQUIDITY
CAPITAL INFLOWS	1.00											
ΔLOANS	0.51	1.00										
ΔLOANS/ASSETS	0.18	0.65	1.00									
LOAN LOSS PROV.	0.07	−0.49	−0.55	1.00								
IMPAIRED LOANS	0.16	0.05	0.08	0.03	1.00							
GROWTH	−0.07	0.21	0.18	−0.25	−0.33	1.00						
PER CAPITA GDP	−0.58	−0.27	−0.05	−0.25	−0.05	0.02	1.00					
YIELD	0.31	0.06	−0.17	0.26	−0.01	0.36	−0.30	1.00				
CAPITAL	0.39	0.65	0.42	−0.43	0.50	−0.08	−0.12	0.04	1.00			
PROFITABILITY	0.50	0.78	0.45	−0.52	0.07	0.17	−0.38	0.16	0.72	1.00		
SIZE	0.23	−0.00	−0.10	−0.18	−0.36	0.01	0.13	−0.03	−0.10	0.17	1.00	
LIQUIDITY	−0.49	−0.27	−0.16	−0.27	−0.25	0.14	0.35	−0.17	−0.18	−0.10	0.15	1.00

The table shows the correlations among all of our baseline variables. Capital inflows is the negative of the current account over GDP. The dependent variables are credit growth, the growth in the loan-to-asset ratio, the shares of loan loss provisions relative to net interest income and the ratios of impaired loans relative to total loans. The macro regressors include real GDP growth, per capita GDP and the growth in 10-year government bond yields. The bank regressors include the capital-to-asset ratios, the returns on assets, the logarithm of total assets (size) and lquid assets over total assets.

Table A.4
Robustness checks (1).

	Fixed effects regressions		Dropping German banks		Dropping foreign-owned banks	
	(1) ΔLOANS	(2) IMPAIRED LOANS	(3) ΔLOANS	(4) IMPAIRED LOANS	(5) ΔLOANS	(6) IMPAIRED LOANS
CAPITAL INFLOWS	1.753**	0.038***	1.046*	0.056***	1.037***	0.051***
	(3.10)	(5.15)	(1.90)	(4.99)	(2.68)	(5.53)
Bank-Level Controls	Yes	Yes	Yes	Yes	Yes	Yes
Macro Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	No	No	Yes	Yes	Yes	Yes
Obs	38,691	7526	18,943	7443	37,828	7367
R-squared	0.007	0.039	0.023	0.187	0.016	0.184

In this robustness test, we estimate our model via fixed effects regressions, we exclude German banks and we drop foreign-owned banks. The dependent variables are credit growth and the impaired loans ratio. The main regressor is capital flows (the negative of the current account over GDP). We also add bank (size, capital- to-asset ratio, liquidity ratio, return on assets) and macro (growth, the growth in 10-year government bond yields, per capita GDP) covariates that are not reported for reasons of space, in addition to time and country fixed effects. The *t*-statistics are shown in parentheses, using standard errors clustered at the country level.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.5
Robustness checks (2).

	2001–2010		2001–2007	
	(1) ΔLOANS	(2) IMPAIRED LOANS	(3) ΔLOANS	(4) IMPAIRED LOANS
CAPITAL INFLOWS	1.140***	0.052***	0.743***	0.079
	(2.85)	(4.34)	(4.51)	(1.06)
Bank-Level Controls	Yes	Yes	Yes	Yes
Macro Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Obs	35,405	7526	25,313	4992
R-squared	0.018	0.186	0.019	0.201

In this robustness check, we restrict the sample to 2001–2010 and 2001–2007, respectively. The dependent variables are credit growth and the impaired loans ratio. The main regressor are capital flows (the negative of the current account over GDP). We further add bank (size, capital, liquidity ratio, return on asset) and macro (growth, the growth in 10-year sovereign bond yields, per capita GDP) controls, which are not reported for reasons of space, as well as time and country fixed effects. The *t*-statistics are depicted in parentheses. The standard errors are clustered at the country level.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.6
Robustness checks (3)

	(1) Z-SCORE	(2) PROFITABILITY	(3) CAPITAL
CAPITAL INFLOWS	−0.011***	0.004	−0.013***
	(−3.04)	(0.41)	(−3.86)
Bank-Level Controls	Yes	Yes	Yes
Macro Controls	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Country FE	Yes	Yes	Yes
Obs	32,848	30,397	33001
R-squared	0.116	0.054	0.121

In this test, we examine the effects of capital inflows, defined as the negative of the current account balance in GDP, on the z-score, defined as the sum of bank profitability and the capital-to-asset ratio over the standard deviation of profitability. Columns (2) and (3) dis-aggregate the z-score into its components, i.e., profitability or the capital ratio, each scaled by the standard deviation of profitability. We add several macroeconomic (the real GDP growth rate, the growth in 10-year government bond yields, per capita GDP) and bank (size, capital, liquidity ratio, return on asset) covariates that are not reported for reasons of space, in addition to year and country fixed effects. The *t*-statistics are shown in parentheses using standard errors clustered at the country level.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.7
Robustness checks (4).

	(1) ΔLOANS	(2) IMPAIRED LOANS
CAPITAL INFLOWS	0.971***	0.049***
	(2.60)	(3.91)
Bank-Level Controls	Yes	Yes
Macro Controls	Yes	Yes
Year FE	Yes	Yes
Country FE	Yes	Yes
Obs	38,691	7526
R-squared	0.016	0.186

In this table, we divide the current account by the trend-value of GDP by employing the Hodrick-Prescott filter. The dependent variables are the loan growth rate and the share of impaired loans in total loans. The main regressor is the negative of the current account over trend GDP. We further include a set of bank (size, capital- to- asset ratio, liquidity ratio, return on asset) and macro controls (GDP growth, the growth in 10-year sovereign bond yields, per capita GDP) that are not reported for reasons of space.We add country and time fixed effects in order to control for (unobserved) heterogeneity over time and across countries. The *t*-statistics are depicted in parentheses and the standard errors are clustered at the country level
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Supplementary material

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.jbankfin.2020.105842.

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