Foreign Capital and Domestic Credit Allocation

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Abstract

The share of domestic bank credit allocated to non-financial business declined substantially in many advanced economies since 1990, mirrored in a rise in the share of loans to households. This may hurt growth, increase the risk of crisis, and prolong recessions after a crisis. Our paper examines the impact of capital inflows on domestic credit allocation. The study utilizes a novel data set on domestic credit allocation for 36 countries over 1990–2011 and on non-FDI capital inflows into bank and non-bank sectors. We estimate panel GMM model controlling for initial financial development, income level, inflation, interest rate, and credit market deregulation. The results suggest that capital inflows into the domestic non-bank sector cause a decline in the share of bank lending to non-financial business due to the substitution effect. This negative impact is reduced in countries with more investment opportunities.

Keywords: domestic credit allocation; capital inflows; investment opportunities

JEL Classification: F32, F36, G15, G21

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1 Introduction

A large empirical literature links capital flows to domestic credit booms, often followed by financial instability. However, the channels through which capital flows increase financial fragility merit more research. Financial fragility could be affected by the dynamics of credit growth as well as by the changes in bank credit allocation over sectors.

Specifically, in this paper we suggest that capital inflows into non-banks may crowd out domestic bank lending to non-financial business, especially if investment opportunities are limited. At the same time, capital flows tend to increase total domestic bank lending. This results in growing bank loan portfolios with increasing loan shares to households and declining loan shares to non-financial business.

Recent credit-growth literature shows that these trends in credit growth and in credit allocation are linked to lower economic growth and larger macro-financial fragility. While the traditional credit-growth literature finds positive effects of bank credit on output growth (e.g., Levine, 1997), a string of recent papers analyzes how the growth effect of bank credit is now limited or negative (Stockhammer, 2004; Rousseau and Wachtel, 2011; Arcand et al., 2012; Cecchetti and Kharroubi, 2012). A key reason is that increasingly, bank debt is funding trade in existing assets, especially household real estate assets. This undermines the growth effectiveness of credit (Bezemer et al., 2014) and is also associated with larger risk of financial crisis (Büyükkarabacak and Valev, 2010; Beck et al., 2014) and more output loss after a crisis (IMF, 2011, 2012; Jorda et al., 2014).

In this paper we research the drivers of this change. We test the hypothesis that capital inflows into non-banks decrease the share of domestic bank loans to non-banks (the non-financial loan share, for short). We collected data taken from the consolidated balance sheets of monetary financial institutions in 36 countries over 1990–2011 (with the time period dictated by data availability). We also collect data on debt and equity capital inflows distinguished by destination into bank and non-bank sectors, plus control variables.

Exploration of the data shows how the decline in banks' non-financial loan share coincided with a surge in capital inflows from around 2002–2003. In dynamic panel models,

we find that the decline in the non-financial loan share correlates to the growth in credit-to-GDP ratios, to credit market deregulation, and to capital inflows into the non-bank sectors. The intuition behind the latter finding is that foreign capital crowds out domestic bank loans to non-financial business. We build on the literature to hypothesize that crowding out is stronger if both domestic and foreign loans are competing for limited investment opportunities. We include the level and the growth rate of the investment share as a proxy for investment opportunities. Capital inflows have a smaller detrimental effect on the non-financial loan share in countries with more investment opportunities.

Since we use inflows not net flows, we also include current account positions in the sensitivity analysis. Another extension is to add the interaction of capital inflows with EMU membership (15 of 36 countries in our sample are EMU members). While the key findings remain robust throughout these robustness checks, we find additionally that both capital account surplus and EMU membership counteract the negative effect of non-bank capital inflows on the non-financial loan share.

In summary, our analysis suggests that there may be costs of financial integration and larger capital flows in terms of the productive allocation of domestic bank credit. The potential dangers of cross-border loans and capital flows into the banking sector are well recognized. We point to a different channel. As Eichengreen (2010) notes, foreign capital flowing into the non-bank sector may be equally if not more important for sustainability of capital flows. We suggest that capital inflows into the non-bank sector may have an unintended side effect on the allocation of domestic bank credit. This is a potentially alarming trend: the literature shows that if bank balance sheets are increasingly dominated by household credit, this creates macro vulnerabilities and adverse growth effects.

The paper proceeds as follows. In Section 2 we discuss the channels from capital inflows to domestic credit allocation. In Section 3 we introduce and explore the data, while Section 4 describes the methodology. In Section 5 we present and discuss the estimation results. Section 6 discusses the robustness checks and Section 7 concludes.

2 Capital Flows and Domestic Credit Allocation: Channels of Transmission

The allocation of bank credit in advanced economies has changed rapidly in recent decades. The share in all loans of bank loans to non-financial business declined in most countries, with the household credit share (mainly household mortgages) rising significantly. For instance, Bezemer et al. (2014) show the increase in household mortgage credit as a share of GDP for a balanced panel of 14 countries from just above 20% in 1990 to 50% in 2012. Jorda et al. (2014) also document the strong increase in real estate lending.

This raises concerns about the effects of changing bank credit allocation on growth and stability, as a small but expanding literature shows. Jappelli and Pagano (1994) showed theoretically that more household credit causes lower private savings and slower economic growth. This is empirically confirmed by Beck et al. (2012) and Bezemer et al. (2014). Büyükkarabacak and Krause (2009) find that more household credit also causes higher external imbalances. Additionally, Barba and Pivetti (2009), Büyükkarabacak and Valev (2010), Sutherland et al. (2012), and Jappelli et al. (2013) report that expansion of household credit increases the probability of crisis and recession. High household mortgage leverage also leads to stronger contractions after a crisis (Jorda et al., 2014; Mian and Sufi, 2014). These findings beg the question what the drivers are of this shift in bank loan allocation. Among the potential determinants are growth of incomes, regulatory changes in the credit market, the stance of monetary policy, inflation, and financial openness leading to capital flows and cross-border bank lending. In this paper we focus on capital flows while controlling for other factors.

Capital flows may be part of the catching-up process of less productive economies through the formation and upgrading of productive capacity. They may support growth and external sustainability, provided capital flows finance productive investment in tradable goods, such that repayment is assured by a future export surplus (Lucas, 1990; Blanchard and Giavazzi, 2002; Eichengreen, 2010). In this scenario, capital flows should lead

to rising investment by non-financial firms in the tradables sector. Many deficit countries, however, lag behind in productivity growth. They experienced booms in real estate and consumption, rather than in non-financial business investment (Obstfeld, 2012). Lane (2013) discusses how the nontradables sector rather than the tradables sector tends to expand during a high-deficit phase. This raises questions about the "distinction between productive and unproductive purposes of foreign borrowing" and investment, as Giavazzi and Spaventa (2010, p.7) note.

The literature (e.g., Rodrik and Subramanian, 2009; Boissay et al., 2013) indicates that capital flows may lead to such 'unproductive' investment — that is, more real estate and consumption finance, rather than loans and investments flowing to the tradables sector — if economies are investment-constrained rather than savings-constrained. Foreign inflows may directly finance consumption booms, but they are also funded with domestic finance. Foreign inflows may crowd out domestic bank lending to non-financial business, followed by an expansion of domestic bank lending to consumption and real estate. This is part of the explanation of the disappointing growth effects of international capital flows, extensively discussed in the literature (see Rodrik and Subramanian (2009) for an overview). But here we focus on another effect of capital inflows: financial fragility in the domestic banking sector, by biasing bank loans portfolios towards household mortgage and consumption credit.

We therefore hypothesize that there is a substitution effect between domestic bank loans to non-financial firms and foreign capital inflows to non-financial firms. This appears especially pertinent when foreign capital costs are lower than costs of domestic bank lending, and in economies with limited investment opportunities, where domestic and foreign loans compete for investments.[1] In the empirical analysis, we will address both these moderating effects by including measures for investment opportunities and domestic interest rates.

[1] In economies with ample investment opportunities, substitution may still occur. But synergies between domestic and foreign finance are then more likely, so that both can expand. As a result, the allocation of domestic bank credit need not change.

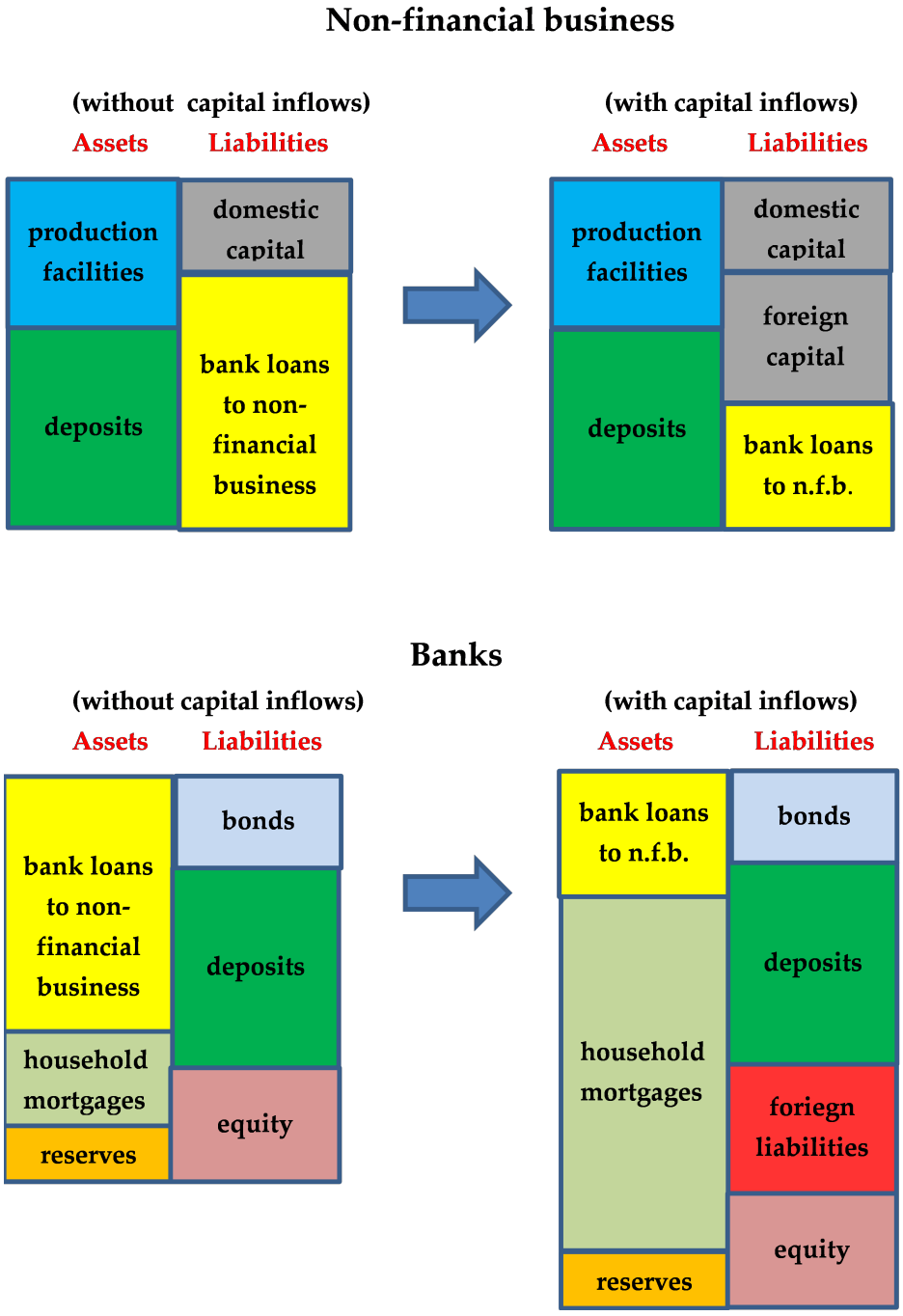
The substitution effect does not imply that total bank lending falls as well. On the contrary, financial openness tends to cause domestic credit booms, as a large literature discusses.[2] It allows domestic banks to fund domestic lending in international markets, rather than from domestic deposits only. This loosens their financing constraint. Simultaneously, due to the substitution effect, domestic banks experience falling demand for loans in non-financial business. Since they expand lending to consumer finance and household mortgages, the non-financial loan share will fall. With limited investment opportunities, it is expected to fall even more.

We illustrate this scenario with the balance sheets in Figure 1. Non-financial firms increase their liabilities to foreign investors and lenders and decrease domestic bank loans. To keep things simple, we assume no changes to their capital investment and bank deposits. Banks reduce their lending to non-financial firms and attract foreign liabilities. They maintain their loan books by expanding mortgage lending to households. Again, we simplify by assuming no changes in their domestic bonds, reserves or equity (although each of these are likely to be affected). We also assume there are no demand side constraints to household debt expansion.

Note that household debt expansion does NOT hinge on expansion of foreign liabilities in banks. Due to the substitution effect, it would also obtain with capital inflows only into non-banks. This is the key point we wish to illustrate. Conversely, with foreign capital flowing only into banks and all else equal, there are no pressures for change of the allocation of bank loans over different sectors of the economy. Domestic bank lending would expand in both the non-financial business sector and in consumer finance and household mortgages. It would follow that the factor driving the decline of the non-financial loan share is the expansion of foreign capital into the non-financial business, substituting domestic bank loans. This motivates our distinction of capital inflows by

[2]Lane and McQuade (2014) examine 54 countries over 1994–2008 and find that net debt inflows increase domestic credit growth. This is particularly evident during the boom period 2003–2008. Mendoza and Terrones (2008), Ostry et al. (2011) and Calderón and Kubota (2012) report that a capital inflow surge causes domestic credit booms. In line with this, 2011 IMF World Economic Outlook surveys 47 economies over 1960–2011 and finds that financial inflows systematically precede credit booms. See also Furceri et al. (2012); Magud et al. (2012)

Figure 1: **Balance sheets of non-financial firms and banks with(out) capital inflows**



destination sector. In the empirical analysis, we examine the relations between bank loan allocation and capital inflows into banks and non-banks.

3 Data

3.1 Description of the dataset

Our dataset covers 36 advanced countries over the period 1990–2011, with the time period dictated by data availability. The country sample includes 25 (eventual) EU member countries — of which 15 EMU member-states — plus 11 other OECD economies (see Table 1 for a list of countries).[3]

Our dependent variable is 'productive bank credit allocation'. This is based on data newly collected from national central bank statistics on the consolidated balance sheets of Monetary Financial Institutions. Four types of domestic bank credit are distinguished, namely: credit to non-financial business, credit to financial business (insurance companies, pension funds, and other non-bank financial institutions), household consumer credit, and mortgages to households. We define domestic 'productive credit allocation' as the percentage share of credit to non-financial business in total bank credit.

Data on capital inflows was collected from the IMF Balance of Payments (BoP) Statistics database. Bank and non-bank inflows are constructed as the sum of portfolio equity, portfolio debt, and other investment (loans) into banking and non-banking sectors. Following the IMF methodology, bank inflows are defined as capital inflows into deposit-taking corporations except the central bank. Non-bank inflows are capital inflows into other private sectors, namely other financial corporations, non-financial corporations, households, and non-profit institutions serving households.[4] Due to the lack of data for FDI by sectors of the economy, we were not able to separate FDI inflows into bank and

[3]New Zealand was dropped from the OECD group as there was no data available on bank and non-bank inflows. Similar to other studies (e.g., Lane and McQuade, 2014), we exclude Luxembourg due to its extremely large annual capital inflows (up to 900% of GDP). Ireland and Iceland are also outliers with respect to very large bank and non-bank inflows during 2002–2007. For this reason, they are also excluded.

[4]For details on classification and definition of institutional sectors, see IMF (2009), Balance of Payments and International Investment Position Manual.

Table 1: **List of countries included in the sample**

EU countries					
Country	EMU	Country	EMU	Country	EMU
Austria	1999	Germany	1999	Poland	–
Belgium	1999	Greece	2001	Portugal	1999
Bulgaria	–	Hungary	–	Romania	–
Cyprus	2008	Italy	1999	Slovakia	2009
Czech Rep.	–	Lithuania	–	Slovenia	2007
Denmark	–	Latvia	–	Spain	1999
Estonia	2011	Malta	2008	Sweden	–
Finland	1999	Netherlands	1999	UK	–
France	1999				

Non-EU countries					
Australia	Canada	Chile	Israel	Japan	S. Korea
Norway	Turkey	Mexico	Switzerland	USA	

non-bank investment. Therefore, we use total FDI inflows into all sectors. All capital inflows are measured as a percentage of nominal GDP.

Due to the high volatility of annual capital inflow data, we constructed 3-year non-overlapping periods of underlying annual data.

As controls we include the initial income level (log of real GDP per capita in constant 2005 USD, at the beginning of each 3-year period), CPI inflation rate, and the overnight money market interest rate. The latter serves as an indicator of domestic money market conditions and risk perception. This data is compiled from Thomson Reuters Datastream and central bank statistics.

A final control variable is the credit market deregulation index from the Fraser Institute's Economic Freedom Indicators. The index consists of three components: ownership of banks (percentage of deposits held in privately owned banks), extension of credit (share of private sector credit in total bank credit), and presence of interest rate controls/negative interest rates. Each component is scaled from 1 to 10; the credit deregulation index is an average of the components. Higher values of the deregulation index indicate less regulation of credit markets. More deregulated credit markets are likely to experience more

rapid credit growth (Giannone et al., 2011; Lane and McQuade, 2014), which typically implies less credit for non-financial investments. Thus, the index is expected to correlate negatively with the share of bank credit to non-financial business.

In a robustness analysis, we test whether a current account status and EMU membership have an impact on the relation between capital inflows and domestic credit allocation. We create a current account position dummy, which takes the value 1 if a country has a current account surplus in a given period, and 0 if it has a deficit, based on the current account balance data from the IMF BoP statistics. EMU membership dummy takes the value 1 if a country is an EMU member in at least one year during a particular 3-year period, and 0 otherwise.

Additionally, we examine whether having more (or less) investment opportunities in a country affects the relationship between capital inflows and non-financial credit share. We use two proxies to measure investment opportunities — the percentage share of investment (gross fixed capital formation) in nominal GDP and the growth rate of this share at the beginning of each 3-year period.

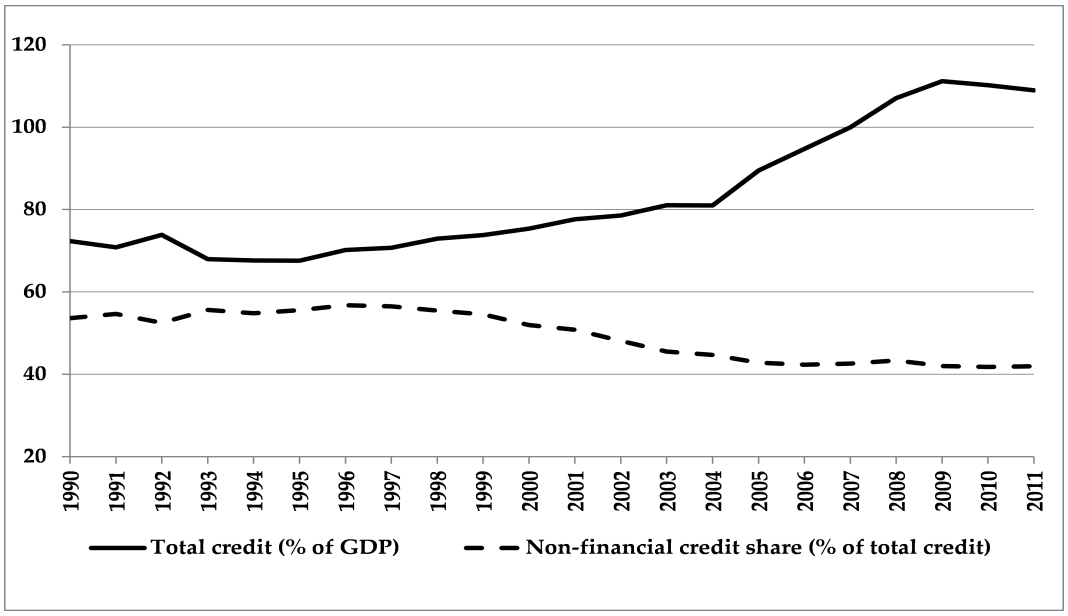
Descriptive statistics for all variables are reported in Table A.1. Tables A.2–A.3 show correlations of non-financial credit share with all explanatory variables. The share of credit to non-financial business is significantly and negatively correlated with all categories of capital inflows (except FDI), lagged one period. Remarkably, the highest correlation (in absolute value) is between domestic credit allocation and non-bank inflows.

3.2 Data trends

Several trends can be observed in bank credit and capital inflows during the period 1990–2011. First, the ratio of total bank credit to GDP in the full, unbalanced sample increased rapidly, from 72% of GDP in 1990 to about 109% in 2011 (see Figure 2). Moreover, domestic credit allocation changed. The share of loans to non-financial business declined over 1990–2011 from 54% to 42% of total bank credit, as banks were reallocating more lending to other sectors. Especially noteworthy is the increase in household mortgages

from 28% of total credit in 1990 to 38% in 2011, while loan shares for household consumption and for financial firms oscillated during the analyzed period around 13–15% and 7–9%, respectively. After 2008 the non-financial credit share continued declining, but the growth of the total credit-to-GDP ratio reversed due to the global credit crunch.

Figure 2: **Total credit and non-financial credit share**

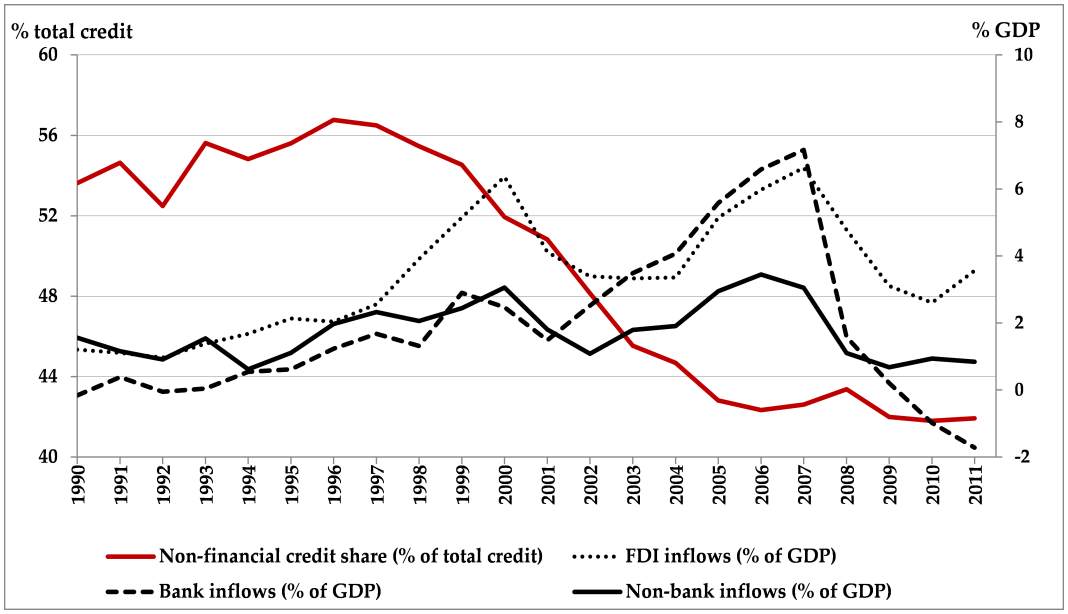


Source: Authors' calculations based on central banks statistics.

Figure 3 shows the evolution of domestic credit allocation and different types of capital inflows over time. Advanced countries experienced a large decline in the non-financial credit share in the same years in which they absorbed large capital inflows. From 1990 to 2007, total capital inflows increased by 14% of GDP, of which 7 percentage points (p.p.) due to the growth of bank inflows, 2 p.p. due to non-bank inflows, and 5 p.p. due to FDI. Meanwhile, the non-financial credit share decreased by 11 p.p. of total bank credit. The financial crisis in 2008–2010 led to a substantial drop in capital inflows. On average from 2007 to 2011, total capital inflows decreased by 14% of GDP, mostly due to decline in bank inflows (dropped by 8% of GDP). Debt inflows into banking sector were volatile and experienced the largest reversals during the crisis;[5] FDI inflows were more stable.

[5]Capital inflow reversal implies that inflows turn negative. It occurs when foreign capital that flew in a country is retrenched back to its foreign owners due to deleveraging. Strictly speaking, this is not equivalent to a typical capital outflow, defined in terms of domestic capital flowing out of a country.

Figure 3: **Non-financial credit share and capital inflows**



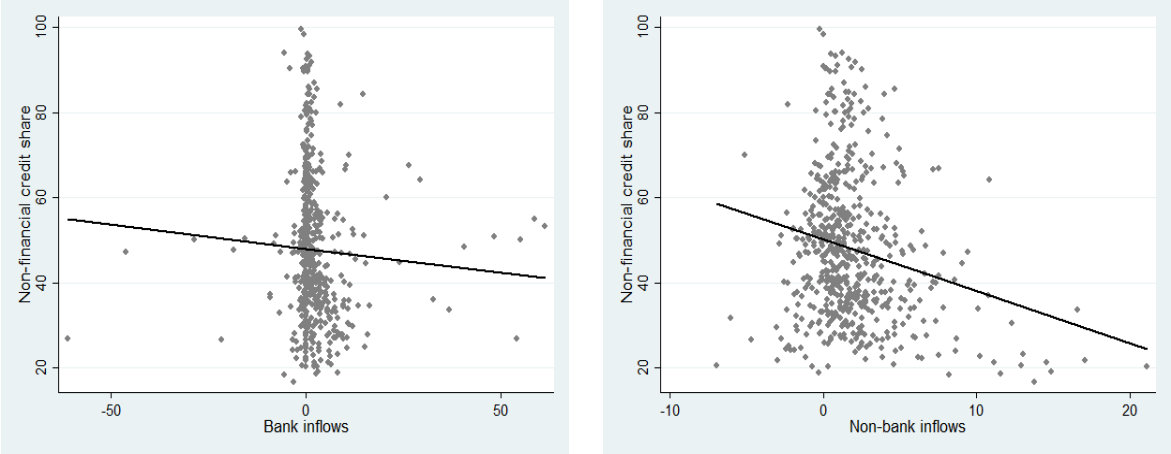
Source: Authors' calculations based on IMF BoP and central banks statistics.

In Appendix (Figure A.1) we discuss the structure and periodization of capital inflows.

To learn more about the relation between bank/non-bank inflows and credit allocation, we present bivariate scatter plots in Figure 4. The graphs show that the share of bank loans to non-financial business in all bank loans is smaller with higher levels of capital inflows. This negative correlation is more prominent in case of non-bank inflows. This gives support to our hypothesis that capital inflows into non-banking sector tend to substitute domestic bank lending to non-financial firms, while bank inflows do not necessarily affect banks' lending portfolio.

In scatter plots, some observations were negative referring to capital inflow reversals during the crisis years 2008–2011. One need to be careful when dealing with negative capital inflows: if extreme negative observations on capital inflows coincide with higher non-financial credit shares in the same country-years, the effect of inflows on credit allocation could be overestimated, driven by these extreme cases. In the 3-year periods averaged data, negative values constitute 23% of the sample for bank inflows and 12% for non-bank inflows. This is not alarmingly large; we will exclude negative inflows in the robustness analysis to test their impact on results.

Figure 4: **Non-financial credit share, bank and non-bank inflows: scatter plots**



Source: Authors' calculations based on IMF BoP and central banks statistics.

Table 2 shows average bank and non-bank inflows for 1990–2011 and for sub-periods, as well as reports trends in bank credit for five years (i.e., sample start, EMU-stage III start, capital flow boom start and end, and sample end). Average total credit-to-GDP ratio has increased dramatically between 2002 and 2007 by 21% of GDP, while the share of bank credit to non-financial business in the same period has dropped by 5 percentage points. Thus, domestic credit expansion coincides with changes in bank loan allocation, with a decreasing share of lending for productive investments of non-financial firms.

Table 2: **Credit, bank and non-bank inflows**

	Bank inflows (% GDP)	Non-bank inflows (% GDP)
1990–2011	1.86	1.74
1990–1998	0.63	1.47
1999–2001	2.29	2.44
2002–2007	4.90	2.37
2008-2011	-0.23	0.89
	Total credit (% of GDP)	Non-financial credit (% of total credit)
1990–2011	82.87	49.46
1990	72.36	53.63
1999	73.83	54.54
2002	78.56	48.14
2007	100.01	42.60
2011	108.95	41.93

Over 1990–2011, advanced economies attracted bank inflows equal to 1.9% of GDP per year, slightly more than non-bank inflows (1.7%). During the 2002–2007 capital flow boom years, that difference widened to 4.9% compared to 2.4% of GDP as inflows into banks expanded faster than into non-banks. However, in the crisis years 2008–2011 bank inflows also experienced a larger drop and turned negative while non-banks inflows nearly escaped the reversals.

4 Methodology

The aim of the analysis is to examine the impact of capital inflows on the non-financial credit share, while taking into account sectoral distinction of inflows and including control variables. We use averages of the underlying annual data in 3-year non-overlapping periods, due to high volatility of capital inflows and in order to examine effects in the medium-run. We estimate system-GMM models, accounting for potential endogeneity of the regressors.

The baseline model specification is the following:

$$NFC_{it} = \alpha + \beta_1 CRD^0_{it} + \kappa INF_{i,t-1} + \gamma X_{it} + \mu_i + \omega_t + \varepsilon_{it}, \quad i = 1,\ldots,N;\ t = 1,\ldots,T, \quad (1)$$

where NFC_{it} is the average share of credit to non-financial business in all bank credit to the private sector of country i in period t. To control for initial financial development, we include the total credit-to-GDP ratio at the beginning of period t, CRD^0_{it}.

$INF_{i,t-1}$ is a matrix of explanatory variables related to capital inflows. Depending on the specification of inflows, this matrix will consist of one, two, or three variables. Our specifications include: (i) total capital inflows as the sum of FDI, bank and non-bank inflows; (ii) bank and non-bank inflows separately; and (iii) bank, non-bank, and FDI inflows separately. κ is a vector of estimated parameters for capital inflows. All categories of capital inflows are included in the model with a lag of one period.

X_{it} is a matrix of control variables, as described the Section 3.1. μ_i are unobserved country-specific fixed effects. We also include time dummies ω_t to control for time fixed effects. Finally, ε_{it} is an independently and identically distributed white noise error term with mean 0 and variance σ_ε^2.

The model in equation (1) may suffer from potential endogeneity, for instance, due to the inclusion of the initial level of total credit-to-GDP as a regressor.[6] To deal with it, we employ a panel system-GMM model.[7] System GMM combines the regression equation (1) in levels with the equation in first differences. The endogenous variable CRD_{it}^0 is then instrumented by its lags in the first-difference equation.[8]

GMM estimation produces consistent and unbiased estimates, provided that the error term in the baseline equation (1) is not serially correlated and that the instruments, used to deal with endogenous regressors, are valid. In our empirical analysis, we conduct Hansen tests of over-identifying restrictions to check for the joint validity of instruments and tests for the second-order autocorrelation of the residuals. Obviously, the system GMM estimator does not solve the endogeneity concerns completely, but given the data, it is the best available method of reducing the endogeneity bias in our model. One source of variation in GMM estimation results is the choice of lags for instrumenting the endogenous regressor. In our case, the results are not sensitive to the number of lags.

5 Empirical results

We conduct estimations in two periods: 1990–2010 and 1990–2007. We use the period till 2007 in an attempt to isolate the effect of the 2008–2010 crisis years, which cannot be estimated as a separate period due to its short duration.

[6] High credit-to-GDP ratios tend to go together with a low share of credit to non-financial business.

[7] See Arellano and Bond (1991), Arellano and Bover (1995), and Blundell and Bond (1998) for a description of system GMM estimators.

[8] Our estimation procedure for system GMM in STATA follows Roodman (2009). We use the `xtabond2` command; CRD_{it}^0 is included as a predetermined variable in `gmmstyle` and instrumented by its lags. To increase efficiency, we restrict the number of lags to 2 and `collapse` instrument sets. The remaining explanatory variables are included in `ivstyle` as strictly exogenous regressors. We apply the two-step efficient GMM with small-sample corrections to the covariance matrix estimate.

As a first step of our empirical analysis, we estimate equation (1) using total capital inflows as the sum of FDI, bank and non-bank inflows. The regression results are reported in Table 3, columns (1)-(2). We find that total capital inflows decrease credit allocation towards non-financial business; however, this impact is insignificant. This result suggests that lumping all capital inflows together leads to apparently insignificant overall effects even if separately different categories of inflows have a noticeable impact.

Next, we examine the effects of capital inflows distinguished by sectoral destination. We estimate the model including separately bank and non-bank inflows (see columns (3)-(4) in Table 3). The findings show that the effect of total inflows, reported in the first analysis, can be decomposed into an insignificant positive effect of bank inflows and a strong negative effect of non-bank inflows. In line with our hypothesis, capital inflows into the non-banking sector significantly reduce the non-financial credit share in all periods. This impact is larger in magnitude in the pre-crisis period 1990–2007. Thus, an increase of non-bank inflows by 1% of GDP leads to the decline of loan share to non-financial business on average annually by 1.1-1.2 percentage point of total bank credit. This is probably due to the substitution effect as foreign capital is crowding out domestic bank lending in competition for funding productive investments of non-financial firms.

Remarkably, inflows into the banking sector have no bearing on domestic credit allocation. That is, more foreign capital flowing into banks does not lead to changes in the banks' portfolio mix between lending to non-financial business and to other sectors.

In a third analysis, we include FDI inflows together with bank and non-bank inflows. FDI is an important part of capital flows as it has a direct impact on productive investment. Hence, it could also play a role in changing domestic credit allocation. Regression results are shown in columns (5)-(6) in Table 3. The findings suggest that FDI inflows do not have a significant impact on the non-financial credit share in both analyzed periods, while the effects of bank and non-bank inflows are similar to the estimations without FDI. Given this result, it is likely that FDI inflows simply serve a different funding purpose than bank credit or non-FDI foreign capital due to their long lasting presence and a much broader

Table 3: **Credit allocation and capital inflows, main estimation results**

	(1)	(2)	(3)	(4)	(5)	(6)
	1990–2010	1990–2007	1990–2010	1990–2007	1990–2010	1990–2007
Total credit$_0$	−0.137 **	−0.205 **	−0.107 **	−0.175 *	−0.107 **	−0.174 *
	(0.052)	(0.102)	(0.052)	(0.099)	(0.053)	(0.099)
Total inflows	0.012	−0.101				
	(0.111)	(0.208)				
FDI inflows					0.157	−0.060
					(0.203)	(0.273)
Bank inflows			0.116	0.182	0.093	0.182
			(0.107)	(0.263)	(0.099)	(0.253)
Non-bank inflows			−1.089 **	−1.226 ***	−1.130 **	−1.214 ***
			(0.448)	(0.399)	(0.455)	(0.414)
GDP per capita$_0$	−4.462	−1.580	−5.374 *	−2.636	−5.028	−2.749
	(2.990)	(3.995)	(3.079)	(4.031)	(3.046)	(4.131)
Inflation	0.010	0.032	−0.003	0.020	−0.003	0.020
	(0.024)	(0.031)	(0.023)	(0.029)	(0.023)	(0.028)
Overnight	0.051	−0.001	0.073	0.023	0.078	0.023
interest rate	(0.080)	(0.094)	(0.071)	(0.083)	(0.070)	(0.080)
Credit market	−4.643 ***	−5.858 ***	−4.470 ***	−5.659 ***	−4.602 ***	−5.607 ***
deregulation	(1.152)	(1.352)	(1.193)	(1.294)	(1.148)	(1.334)
Observations	148	113	148	113	148	113
Countries	35	33	35	33	35	33
Hansen test p-value	0.37	0.35	0.25	0.24	0.25	0.24
AR(2) test p-value	0.53	0.92	0.48	0.90	0.50	0.87

Notes: The table reports coefficient estimates with robust standard errors in parentheses. ***p<0.01, **p<0.05, *p<0.1. Constant term, time dummies, and country-fixed effects are included in the estimations but not reported. AR(2) is the Arellano-Bond test for second-order serial correlation of residuals. The Hansen test reports the Hansen over-identification statistic.

scope of activities.

Finally, we briefly discuss the results for control variables. The initial total-credit-to-GDP ratio significantly reduces the non-financial credit share. Thus, in this sample domestic bank credit expansion leads to credit disallocation away from non-financial business and towards household consumption and mortgages. Initial income level, inflation, and overnight interest rate are insignificant in all estimations. An interesting and robust result is that credit market deregulation has a strong negative effect on domestic credit allocation. This suggests that deregulated credit markets are not always favorable as they are more likely to experience credit booms and undesirable shifts in bank lending from non-financial business and towards real estate and consumption.

6 Robustness analysis

As a sensitivity analysis, we control for a number of factors that could potentially influence the relation between capital inflows and credit allocation.

First, we test whether current account (CA) position matters. Surplus countries with strong export sectors are less likely to be investment-constrained in the sense of Rodrik and Subramanian (2009) and more likely to utilize capital inflows productively by channeling them into credit for non-financial business; here, foreign capital and bank loans do not have to substitute each other in financing investments. Meanwhile, deficit countries are more likely to be investment-constrained and to use capital inflows unproductively; with limited investment opportunities, substitution effect would be more evident. Thus, capital inflows into deficit economies are expected to reduce the share of credit allocated to non-financial business.

We include CA dummy and its interaction term with bank and non-bank inflows. The estimation results are reported in Table 4, columns (1)-(2). We find that in surplus economies bank inflows have a negative effect on domestic credit allocation. Non-bank inflows robustly reduce the share of credit to non-financial business; this negative effect however is substantially counteracted in surplus countries compared to deficit ones. Apparently, surplus economies have more investment opportunities; this weakens the substitution effect between foreign capital and domestic credit as both sources of funding for non-financial firms can be used to realize those plentiful investments. The results for control variables are comparable to the main ones.

Second, membership in the EMU could influence how capital inflows change domestic credit allocation. More financial integration led to larger capital flows within the euro area (Spiegel, 2009; Lane, 2013). As a result, non-banks can borrow more easily abroad within EMU and banks have easier access to international interbank markets (Obstfeld, 2012). Cross-border access to finance is further enhanced by the absence of exchange rate risk and (in the case of EMU) borrowing at low costs of the strongest creditor economies. Unless domestic business investment opportunities have also increased, this larger loan

Table 4: **Sensitivity analysis**

	(1)	(2)	(3)	(4)	(5)	(6)
	1990–2010	1990–2007	1990–2010	1990–2007	1990–2010	1990–2007
Total credit$_0$	−0.078 *	−0.165 **	−0.130 ***	−0.238 **	−0.154 **	−0.195 *
	(0.043)	(0.073)	(0.039)	(0.116)	(0.067)	(0.107)
Bank inflows	0.169	0.535 **	0.021	0.273	−0.914	0.648
	(0.112)	(0.243)	(0.126)	(0.259)	(0.728)	(2.357)
Non-bank inflows	−1.467 ***	−1.618 ***	−1.375 ***	−1.573 ***	−4.339 ***	−1.985
	(0.334)	(0.231)	(0.448)	(0.317)	(1.195)	(3.067)
CA position	1.305	2.516				
	(2.719)	(3.065)				
CA×Bank inflows	−0.349 **	−0.651 **				
	(0.152)	(0.298)				
CA×Non-bank inflows	1.346 ***	1.186 ***				
	(0.444)	(0.322)				
EMU membership			2.663	−0.249		
			(2.444)	(3.274)		
EMU×Bank inflows			0.049	1.358 **		
			(0.170)	(0.640)		
EMU×Non-bank inflows			0.969 **	0.968 **		
			(0.465)	(0.421)		
Investment/GDP$_0$					−0.235	0.151
					(0.511)	0.606)
Investment/GDP$_0$					0.053	−0.020
×Bank inflows					(0.039)	(0.100)
Investment/GDP$_0$					0.162 **	0.044
×Non-bank inflows					(0.062)	(0.163)
GDP per capita$_0$	−7.584 **	−4.321	−5.182 *	−1.185	−2.149	−1.480
	(3.123)	(3.209)	(2.931)	(4.911)	(4.055)	(4.383)
Inflation	−0.021	0.004	−0.006	0.031	0.002	0.024
	(0.024)	(0.018)	(0.022)	(0.032)	(0.026)	(0.033)
Overnight interest rate	0.105 **	0.042	0.095	0.012	0.083	0.022
	(0.051)	(0.054)	(0.068)	(0.074)	(0.080)	(0.092)
Credit market	−4.520 ***	−5.476 ***	−4.720 ***	−5.680 ***	−5.117 ***	−5.856 ***
deregulation	(1.207)	(1.126)	(1.272)	(1.219)	(1.323)	(1.371)
Observations	148	113	148	113	148	113
Countries	35	33	35	33	35	33
Hansen test p-value	0.86	0.87	0.51	0.76	0.11	0.20
AR(2) test p-value	0.55	0.89	0.62	0.71	0.92	0.97

Notes: The table reports coefficient estimates with robust standard errors in parentheses. ***p<0.01, **p<0.05, *p<0.1. Constant term, time dummies, and country-fixed effects are included in the estimations but not reported. AR(2) is the Arellano-Bond test for second-order serial correlation of residuals. The Hansen test reports the Hansen over-identification statistic.

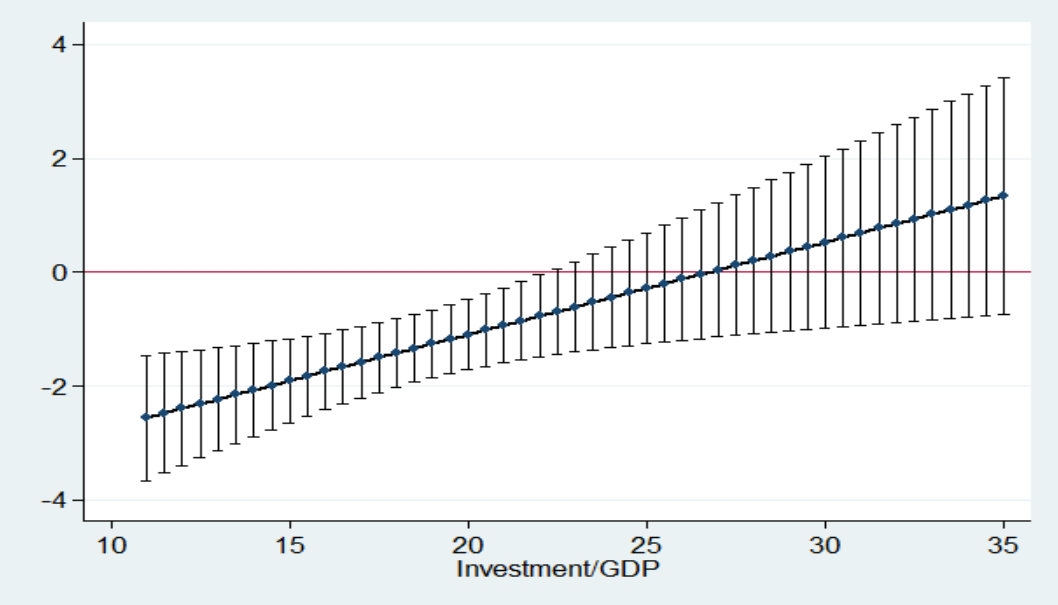
supply is likely to translate into loans other than to non-financial business.

Table 4, columns (3)-(4) present estimation results including EMU dummy and its interaction terms with capital inflows. The outcomes are consistent with the main results. Bank inflows matter for credit allocation only in EMU economies during 1990–2007 period. Non-bank inflows strongly decrease the non-financial credit share, but EMU membership significantly moderates this negative effect. That is, foreign capital is crowding out domestic bank lending to non-financial firms much less in euro area countries, probably due to the larger supply of productive investment opportunities and synergies.

Third, we directly control for the presence of good investment opportunities. According to our hypothesis, in economies with limited investment opportunities the substitution effect between foreign and domestic sources of funding for non-financial business could be stronger. We proxy investment opportunities with total investment to GDP ratio at the beginning of each 3-year period. Alternatively, we used such measures as investment-to-GDP and TFP growth rates; those measures performed relatively worse in the models (results available upon request). Therefore, we report the estimation results for Investment/GDP ratio only (see Table 4, columns (5)-(6)).

The findings show that capital inflows into non-banking sector have a smaller detrimental effect on the non-financial credit share in countries with more investment opportunities. Figure 5 illustrates the total marginal effect of non-bank inflows on credit allocation conditional on different levels of investment, based on the regression results for the period 1990–2010. The marginal effect is significant for low levels of Investment below 22.5% of GDP, that counts for around 60% of all observations in our sample. Thus, for low levels of investment in a country, the presence of more investment opportunities reduces the negative impact of non-bank inflows on credit allocation. That is, bank loans and foreign capital could be channeled into non-financial firms without much of substitution as competition for productive investments is less stringent. For the pre-crisis period, the effect of non-bank inflows conditional on investment opportunities is weaker and less evident, but holds significant for half of a sample.

Figure 5: **The effect of non-bank inflows on non-financial credit share conditional on investment opportunities**



Notes: The solid line shows the total marginal effect of non-bank inflows on non-financial credit share at different levels of investment opportunities; vertical boundaries indicate 95% confidence interval. The marginal effect is significant when the solid line and confidence intervals are above (below) zero.

Finally, we re-estimated our model while excluding negative values for capital inflows, as was discussed in Section 3.2. The results are comparable to the main ones but effects of non-bank inflows become slightly larger in absolute value (results available upon request).

7 Conclusion

This paper investigates whether capital inflows affects the shift away from bank lending to non-financial business. We construct a novel measure for 'domestic bank credit allocation', defined as the share of credit to non-financial business. This measure is based on newly collected data from consolidated balance sheets of domestic banks in 36 countries over 1990–2011. We observe large declines in this share in the 1990s and during the pre-crisis credit boom period in 2002–2007. We distinguish capital inflows according to their sectoral destination, i.e. bank and non-bank inflows.

We explore the data and estimate system GMM regressions. In line with our hypoth-

esis, we find that a decline in the non-financial loan share is significantly larger in those economies which experience more capital inflows into their non-bank sectors, while bank inflows do not influence credit allocation. This provides an evidence for the existence of a substitution effect between foreign capital and domestic bank loans which compete for investments in non-financial firms. Moreover, the negative impact of non-bank inflows is largely reduced in countries with more productive investment opportunities. We also find that current account surplus and EMU membership offset the negative effect of non-bank inflows on non-financial business loan share.

One policy implication of this study is that financial integration and capital mobility may have a detrimental effect on productive allocation of bank credit through the increase of inflows into the non-banking sector which crowd out domestic loans to non-financial business sector. Such shifts in credit allocation lead to real estate booms, financial fragility, and lower economic growth. However, creating more investment opportunities could considerably mitigate the adverse effects of capital inflows.

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References

Arcand, J.-L., E. Berkes, and U. Panizza (2012). Too much finance? IMF Working Paper 161, International Monetary Fund.

Arellano, M. and S. Bond (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *Review of Economic Studies 58*(2), 277–297.

Arellano, M. and O. Bover (1995). Another look at the instrumental variable estimation of error-component models. *Journal of Econometrics 68*(1), 29–52.

Barba, A. and M. Pivetti (2009). Rising household debt: Its causes and macroeconomic implicationsa long-period analysis. *Cambridge Journal of Economics 33*(1), 113–137.

Beck, T., B. Büyükkarabacak, F. K. Rioja, and N. Valev (2012). Who gets the credit? And does it matter? Household vs. firm lending across countries. *The B.E. Journal of Macroeconomics 12*(1), 1–46.

Beck, T., H. Degryse, and C. Kneer (2014). Is more finance better? Disentangling intermediation and size effects of financial systems. *Journal of Financial Stability 10*, 50–64.

Bezemer, D., M. Grydaki, and L. Zhang (2014). Is financial development bad for growth? Research Report 14016-GEM, University of Groningen, Research Institute SOM.

Blanchard, O. and F. Giavazzi (2002). Current account deficits in the Euro area: The end of the Feldstein-Horioka puzzle? *Brookings Papers on Economic Activity 33*(2), 147–186.

Blundell, R. and S. Bond (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics 87*(1), 115–143.

Boissay, F., F. Collard, and F. Smets (2013). Booms and systemic banking crises. ECB Working Paper 1514, European Central Bank.

Büyükkarabacak, B. and S. Krause (2009). Studying the effects of household and firm credit on the trade balance: The composition of funds matters. *Economic Inquiry 47*(4), 653–666.

Büyükkarabacak, B. and N. T. Valev (2010). The role of household and business credit in banking crises. *Journal of Banking and Finance 34*(6), 1247–1256.

Calderón, C. and M. Kubota (2012). Gross inflows gone wild: Gross capital inflows, credit booms and crises. Policy Research Working Paper 6270, World Bank.

Cecchetti, S. and E. Kharroubi (2012). Reassessing the impact of finance on growth. BIS Working Papers 381, Bank for International Settlements.

Eichengreen, B. (2010). Imbalances in the Euro Area. Mimeo, UC Berkeley.

Furceri, D., S. Guichard, and E. Rusticelli (2012). The effect of episodes of large capital inflows on domestic credit. *The North American Journal of Economics and Finance 23*(3), 325–344.

Giannone, D., M. Lenza, and L. Reichlin (2011). Market freedom and the Global Recession. *IMF Economic Review 59*(1), 111–135.

Giavazzi, F. and L. Spaventa (2010). Why the current account may matter in a monetary union: Lessons from the financial crisis in the Euro area. CEPR Discussion Papers 8008, Center for Economic Policy Research.

IMF (2009). *Balance of Payments and International Investment Position Manual* (6th ed.). International Monetary Fund.

IMF (2011). *World Economic Outlook*, Chapter 1. Global Prospects and Policies, pp. 1–66. International Monetary Fund.

IMF (2012). *World Economic Outlook*, Chapter 3. Dealing with Household Debt, pp. 89–124. International Monetary Fund.

Jappelli, T. and M. Pagano (1994). Saving, growth, and liquidity constraints. *The Quarterly Journal of Economics 109*(1), 83–109.

Jappelli, T., M. Pagano, and M. di Maggio (2013). Households‘ indebtedness and financial fragility. *Journal of Financial Management, Markets and Institutions 1*(1), 26–35.

Jorda, O., M. Schularick, and A. M. Taylor (2014). The great mortgaging: Housing finance, crises, and business cycles. NBER Working Paper 20501, National Bureau of Economic Research.

Lane, P. R. (2013). Capital flows in the Euro Area. CEPR Discussion Papers 9493, Center for Economic Policy Research.

Lane, P. R. and P. McQuade (2014). Domestic credit growth and international capital flows. *The Scandinavian Journal of Economics 116*(1), 218–252.

Levine, R. (1997). Financial development and economic growth: Views and agenda. *Journal of Economic Literature 35*(2), 688–726.

Lucas, R. E. (1990). Why doesn't capital flow from rich to poor countries? *The American Economic Review 80*(2), 92–96.

Magud, N. E., C. M. Reinhart, and E. R. Vesperoni (2012). Capital inflows, exchange rate flexibility, and credit booms. IMF Working Paper 41, International Monetary Fund.

Mendoza, E. G. and M. E. Terrones (2008). An anatomy of credit booms: Evidence from macro aggregates and micro data. NBER Working Paper 14049, National Bureau of Economic Research.

Mian, A. and A. Sufi (2014). *House of Debt*. University of Chicago Press.

Obstfeld, M. (2012). Does the current account still matter? *The American Economic Review 102*(3), 1–23.

Ostry, J. D., A. R. Ghosh, K. Habermeier, L. Laeven, M. Chamon, M. S. Qureshi, and A. Kokenyne (2011). Managing capital inflows: What tools to use? IMF Staff Discussion Note 11/06, International Monetary Fund.

Rodrik, D. and A. Subramanian (2009). Why did financial globalization disappoint? *IMF Staff Papers 56*(1), 112–138.

Roodman, D. (2009). How to do `xtabond2`: An introduction to difference and system GMM in Stata. *The Stata Journal 9*(1), 86–136.

Rousseau, P. L. and P. Wachtel (2011). What is happening to the impact of financial deepening on economic growth? *Economic Inquiry 49*(1), 276–288.

Spiegel, M. M. (2009). Monetary and financial integration in the EMU: push or pull? *Review of International Economics 17*(4), 751–776.

Stockhammer, E. (2004). Financialisation and the slowdown of accumulation. *Cambridge Journal of Economics 28*(5), 719–741.

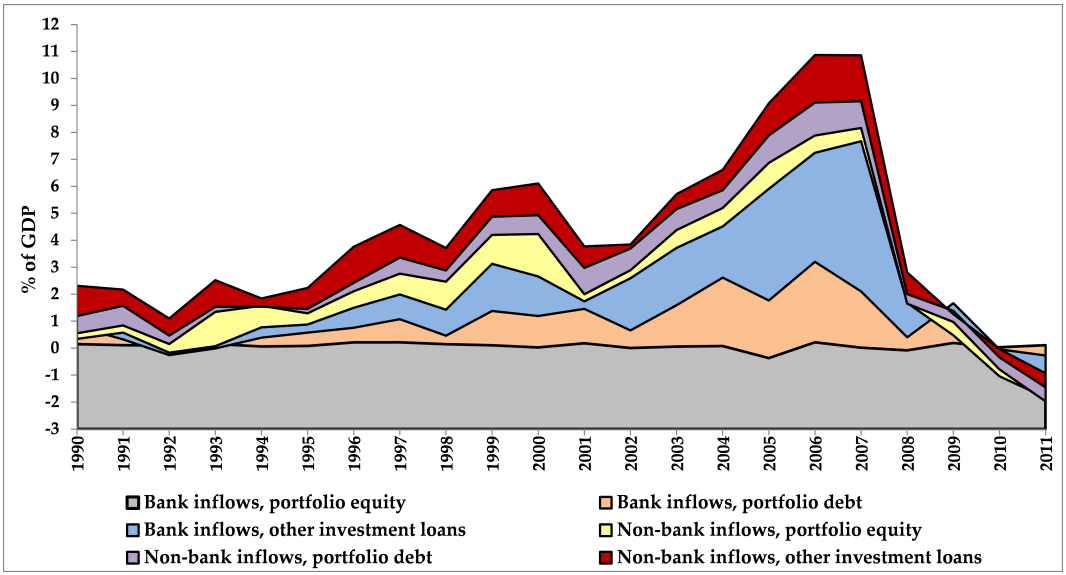
Sutherland, D., P. Hoeller, R. Merola, and V. Ziemann (2012). Debt and macroeconomic stability. OECD Economics Department Working Papers 1003, OECD.

Appendix

In Figure A.1 we disaggregate bank and non-bank inflows over 1990–2011 into portfolio equity, portfolio debt, and other investment loans. Bank inflows are on average larger in size and more volatile than non-bank inflows. Debt inflows, i.e. portfolio debt and other investment loans, constitute the largest share of bank inflows, while other investment loans dominate in non-bank inflows. Moreover, debt inflows had higher volatility than equity, especially from 1999.

Figure A.1 suggests a periodization for capital inflows. First, the 1990–1998 pre-EMU years, with low and stable growth of capital inflows when average annual bank and non-bank inflows were equal 0.6% and 1.5% of GDP, respectively. Second, the period 1999–2001: the start of EMU in 1999 inaugurated faster growth of capital inflows. Bank inflows rose to 2.3% of GDP on average and non-bank inflows to 2.4%. The period 2002–2007 were the capital boom years. Both bank and non-bank inflows more than tripled in size relative to GDP, from 2.5% in 2002 to 7.2% of GDP in 2007 for bank inflows, and from 1% to 3% for non-bank inflows. Lane (2013) notes that the growth of international financial transactions in these years was more rapid than the growth in international trade of goods and services. A fourth period in our sample are the financial crisis years 2008–2011, which saw a remarkable drop in capital inflows. Bank debt flows declined most dramatically, from over 7% of GDP in 2007 to -1.7% in 2011, while non-bank inflows remained positive.

Figure A.1: **Composition of bank and non-bank inflows**



Source: Authors' calculations based on IMF Balance of Payments Statistics.

Table A.1: **Descriptive statistics, 1990–2010 (3-year periods)**

Variable	Unit	No. obs.	Mean	Sd	Min	Max
Credit variables						
Non-financial credit	% of total credit	187	48.71	17.33	18.64	98.33
Initial total credit	% of GDP	175	83.15	52.85	2.56	379.89
Capital Inflows						
Total inflows	% of GDP	228	7.58	8.56	−22.96	73.83
FDI inflows	% of GDP	241	3.47	3.58	−0.63	23.22
Bank inflows	% of GDP	229	2.18	5.94	−28.29	56.02
Non-bank inflows	% of GDP	239	1.79	2.25	−1.99	14.86
Control variables						
Initial GDP per capita	In log	183	9.88	0.76	7.77	11.11
Inflation	%	199	8.56	32.64	−0.60	399.55
Overnight interest rate	%	189	7.89	17.02	0.00	148.91
Credit market deregulation	1 to 10	200	8.40	1.52	1.47	10
Current account position	0/1	246	0.36	0.48	0	1
EMU membership	0/1	246	0.18	0.39	0	1
Initial Investment level	% of GDP	246	22.21	4.17	11.18	34.64

Table A.2: **Correlations of non-financial credit share with capital inflows (lagged one period)**

	Non-financial credit	Total inflows	FDI inflows	Bank inflows	Non-bank inflows
Non-financial credit	1.00				
Total inflows	−0.26***	1.00			
FDI inflows	−0.09	0.74***	1.00		
Bank inflows	−0.18**	0.85***	0.38***	1.00	
Non-bank inflows	−0.32***	0.42***	0.24***	0.07	1.00

Note: The table reports pairwise correlation coefficients (see regression results). ***p<0.001, **p<0.05, *p<0.1.

Table A.3: **Correlations of non-financial credit share with other explanatory variables**

	Non-financial credit	Initial total credit	GDP p.c.	Inflation	Interest rate	Credit mkt dereg.	CA position	EMU	Investment
Non-financial credit	1.00								
Initial total credit	−0.51***	1.00							
GDP per capita	−0.63***	0.54***	1.00						
Inflation	0.39***	−0.16**	−0.38***	1.00					
Interest rate	0.50***	−0.25***	−0.43***	0.86***	1.00				
Credit mkt dereg.	−0.68***	0.31***	0.46***	−0.41***	−0.47***	1.00			
CA position	−0.21***	0.34***	0.50***	−0.02	−0.11	0.27***	1.00		
EMU	−0.13*	0.30***	0.28***	−0.11	−0.18**	0.17**	0.11*	1.00	
Investment	0.05	0.07	−0.16**	−0.12*	−0.14**	0.07	−0.22***	−0.03	1.00

Note: The table reports pairwise correlation coefficients. ***p<0.01, **p<0.05, *p<0.1.