Foreign funded credit: funding the credit cycle?

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Abstract

This study investigates what drives the credit cycle, focusing on the role of foreign funded bank credit (FFC). Considering credit cycles in 41 countries over the period 1985-2015, this study finds that credit booms are associated with an increase in the share of FFC in an economy, both in emerging and developed economies and for business as well as for household credit cycles. The impact of FFC on credit booms is however significantly higher in emerging countries. While FFC increases rapidly during the boom, the period preceding the boom is characterized by an in increase in domestically funded credit relative to FFC. FFC thus accelerates credit during the boom. The increased credit needs during a boom may cause the subsitution of domestically funded credit by FFC, as the growth in FFC is less restricted than domestically funded credit, for example by the domestic deposit base.[3]

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1. Introduction

Credit plays an important and dominant role in shaping the business cycle, and has an impact on both the probability and intensity of crises (Schularick and Taylor, 2012). Recent studies have further stressed the relation between credit and financial crises (Jordà et al, 2011; Drehmann et al., 2011). Financial boom-and-bust cycles are not only costly for banks, but also for the broader economy as characterized by sharp output (GDP) declines during the downturn of the cycle (Laeven and Valencia, 2013). Given the positive relation between credit cycles and financial instability, this study investigates what drives the credit cycle, and more specifically, what the role of foreign funded bank credit (FFC) is in the credit cycle.

Most studies consider the impact of foreign bank credit on the credit cycle, where foreign bank credit is based on bank ownership, i.e. the credit granted by banks that are foreign-owned. This study considers that the credit that is most relevant is the credit that is not locally funded, since this enables the total credit to outgrow the domestic deposit growth. Hence, this study focusses not on where the bank resides, but on where the funding comes from. In that respect, this study builds upon previous work by the Bank for International Settlements (BIS) (Borio et al. (2011), Avdjiev et al. (2012) and Ehlers and McGuire (2017)).

FFC can potentially be more procyclical. During the upturn of the cycle, foreign funded credit is not restricted as much as domestically funded credit by either the domestic deposit base or domestic capital controls aimed at slowing down the credit growth. Besides, during downturns, external funding, including FFC, may dry up. The aforementioned BIS studies focus on the period surrounding the global financial crisis (2002-2008) and show that FFC contributed to the rapid credit growth in the run-up to the crisis.

This study extends the analysis in several ways. First of all, instead of only considering the role of FFC before and during the global financial crisis I use a logit model to empirically investigate the role of FFC in explaining credit booms and busts over the period 1985-2015. I do so by identifying country-specific boom and bust periods, since not all countries experience booms and busts at the same time. Second, and in contrast to most studies that consider the determinants of credit booms and busts, by identifying the boom and bust periods I consider the total credit in an economy, including non-bank credit. In the end, what matters for the real economy and financial stability is preventing large swings in total credit in an economy. Kemp et al. (2018) show that the relationship between bank credit and non-bank credit cycles became less synchronized in the period leading up to the financial crisis, pointing to a substitution effect. In general, the importance of non-bank credit is also highlighted in Cizel et al. (2019), especially in advanced economies where non-bank credit on average represents 56% of GDP (with bank

credit representing 85% of GDP). The authors also point to differences in cyclicality between bank and non-bank credit, with bank credit being more cyclical. Third, I consider both developed and emerging market economies since previous studies have shown that credit booms in emerging economies are larger and last longer than those in developed countries (Mendoza and Terrones, 2008). Fourth, I investigate whether the impact of FFC on the credit cycle differs for credit provided to different sectors. The two main borrowers of credit are households and non-financial corporations. The rationale for making this distinction is that the cyclical pattern in credit in these sectors may be driven by different factors among differences in the access to non-bank funding. This may in turn influence the role FFC plays in these cycles. One may for example assume that the banking sector, and thereby FFC, matters more for households, as banks are the main provider of credit to households while corporates have better access to market funding (Igan and Tan, 2017). Lastly, besides investigating the role of FFC during credit booms and busts, I also consider its behavior preceding booms and busts.

By investigating the credit cycles in 41 countries over the period 1985q1-2015q4, this study finds that an increasing share of FFC in total bank credit is positively associated with credit booms. The quarterly change in the share of FFC, however, is not found to be significantly associated with credit busts. These results suggest a procyclical role for FFC during booms. While this holds for both emerging and developed countries, the results are more pronounced for emerging countries. I found no evidence to uphold the expectation that the impact of FFC differs for household versus business credit. By distinguishing the periods before and after 2000, results show that while FFC is associated with business credit booms in both periods, it is only associated with household credit booms in the post-2000 period. This suggests that FFC was used to fulfil the increased demand for credit from households around the mid-2000s. When investigating what happens before a boom or bust, results show that the period preceding the boom is characterized by an increase in the relative share of domestically funded credit. In other words, while before the credit boom domestically funded credit increased relative to FFC, during the boom it is FFC that accelerates credit growth.

The finding that FFC contributes to the cyclicality in credit stresses the importance of macro-prudential measures, such as the countercyclical buffer, to stabilize the credit cycle. Irrespective of the total level of credit, however, the funding base of the credit in an economy should also deserve attention. By enabling total credit to outgrow the domestic deposit base, a high inflow of FFC increases the domestic loan-to-deposit ratio and therefore the reliance on external funding. This reliance in turn increases the vulnerability to economic reversals, particularly. Especially since external funding or wholesale funding may dry up during

economic downturns. Instruments that are specifically targeted at FFC, e.g. capital control-like instruments, could probably be more effective in this sense.

2. Literature and hypotheses

2.1 The relation between financial crisis and credit

The relation between credit booms and financial crises underlies the work of Minsky (1977). He introduced a theory of endogenous business cycles where financial imbalances are not driven by external shocks to the economy, but are built up by unsustainable economic expansion and rapid credit growth. It is only much more recently that economists have begun to empirically study the link between credit and financial crises. For example, Schularick and Taylor (2012) explore the relation between domestic credit and financial crises for 14 countries over a period of 140 years. They find that – in line with Minsky's theory – credit plays an important and dominant role in shaping the business cycle, and has an impact on both the probability of crises as well as on the intensity of recessions. Real credit growth and the credit-to-GDP ratio both contribute significantly to the probability of crises. Jordà et al. (2011) use the same dataset, but also consider external imbalances (specifically, long-run current account data). Their finding is however similar; credit trends (and not external imbalances) are the best predictors of financial instability.[4] Drehmann et al. (2011) are specifically interested in variables that signal the pace and size of the build-up phase in business cycles, and find the credit-to-GDP gap (i.e. the deviation of the credit-to-GDP ratio from its trend) to perform best as a leading indicator for financial booms.

These studies (Schularick and Taylor, 2012; Jordà et al, 2011; Drehmann et al., 2011) focus on the relation between credit and financial stability, but do not consider the drivers of credit. To ensure financial stability, it is important to manage imbalances in the credit market. In other words, the strong cyclicality in credit, with excessive credit growth in the upturn and credit crunches in the downturn of the cycle, is a threat to financial stability. This stresses the importance of a better understanding of the drivers of the credit cycle.

2.2 Foreign funded credit as a driver of the credit cycle

Several studies have considered the role of foreign banks in explaining credit growth or credit booms. The idea that foreign bank credit may contribute to the cyclicality of credit in a country

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[4] The authors find that external imbalances have played an additional role, but this was more so in the period before World War II, i.e. a period that was characterized by low financialization.

stems from the fact that foreign banks may rely on funding from their international parent. They are therefore less dependent on local market conditions, enabling them to increase their credit more than domestic banks are able to. Schoenmaker (2015) shows that the strong credit growth in Ireland during the run-up to the global financial crisis, with total banking assets almost tripling, was fueled mainly by credit flows from foreign banks. The empirical studies on this topic yield mixed results. While some studies find that foreign banks are contributing to financial stability as – in contrast to domestic banks – they do not have to contract their lending (Crystal et al., 2001; de Haas and van Lelyveld, 2006), other studies point to the procyclical role of foreign banks (Popov and Udell, 2010; Bertay et al., 2015).[5]

One important element that may be overlooked is the exact definition of foreign bank credit. Most studies consider foreign bank credit based on bank ownership, i.e. the credit granted by banks that are foreign-owned. This study argues that the credit that is most relevant is the credit that is foreign funded (FFC), since this enables the total credit to outgrow the domestic deposit growth and may contribute to the overheating of the economy.

Table 1 provides more information on the definition of FFC, and makes clear the differences between foreign bank credit and FFC. The first three rows in the table represent FFC. In this study a distinction is made between the credit that borrowers obtain directly from abroad (Table 1, row 1) and indirectly via local banks that fund themselves abroad, i.e. via the interbank market (Table 1, rows 2 and 3).

While FFC is in some aspects quite similar to foreign bank credit (since foreign banks may get their funding from outside the country in which they grant the credit), there are some notable differences. The definition of foreign bank credit is based on the residence of the bank, while FFC is based on the location where the funding comes from. Table 1 also makes clear these differences in definitions, as well as the consequences. Assume a borrower is resident in Country X. This borrower borrows money from a bank subsidiary that is located in Country X, but headquartered outside Country X. This bank subsidiary however funds itself by deposits of Country X. This type of credit will be included in foreign bank credit, but excluded in the FFC, since the credit is funded locally (Table 1, row 4). Moreover, if such a party – a bank subsidiary in Country X funded with deposits from Country X – grants credit directly to a borrower outside Country X this credit will also be seen as foreign bank credit in Country X, while it has nothing

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[5] In the remainder of this section I focus on those studies that are closest to ours. There are more studies that focus on the role of foreign bank credit (e.g. Micco and Panizza, 2006; Claessens and van Horen, 2014, 2017; de Haas and van Lelyveld, 2006; de Haas and van Horen, 2011) or foreign capital inflows (e.g. Elekday and Wu, 2011; Calderon and Kubota, 2012; Lane and McQuade, 2013) as a driver of the credit cycle.

to do with the credit base in Country X (Table 1, row 6). In these two examples, therefore, foreign bank credit overstates relative to FFC. On the other hand, in case a bank from Country X – located and resident in Country X – grants credit to this borrower resident in Country X, but obtains the funding for this credit from outside the country, this will be excluded in foreign bank credit but included in FFC (Table 1, row 3). In this example, by considering foreign bank credit, one will miss this FFC-included type of credit. It actually deserves attention, however, since this type of credit facilitates the total credit to exceed the domestic deposit base.

Table 1: Non-locally funded credit (FFC)

	Residence of the borrower	Location of the bank (e.g. subsidiary)	Home country of the bank	Funding of the credit	Included in foreign funded credit? (FFC)	Part of foreign bank assets?
(1)	Country X	Outside	Outside	Outside	Yes	Yes
(2)	Country X	Country X	Outside	Outside	Yes	Yes
(3)	Country X	Country X	Country X	Outside	Yes	No
(4)	Country X	Country X	Outside	Country X	No	Yes
(5)	Country X	Country X	Country X	Country X	No	No
(6)	Outside	Country X	Outside	Country X	No	Yes

While the analyses by Ongena et al. (2013) and Cull and Peria (2013) are not based on FFC, but on bank ownership, the results of their studies imply that the funding base may matter. Cull and Peria (2013) consider the impact of bank ownership on credit growth and find that in Latin America foreign banks did not contract their loans more than domestic banks before and during the global financial crisis. The authors argue that this is because these foreign banks were mostly funded locally. Focusing on Eastern Europe and Central Asia, Ongena et al. (2013) find that both foreign-owned banks and domestic banks that borrow on the wholesale market contract their credit more during a crisis than domestic banks that are funded locally.

This study is closest to some recent studies from the Bank for International Settlements (BIS) that show that it is the FFC that matters most in explaining rapid credit growth (Borio et al. (2011), Avdjiev et al. (2012) and Ehlers and McGuire (2017)).[6] Borio et al. (2011) show that in Ireland, Hungary and the Baltic States, the FFC components grew faster than the overall

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[6] In their studies these authors refer to cross-border credit instead of FFC.

credit to residents during the boom period in 2007-2008. While in larger economies the share of FFC as a percentage of total credit is lower, these economies (e.g. Spain, UK, US) also showed a relatively rapid growth in FFC during the pre-crisis credit boom. Focusing on Asian countries, Avdjiev et al. (2012) conduct a regression analysis and find that FFC significantly contributed to the total credit-to-GDP growth over the period 2002-2008. Ehlers and McGuire (2017) focus on emerging countries and investigate the impact of both FFC and foreign bank participation on the 2002-2008 credit growth. The latter is measured as all credit that is booked by banks headquartered outside the borrowing country (i.e. also including the credit that is granted by foreign banks, but funded locally). Applying a similar regression analysis as Avdjiev et al. (2012) their results suggest that FFC did contribute to credit growth over the period 2002-2008, but foreign banks do not necessarily have a destabilizing effect since their local operations (locally funded lending) were a source of stability. Hence, the aforementioned studies stress that it is the credit backed by cross-border liabilities (FFC) – and not the total credit extended by foreign banks (foreign bank credit) – that contributed to the rapid credit growth in the period before the global financial crisis. I expand the analysis to investigate more generally the eventual procyclical role of FFC over a longer timeframe and this results in the first hypothesis:

H$_1$: The share of FFC increases during booms and decreases during busts

Anticipating differences between emerging and developed countries when it comes to the role of FFC, an analysis is performed for these two groups of countries. Mendoza and Terrones (2008) find that credit booms in emerging and industrial countries differ, and that credit booms in emerging markets are larger and last longer than those in developed countries. Moreover, they find that while credit booms in emerging countries are often preceded by foreign capital inflows, booms in developed economies are preceded by productivity gains or financial reforms. Besides, Avdjiev et al. (2012) and Ehlers and McGuire (2017) solely focus on emerging countries, and their studies suggest that at least in emerging countries, FFC contributed to the rapid credit growth in the run-up to the global financial crisis. In order to investigate whether the impact of FFC differs for emerging versus developed economies, in this study I consider both types of countries separately. This results in the second hypothesis:

H$_2$: The (procyclical) impact of FFC is higher for emerging market economies than for developed economies

In this study a distinction is also made between household and business credit cycles.[7] Differences in credit cycles for household credit and business credit may be caused by differences between housing dynamics and the business cycle as these are not perfectly linked (Żelazowski, 2017). Even before the global financial crisis the ECB (2007) observed that while *bank* credit to households and corporates has followed a similar cyclical pattern, the peaks and troughs have been higher and deeper for the latter. An explanation for this finding is that banks may increase their lending to non-financial corporations only after the economic recovery has already materialized and corporate balance sheets have improved. On the other hand, banks may be more willing to increase their lending to households earlier in the economic cycle, given that these parties are generally better collateralized. Hence, *bank* credit, and thereby FFC, to corporates may be more cyclical than bank credit to households. This results in the third and final hypothesis:

H₃: The (procyclical) impact of FFC is higher for the business sector than for the household sector

3. Data and variable construction

3.1 Credit booms and busts

To capture total credit in an economy, i.e. both bank and non-bank credit and both domestic and cross-border credit, I obtained credit series from the Bank for International Settlements (BIS) database on total credit to the non-financial sector (Dembiermont at al., 2013). The dataset contains quarterly data for 43 countries starting in 1961 at the earliest. I consider data from 1985 onwards, since most data (also control variables) are available from that date for most countries. Private credit can be split into credit to households and credit to (non-financial) corporations. I exclude financial centers, thereby focusing on 41 countries.[8]

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[7] By investigating the impact of *capital inflows* on the credit cycle, Igan and Tan (2017) make a distinction between credit to households and credit to non-financial corporates. They find that capital inflows increase both credit growth and the probability of credit booms, in both household and non-financial corporate sectors. By splitting capital inflows into FDI, portfolio and other inflows, they find that the impact of other inflows depends on how developed the country's financial sector is. That is, as the main provider of credit to households is banks, the development of the banking sector matters more for household credit growth and only when the banking sector is more advanced, net capital inflows begin to matter for household credit.

[8] Argentina, Australia, Austria, Belgium, Brazil, Canada, Chili, China, Colombia, Czech Republic, Denmark, Finland, France, Germany, Greece, Hong Kong, Hungary, India, Indonesia, Ireland, Israel, Italy, Japan, Korea, Malaysia, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Russia, Singapore, South Africa, Spain,

There is no common definition of credit booms, but most studies define certain periods based on large deviations in the credit-to-GDP ratio or credit per capita from their (non-linear) trend (e.g. Gourinchas et al., 2001; Mendoza and Terrones, 2008; Barajas et al., 2009; Dell'Ariccia et al., 2015; Cerutti et al., 2017). The exact specifications, i.e. the thresholds used or the construction of the trend, differ. Real credit growth significantly contributes to the probability of crises (Schularick and Taylor, 2012). Therefore, the real credit per capita is used in place of the credit-to-GDP ratio. The use of the credit-to-GDP ratio also has some drawbacks, as highlighted by Mendoza and Terrones (2008). Most importantly, in case of a decrease in both credit and GDP, the credit-to-GDP ratio may increase if the fall in GDP is higher than the fall in credit.

Hence, for this study I apply the following condition: a credit boom takes place when the growth in real credit per capita provided to the private sector is higher than during a typical business cycle expansion. I use the logarithm of real credit per capita and its deviation from its long-term trend in country i at time t is denoted as l_{it} (i.e. the cyclical component) with its corresponding standard deviation $\sigma(l_i)$. The long-term trend is estimated using the Hodrick-Prescott filter. A credit boom takes place when two conditions are satisfied; i) the year-on-year growth rate of real credit per capita is higher than 20 percent or the positive deviation from the trend (l_{it}) is higher than 1.65 times its standard deviation $\sigma(l_i)$ in a given quarter (i.e. $l_{it} \geq \theta\sigma(l_i)$, with $\theta_1 = 1.65$); and ii) the year-on-year growth rate of real credit per capita is higher than 10 percent or the deviation from the trend (l_{it}) is equal to or higher than its standard deviation $\sigma(l_i)$ (i.e. $l_{it} \geq \theta\sigma(l_i)$, with $\theta_2 = 1$) and the growth in real credit per capita is positive for a period of at least 6 quarters.[9] This approach is closest to that of Cerutti et al. (2017) as the first condition ensures that a credit boom contains at least one quarter with very high credit growth or a large deviation from the trend, while the second condition ensures that short-lived spikes are left out of the analysis.

Credit busts are identified in a similar fashion. That is, a credit bust takes place when two conditions are satisfied; i) the real credit per capita decreases by at least 10 percent on a year-on-year basis or the negative deviation from the trend (l_{it}) is higher than 1.65 times its standard deviation $\sigma(l_i)$ in a given quarter (i.e. $l_{it} \leq -\theta\sigma(l_i)$, with $\theta = 1.65$); and ii) the real credit per capita decreases by at least 5 percent on a year-on-year basis or the negative deviation

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Sweden, Switzerland, Thailand, Turkey, United Kingdom, and United States. I excluded Luxembourg and Saudi Arabia.

[9] Observations with hyperinflation (> 50%) are excluded, since including them would results in an overestimation of credit busts.

from the trend (l_{it}) is equal to or higher than its standard deviation $\sigma(l_i)$ (i.e. $l_{it} \geq \theta\sigma(l_i)$, with $\theta_2 = 1$) and the growth in real credit per capita is negative for a period of at least 6 quarters. For robustness, I also consider different specifications by setting the thresholds at different levels.

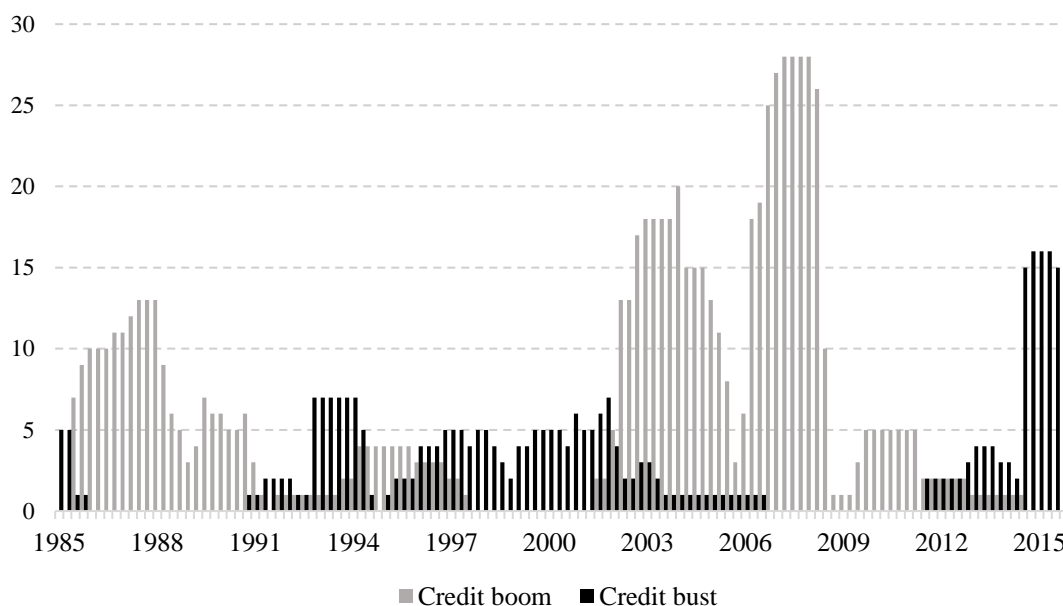**Figure 1: Number of credit booms and busts**

Figure 1 shows the total number of credit booms and busts in each quarter. It can be observed that, most credit booms take place during the start of the global financial crisis (2007-2008). The number of busts is generally lower than the number of booms. This relates to the finding that not all credit booms are bad, i.e. not all credit booms are followed by a crisis or credit bust (Barajas et al., 2009, Goetzmann, 2015). Most busts take place around the dotcom crisis (around 2000) or a few years after the global financial crisis (from 2012 onwards).

3.2 Data on FFC

As mentioned previously, instead of relying on data on foreign bank ownership, I follow Borio et al. (2011), Avdjiev et al. (2012) and Ehlers and McGuire (2017) and focus on the credit that is backed by cross-border liabilities, also referred to as FFC in this study. The data is obtained from the BIS statistics, both the BIS consolidated banking statistics and the BIS locational banking statistics. From these statistics I first of all collect the credit that banks outside the borrower country directly grant to the non-bank private sector. This is labelled as direct FFC

($FFC_{i,t}^{Direct}$). Secondly, I consider the amount of credit extended by banks in the country that is financed by cross-border liabilities, or, in other words, indirect FFC ($FFC_{i,t}^{Indirect}$). This is the net cross-border borrowing (i.e. the cross-border liabilities minus claims) by banks located in the country.[10] In the analysis, therefore, only positive numbers are taken into account. In case a banking sector has more cross-border loans outstanding than it borrows from other banking sectors, there is no net cross-border borrowing (i.e. a zero observation).[11] For the analysis the focus is on the share of the total FFC to total credit, with total credit measured by the sum of direct FFC and domestic credit[12]:

$$S\_FFC_{i,t} = \frac{FFC_{i,t}^{Direct} + FFC_{i,t}^{Indirect}}{DC_{i,t} + FFC_{i,t}^{Direct}} \qquad (1)$$

whereas $DC_{i,t}$ represents the domestic credit (excluding credit to governments), taken from the BIS credit statistics.

Figure 2 below shows the pattern of the share of FFC ($S\_FFC_{i,t}$) before and during credit booms and busts. The share of FFC is indexed at t=0, where t=0 marks the start of the credit boom or bust. The figure on the left shows that shortly after the start of a credit boom the share of FFC credit increases. During the year preceding and at the beginning of the credit boom there is however a decrease in the share of FFC. This implies that not the foreign funded share of credit, but rather the share of domestically funded credit increases in anticipation of a credit boom. During the boom, however, it is the FFC that causes an acceleration in credit. An explanation for this could be that FFC comes later, since it is a more expensive form of credit.

The figure on the right shows that during the three years preceding a credit bust, the share of FFC in total credit decreases, offsetting an increase in the share of domestically funded credit. This suggests a procyclical pattern in FFC. However, the pattern of FFC during a credit bust is less clear; on average there seems to be an increase in the share of FFC during the first three years of the bust. This contradicts the expectations, i.e. a procyclical impact from FFC,

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[10] For non-BIS reporting countries, BIS reporting banks' net cross-border claims on banks in the country have been used.

[11] A negative number implies that banks in the country, on average, lend money to banks in other countries. Not applying a cap would mean that the net-lending amount would be subtracted from the total non-financial credit in the country, while the outstanding loans are not relevant for the total credit in a country. Actually, one would just underestimate the total credit, and thereby, credit fluctuations, booms and busts.

[12] The net cross-border borrowing by banks (indirect FFC) is by definition included in the domestic credit.

and hence a decreasing share of FFC during busts. It is worth noting however that an increase in the share of FFC does not imply that the FFC itself is increasing; it indicates that the FFC is increasing more than domestic credit.

Figure 2: Share of FFC during booms and busts

This figure shows the share of FFC 12 quarters before the boom or busts, and during the first 12 quarters of the boom or bust, taking into consideration that the share of FFC is indexed at t=0 (the start of the boom or bust).
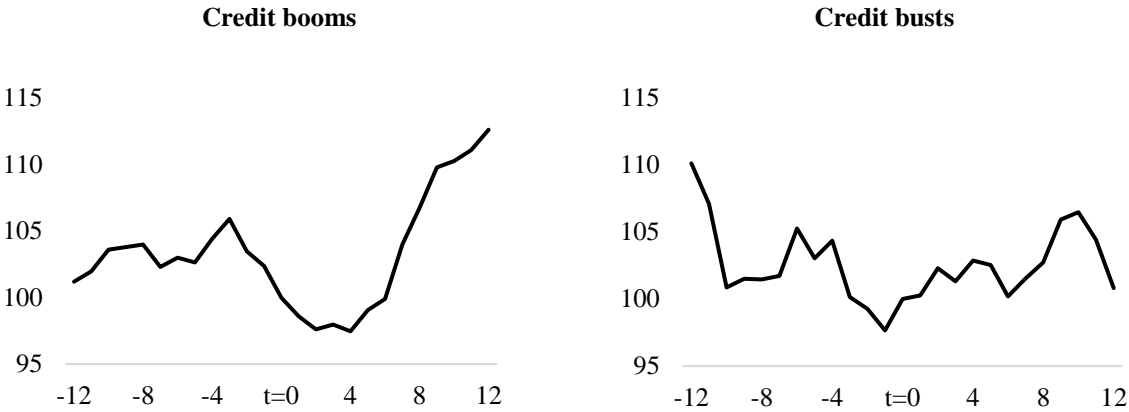

Table 2 shows the occurrence and duration of credit booms and busts for the full sample of countries as well as for different subsamples. Considering the first column of this table, the probability of a credit boom in a given quarter is equal to 21.4%. In line with Figure 1 credit busts occur less than credit booms and the probability of having a credit bust is generally lower by 8.8%. And with the average duration of a boom being 13.4 quarters versus 9.9 quarters for a bust, booms last on average almost one year longer.

Next, I split the sample of countries into subsamples with respect to the share of FFC in total credit[13] and their economic status (developed or emerging)[14]. In addition, I consider credit booms and busts for household and business credit separately. In looking to the second and third row of Table 2, a distinction is made between countries with a high and low share of FFC. On average countries with a high share of FFC experience slightly fewer booms, but more busts than countries with a low share of FFC. Looking at the duration of credit booms and busts, a high share of FFC is associated with longer-lasting busts, but shorter booms.

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[13] This classification is based on the average share of FFC being higher of lower than the median of all banks.
[14] This classification is derived from the IMF 2010 classification (IMF, 2010). Based on this definition, there are 26 developed countries and 15 emerging countries in this dataset.

Table 2: Occurrence and duration of credit booms and busts

This table shows the occurrence and duration of credit booms and busts for the full sample of countries as well as for different subsamples.

	Credit booms		Credit busts	
	Occurrence (probabilities)	Duration (in quarters)	Occurrence (probabilities)	Duration (in quarters)
(1) Mean	0.214	13.4	0.088	9.9
(2) High FFC countries	0.208	11.2	0.107	10.9
(3) Low FFC countries	0.219	15.6	0.068	8.1
(4) Emerging countries	0.204	20.9	0.166	12.4
(5) Developed countries	0.217	10.8	0.059	7.1
(6) Household credit	0.279	14.0	0.086	11.5
(7) Business credit	0.195	11.5	0.103	10.2

In the fourth and fifth rows some remarkable differences can be observed between emerging and developed countries. While emerging countries experience slightly fewer booms, the probability of credit busts is much higher for emerging than for developed countries. For emerging countries, in contrast to developed countries, the probability of a boom is not significantly different to the probability of a bust. This corresponds with the finding that in emerging countries credit booms are more likely to end in a financial crisis (or in a credit bust) (Mendoza and Terrones, 2008). Moreover, both credit booms and credit busts last much longer in emerging countries relative to developed countries. For example, while a credit boom only lasts for 10.8 quarters in developed markets, in emerging markets it lasts for 20.9 quarters. On average, booms in emerging markets last around 2.5 years longer than in developed markets.

Rows six and seven show that while there is a larger probability of a credit boom in the household market, the probability of a bust is larger in the business market. And on average, the duration of household credit booms and busts is longer than that of business credit booms.

4. Methodology

To test whether credit booms and busts are driven by FFC the following binominal logit model is applied:

$$\mathbb{P}[\gamma_{i,t} = 1] = \delta_t + \mu_i + \beta_1 \Delta S\_FFC_{i,t} + \sum_{j=3}^{J} \beta_j X_{i,t} + \varepsilon_{i,t} \qquad (2)$$

where $\delta_{i,t}$ stands for a credit boom, normal period or credit bust, and thereby $\mathbb{P}[\delta_{i,t} = 1]$ is the probability of being in a credit boom, normal period or credit bust in quarter t. Periods that are not classified as either a boom or a bust are classified as a normal period. The main independent $\Delta S\_FFC_{i,t}$ represents the quarterly growth rate of the share of FFC in total credit. In line with the hypotheses of a procyclical role of FFC a positive coefficient is expected in booms, such that an increasing share of FFC is positively associated with credit booms. In busts, a negative coefficient is expected such that credit busts are characterized by a decreasing share of FFC.

$X_{i,t}$ includes the control variables. First, the market-to-bank ratio is included. This is defined as the ratio of market to bank funding, where market funding consists of debt securities to non-financial institutions obtained from the BIS debt securities statistics. A negative coefficient is expected for the market-to-bank ratio since, first of all, booms and busts seem to occur less in more market-based systems (Cizel et al., 2019; Gambacorta et al., 2014). Besides, when (house) prices drop, banks are constrained in their ability to grant new loans and, consequently, the contraction in bank credit has a negative impact on investment opportunities. This amplification mechanism is found to be higher in more bank-based economies (Langfield and Pagano 2016). Second, as a proxy for the short-term interest rate, the US federal fund rate is included as a control variable.[15] Since periods with low interest rates often coincide with a build-up in credit, a negative coefficient for this variable is expected during a boom while a positive coefficient is expected for bust periods. Third, I consider a country's real GDP growth. An increase in real GDP is expected to go hand in hand with increase in credit, and vice versa. Finally, the inflation rate and trade openness are included, whereas trade openness is measured by the sum of a country's import and export (as obtained from the IMF Direction of Trade Statistics), divided by its GDP. Other control variables that are sometimes used in analyses on credit cyclicality are not available for all countries and/or the period considered.[16] I use both quarter fixed effects δ_t and country fixed effects μ_i, and cluster the standard errors at the country level. Lastly, I exclude observations with hyperinflation (>50% on a quarterly basis).

Table 3 shows the correlation matrix. A high correlation – higher than 0.5 – is only observed between the boom and bust variables, implying that booms and busts are concentrated

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[15] Country-specific data on interest rates is not available for all countries and all years. The US federal fund rate is obtained from the Federal Reserve Economic Data.
[16] These include for example, real effective exchange rate, VIX index, m2-to-reserve ratio or housing prices (e.g. Bezemer and Zhang, 2014).

in specific periods. High correlations between any of the independent variables are however not observed, and therefore multicollinearity is not expected to be an issue.

Table 3: Correlation matrix

This table shows the correlation among the variables used in the logit model as specified in equation (2).

	Credit boom	Credit bust	ΔS_FFC	MtB ratio	Interest rate	Trade open.	Inflation	ΔGDP
Credit boom	1.000							
Credit bust	0.578	1.000						
ΔS_FFC	-0.031	0.019	1.000					
MtB ratio	-0.128	-0.130	0.007	1.000				
Interest rate	0.109	0.114	0.037	-0.125	1.000			
Trade open.	-0.079	0.001	0.034	-0.030	-0.130	1.000		
Inflation	0.090	0.071	-0.039	-0.101	0.209	-0.067	1.000	
ΔGDP	0.272	0.205	-0.278	-0.024	0.106	-0.017	0.064	1.000

5 Results

5.1 Baseline results

Table 4 shows the baseline results from the logit model. The positive coefficient in column 1 first of all shows that the quarterly growth in the share of FFC is positively associated with credit booms. This implies that during credit booms FFC increases significantly more than domestic credit, supporting hypothesis 1. Column 2 shows that the growth in FFC is negatively related to normal periods (i.e. no boom or bust). However, for credit busts, the results in column 3 do not show any significant relation between FFC and the occurrence of credit busts.

The market-to-bank ratio is negatively associated with credit booms and normal periods, and positively associated with credit busts. This implies that during credit booms and normal periods, bank credit increases significantly more than market funding. And vice versa, during a bust, market funding decreases less than bank credit. This is in line with the expectations and points to the stabilizing role of market funding, thereby supporting the findings of Langfield and Pagano (2016). While the other control variables are not always significant, the coefficients show the expected signs.

Table 4: Baseline results

This table shows the regression results from equation (2), estimated by a logit model over the period 1985q1-2015q4. The table shows the marginal effects. Both quarterly and country fixed effects are included, and

	Credit boom	Normal	Credit bust
	(1)	(2)	(3)
$\Delta S\_FFC_{i,t}$	0.003**	-0.002**	-0.002
	(0.001)	(0.001)	(0.002)
MtB$_{i,t}$	-0.012**	-0.001	0.012***
	(0.006)	(0.005)	(0.004)
Interest$_t$	0.022***	-0.023***	-0.004
	(0.007)	(0.008)	(0.014)
Openness$_{i,t}$	0.009*	-0.002	-0.017***
	(0.005)	(0.005)	(0.006)
Inflation$_{i,t}$	0.007	-0.023	-0.002
	(0.024)	(0.029)	(0.046)
ΔGDP$_{i,t}$	0.024***	-0.010***	-0.015***
	(0.004)	(0.003)	(0.003)
# Obs.	3,116	3,356	2,230
# Countries	35	39	25
Pseudo R^2	12.58	3.48	7.72
Wald chi2	313.23	43.75	46.48
Prob>chi2	0.000	0.000	0.000

5.2 Emerging versus developed countries

Table 5 shows the same results, but for subsamples based on whether the country is classified as an emerging or developed according to the IMF (2010) classification. Columns 1-3 show the results for emerging countries. The positive coefficient of the quarterly change in the share of FFC implies that during booms FFC increases relative to domestically funded bank credit. For developed countries the coefficient in column 4 is also significantly positive, but remarkably lower. The results also show that there is a significant difference between the coefficients for emerging versus developed countries. The role of FFC in the credit boom is thus significantly higher for emerging than for developed countries.

Table 5: Emerging versus developed countries

This table shows the regression results from equation (2), estimated by a logit model over the period 1985q1-2015q4. The table shows the marginal effects. Both quarterly and country fixed effects are included, and standard errors are clustered at the country level reported in parentheses. ***, ** and * denote significance at the 1%, 5% and 10% levels.

	Emerging countries			Developed countries		
	Credit boom	Normal	Credit bust	Credit boom	Normal	Credit bust
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta S\_FFC_{i,t}$	0.009***	-0.008***	0.000	0.002*	-0.001	-0.002
	(0.002)	(0.003)	(0.002)	(0.001)	(0.001)	(0.002)
MtB$_{i,t}$	-0.036**	-0.008***	0.008**	-0.008	0.008	0.007
	(0.018)	(0.003)	(0.004)	(0.005)	(0.006)	(0.011)
Interest$_t$	0.034	-0.046*	0.016	0.019***	-0.014	-0.016

	(0.025)	(0.024)	(0.016)	(0.007)	(0.010)	(0.012)
Openness$_{i,t}$	0.007	0.009	-0.009*	0.008	-0.007	-0.007
	(0.011)	(0.015)	(0.005)	(0.005)	(0.005)	(0.009)
Inflation$_{i,t}$	-0.129**	-0.060	0.136***	0.037	0.002	-0.078*
	(0.054)	(0.056)	(0.021)	(0.025)	(0.031)	(0.044)
ΔGDP$_{i,t}$	0.023***	-0.006**	-0.006	0.024***	-0.016***	-0.018***
	(0.008)	(0.003)	(0.004)	(0.004)	(0.003)	(0.006)
# Obs.	666	1,351	698	2,450	2,756	1,532
# Countries	10	14	10	25	25	15
Pseudo R^2	20.10	10.63	25.93	12.88	4.39	11.27
Wald chi2	385.94	275.80	71.99	367.83	52.22	92.93
Prob>chi2	0.000	0.000	0.000	0.000	0.000	0.000

	Boom	Normal	Bust
Chi2(Equality of coefficients)	9.33***	12.41***	0.58

While a significant negative coefficient is found for emerging countries for periods that are classified as normal, this is not the case for developed countries. Hence, for emerging countries the share of FFC significantly decreases during periods that are not considered as either a boom or a bust. In line with the baseline results, the table does not point to a relation between credit busts and quarterly growth in the share of FFC.

For developed countries, the coefficient for inflation is significantly positive during booms and significantly negative during busts, as expected. For emerging countries, however, the opposite is shown. This can be explained by the decreasing trend in inflation in these countries, whereas the originally high inflation rates have converged towards the levels in developed countries (Daly and O'Doherty, 2018). This may in turn impact the results.

5.3 Household versus business credit

Table 6 shows the regression results for household and business credit cycles separately, whereas columns 1-3 show the results for household credit and columns 4-6 the results for business credit. The results are roughly in line with the baseline results. That is, credit booms are associated with a significantly increasing share of FFC, normal periods with a decreasing share of FFC, and no significant relation between the share of FFC in total credit and the occurrence of credit busts. Against the expectation of differences between household and business credit cycles with respect to the impact FFC may have, the results do not point to any differences between household and business credit cycles.

Regarding the control variables, differences in the coefficients for openness and inflation are shown with respect to the impact they have on household versus business credit cycles. The impact of openness – the amounts of imports and export relative to a country's GDP – is more significantly related to the business credit cycle. This may be explained by the

business sector's credit needs that are – in case of international operations - directly affected by the amounts of imports and exports.

Table 6: Household versus business credit

This table shows the regression results from equation (2), estimated by a logit model over the period 1985q1-2015q4. The table shows the marginal effects. Both quarterly and country fixed effects are included, and standard errors are clustered at the country level and reported in parentheses. ***, ** and * denote significance at the 1%, 5% and 10% levels.

	Household credit			Business credit		
	Credit boom	Normal	Credit bust	Credit boom	Normal	Credit bust
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta S\_FFC_{i,t}$	0.002*	-0.002	-0.003	0.003***	-0.003***	-0.000
	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)
$MtB_{i,t}$	-0.009	0.003	0.009***	-0.008	-0.000	0.005*
	(0.006)	(0.006)	(0.003)	(0.005)	(0.004)	(0.003)
$Interest_t$	0.022**	-0.020**	-0.009	0.019***	-0.025***	0.005
	(0.009)	(0.009)	(0.014)	(0.007)	(0.008)	(0.011)
$Openness_{i,t}$	0.005	0.001	-0.013**	0.011***	-0.004	-0.021***
	(0.006)	(0.006)	(0.006)	(0.002)	(0.002)	(0.003)
$Inflation_{i,t}$	-0.025	0.020	-0.014	0.008	-0.017	-0.012
	(0.022)	(0.023)	(0.050)	(0.022)	(0.031)	(0.035)
$\Delta GDP_{i,t}$	0.027***	-0.015***	-0.017***	0.020***	-0.007***	-0.010***
	(0.002)	(0.002)	(0.004)	(0.003)	(0.002)	(0.003)
# Obs.	3,218	3,250	2,330	3,217	3,403	2,585
# Countries	37	38	26	37	40	28
Pseudo R^2	10.54	3.59	6.91	9.50	2.87	7.69
Wald chi2	322.54	101.04	55.28	162.18	36.47	59.59
Prob>chi2	0.000	0.000	0.000	0.000	0.000	0.000
		Boom	Normal	Bust		
Chi2(Equality of coefficients)		2.20	1.92	2.83*		

5.4 FFC pre-boom and pre-bust

So far, the results in the previous sections point to credit booms being associated with an increasing share of FFC, while FFC is not found to be significantly related to busts. But what happens before the boom or bust? The analysis has focused on the behavior of FFC over the credit cycle so far, without exploring a causal relation. As a next step, I investigate the behaviour of FFC pre-boom and pre-bust. Simply using lagged FFC variables has the disadvantage that actual booms and bust periods are still included in the analysis. Therefore, instead of using lagged variables of FFC, I define pre-boom and pre-bust indicator variables. That is, instead of the dependent variable $\mathbb{P}[\delta_{i,t} = 1]$ being the probability of a boom or bust in quarter t, I construct $\mathbb{P}[\delta_{i,t-1;t-c} = 1]$, capturing the period from the first quarter before the boom or bust, t-1, until t-c, where I set c at different levels with c = 2, 4, 8 and 12. In this way I am able to

test the behavior of FFC half a year, a year, 2 years and 3 years before the boom or bust. Figure 2 already indicated that the share of FFC may act differently before credit booms or busts, as it points to a decreasing share of FFC preceding a credit boom.

Table 7 shows the main results of this analysis. Considering column 1-4, the results show that the coefficient for the quarterly growth in the share of FFC turns from significantly positive in the baseline specification to a (in some specifications significantly) negative one. Put differently, during the period – be it half a year, a year, 2 years or 3 years - before a credit boom it is not the share of FFC, but rather the share of domestically funded credit that seems to increase. For example, the negative coefficients for emerging countries and household credit imply that during the year preceding the credit boom, there is a significant decrease in the share of FFC, offsetting an increase in domestically funded credit. This is in line with the pattern in Figure 2. Hence, while before the boom there is a significant increase in domestically funded credit relative to FFC during the boom it is the FFC that significantly gains share. This may be explained by the ability to provide credit. In other words, during the build-up phase of the boom, domestically funded credit is able to fulfil credit needs. This type of funding may be preferred as well, since it is generally cheaper. With the continuously growing credit, during a boom this domestically funded credit may need to be substituted by FFC as it is less restricted than domestically funded credit by, as an example, the domestic deposit base.

Columns 5-8 shows the results when the pre-bust period is considered. The coefficients of the quarterly changes in FFC are negative and rather insignificant, just as in the baseline specification. There is some small evidence of a (slightly) significant decrease in the share of FFC, implying that three years before the credit bust, the share of FFC is already decreasing.

Table 7: Pre-boom and bust

This table shows the regression results from equation (2) with $\mathbb{P}[\delta_{i,t-1:t-c} = 1]$ as the dependent variable and estimated by a logit model over the period 1985q1-2015q4. The table shows the marginal effects. Both quarterly and country fixed effects are included, and standard errors are clustered at the country level and reported in parentheses. ***, ** and * denote significance at the 1%, 5% and 10% levels.

	Credit boom				Credit bust			
	2-quarter	4-quarter	8-quarter	12-quarter	2-quarter	4-quarter	8-quarter	12-quarter
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Baseline								
$\Delta S\_FFC_{i,t}$	-0.002	-0.001	-0.001	-0.001	-0.002	-0.000	-0.001	-0.003
	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
Pseudo R²	5.26	2.91	3.89	3.09	3.44	2.59	2.52	2.98
Emerging countries								
$\Delta S\_FFC_{i,t}$	-0.013	-0.009*	-0.002	-0.001	-0.001	-0.001	-0.002	-0.002
	(0.010)	(0.005)	(0.003)	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)
Pseudo R²	16.52	6.88	7.35	3.66	8.29	6.00	4.46	6.96
Developed countries								
$\Delta S\_FFC_{i,t}$	-0.001	-0.001	-0.001	-0.000	-0.001	0.001	0.000	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.001)
Pseudo R²	4.95	2.91	4.32	4.09	5.75	5.53	5.84	8.14
Household credit								
$\Delta S\_FFC_{i,t}$	-0.002	-0.004**	-0.002**	-0.001	-0.001	-0.000	-0.000	-0.001
	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)
Pseudo R²	0.74	0.33	1.17	2.11	3.36	3.63	4.23	4.60
Business credit								
$\Delta S\_FFC_{i,t}$	-0.002**	-0.001	-0.002**	-0.002*	-0.001	-0.001	-0.001	-0.002*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Pseudo R²	4.64	3.81	3.40	2.27	5.50	3.91	4.14	3.16

5.5 Robustness checks

Two kinds of robustness checks are performed. First of all, I check whether the findings are robust to different specifications for determining credit booms and busts. Table 8 below shows the impact of these different settings on the occurrence of booms and busts. By relaxing the thresholds (Table 8, column 1) the probability of experiencing a credit boom in a specific quarter increases by more than 50%, i.e. from 0.214 to 0.352. The probability of experiencing a bust also increases, by somewhat less than 50%. Moreover, by relaxing the thresholds the average duration of booms and busts increases. And vice versa, by strengthening the thresholds both the occurrence and duration of credit booms and busts decrease.

Table 8: Occurrence and duration of credit booms and busts using different thresholds

This table shows the occurrence and duration of credit booms and busts for different thresholds. See section III.A for more information on the thresholds.

	(1) Relaxing threshold	(2) Baseline	(3) Strengthening threshold
Condition 1 - boom	$\theta_1 = 1.3$	$\theta_1 = 1.65$	$\theta_1 = 2$
	Y-o-Y growth > 15%	Y-o-Y growth > 20%	Y-o-Y growth > 25%
Condition 2 - boom	$\theta_2 = 0.75$	$\theta_2 = 1$	$\theta_2 = 1.25$
	Y-o-Y growth > 5%	Y-o-Y growth > 10%	Y-o-Y growth > 15%
Boom occurrence (in prob.)	0.352	0.214	0.123
Boom duration (in quarters)	15.1	13.4	11.8
Condition 1 - bust	$\theta_1 = 1.3$	$\theta_1 = 1.65$	$\theta_1 = 2$
	Y-o-Y growth < -5%	Y-o-Y growth < -10%	Y-o-Y growth < -15%
Condition 2 - bust	$\theta_2 = 0.75$	$\theta_2 = 1$	$\theta_2 = 1.25$
	Y-o-Y growth < -2.5%	Y-o-Y growth < -5%	Y-o-Y growth < -10%
Bust occurrence (in prob.)	0.153	0.088	0.040
Bust duration (in quarters)	12.1	9.9	9.5

Table 9 shows that the results are robust to either relaxing or strengthening the threshold levels for determining credit booms and busts. That is, the results are in line with the baseline results.

Table 9: Robustness check – different thresholds

This table shows the regression results from equation (2), estimated by a logit model over the period 1985q1-2015q4. The table shows the marginal effects. Both quarterly and country fixed effects are included, and standard errors are clustered at the country level and reported in parentheses. ***, ** and * denote significance at the 1%, 5% and 10% levels.

	Relaxing thresholds			Baseline			Strengthening thresholds		
	Credit boom	Normal	Credit bust	Credit boom	Normal	Credit bust	Credit boom	Normal	Credit bust
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$\Delta S\_FFG_{i,t}$	0.003**	-0.003**	-0.001	0.003***	-0.002***	-0.002	0.004***	-0.003***	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
$MtB_{i,t}$	-0.013***	0.004	0.005	-0.012***	-0.001	0.012***	-0.023**	0.006	0.004**
	(0.004)	(0.006)	(0.003)	(0.002)	(0.001)	(0.002)	(0.009)	(0.009)	(0.002)
$Interest_t$	0.028***	-0.031***	-0.005	0.022***	-0.023***	-0.004	0.023*	-0.025*	0.008
	(0.006)	(0.006)	(0.008)	(0.003)	(0.004)	(0.006)	(0.014)	(0.013)	(0.020)
$Openness_{i,t}$	0.006***	-0.001	-0.016***	0.009***	-0.002	-0.017***	0.008	0.010	-0.028***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.009)	(0.007)	(0.008)
$Inflation_{i,t}$	-0.019	0.026	-0.024	0.007	-0.023**	-0.002	-0.032	-0.026	0.049
	(0.028)	(0.024)	(0.026)	(0.012)	(0.012)	(0.016)	(0.027)	(0.039)	(0.075)
$\Delta GDP_{i,t}$	2.462***	-1.079***	-1.264***	0.024***	-0.010***	-0.015***	2.595***	-1.254***	-0.746**
	(0.153)	(0.197)	(0.244)	(0.002)	(0.002)	(0.002)	(0.248)	(0.344)	(0.309)
# Obs.	3,372	3,404	3,026	3,116	3,356	2,230	2,540	2,809	1,178
# Countries	39	40	34	35	39	25	29	33	14
Pseudo R^2	12.37	3.79	7.63	12.58	3.48	7.72	12.85	6.02	16.13
Wald chi2	494.52	162.02	179.11	378.98	124.35	115.45	270.01	47.04	113.44
Prob>chi2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

As a second type of robustness check, I run the baseline specification for two different subperiods; the period before 2000 (1985-2000) and the period thereafter (2001-2015). Due to data limitations, the results cannot be retrieved for emerging countries over the period 1985-2000. The results in columns 4-6 of Table 10, covering the period 2001 till 2015, are roughly similar to the baseline results, i.e. credit booms and normal periods are associated with, respectively, an increase and decrease in the share of FFC. Remarkably, the coefficient for emerging countries turns insignificant. For the period 1985-2000 there is also (albeit less) significant evidence for a procyclical role of FFC in credit booms in the baseline specification. This is not the case for all subsamples, including household credit and developed countries, where insignificant coefficients are shown. The procyclical role of FFC is however present for business credit (note that for emerging countries the observations are too limited to provide any results). The finding that FFC is unrelated to household booms in the pre-2000 period, but related after may be linked to the massive rise of global household debt during mid-2000s. Hence, the – less restricted than domestically funded credit - FFC was used to fulfil the demand for credit from households.

Table 10: Robustness check: subperiods

This table shows the regression results from equation (2), estimated by a logit model over the periods 1985q1-2000q4 and 2001q1-2015q4. The table shows the marginal effects. Both quarterly and country fixed effects are included, and standard errors are clustered at the country level and reported in parentheses. ***, ** and * denote significance at the 1%, 5% and 10% levels.

| | | 1985-2000 | | | 2001-2015 | | |
		Credit boom	Normal	Credit bust	Credit boom	Normal	Credit bust
		(1)	(2)	(3)	(4)	(5)	(6)
Baseline	$\Delta S\_FFC_{i,t}$	0.002	-0.001	-0.000	0.004**	-0.004*	-0.001
		(0.002)	(0.001)	(0.000)	(0.002)	(0.002)	(0.003)
	Pseudo R^2	25.77	5.28	21.39	17.64	7.47	14.08
Emerging countries	$\Delta S\_FFC_{i,t}$	n.a.	-0.008*	0.000	0.009	-0.009**	-0.001
			(0.005)	(0.002)	(0.005)	(0.003)	(0.003)
	Pseudo R^2	n.a.	25.13	18.71	19.19	12.39	19.21
Developed countries	$\Delta S\_FFC_{i,t}$	0.001	0.000	-0.000	0.003*	-0.002	-0.000
		(0.002)	(0.001)	(0.000)	(0.002)	(0.002)	(0.002)
	Pseudo R^2	26.91	6.54	27.69	19.96	8.59	23.41
Household credit	$\Delta S\_FFC_{i,t}$	0.002	-0.000	-0.001	0.002*	-0.002**	-0.002
		(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)
	Pseudo R^2	21.07	7.62	24.76	16.56	7.12	15.45
Business credit	$\Delta S\_FFC_{i,t}$	0.004*	-0.002*	-0.000	0.004**	-0.004**	0.000
		(0.002)	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)
	Pseudo R^2	19.95	3.45	7.72	13.88	6.08	7.88

6. Conclusion

Financial boom-and-bust cycles are not only costly for banks, but also for the broader economy as characterized by sharp output (GDP) declines during the downturn of the cycle. The positive relation between credit growth and financial crises – that goes back to the concept of endogenous business cycles of Minsky (1977) – stresses the importance of a better understanding of the drivers of credit growth and credit cycles. Contrary to previous studies that focus on the role of foreign banks in explaining credit cycles, in this study I consider the impact of credit that is not locally funded. The focus is on this type of credit because it enables the total credit to outgrow the domestic deposit growth.

Investigating credit cycles in 41 countries over the period 1985-2015, the results indicate that foreign funded credit (FFC) has a procyclical role in the credit cycle, characterized by an increasing share of FFC during credit booms. While normal periods are associated with a decrease in the share of FFC, no significant relation can be found between credit busts and FFC. The results contradict the expectations of differences between household and business credit with respect to the impact FFC has on the credit cycle. However, when considering the periods before and after 2000 separately, I find that while FFC is associated with business credit booms in both periods, it is only associated with household credit over the post-2000 period. This may relate to the rise in global household (mortgage) debt since the mid-2000s. FFC was thus used to fulfil the increased demand for credit from households.

By investigating the periods preceding booms and busts, the results show that before a credit boom there is actually a significant increase in domestically funded credit relative to FFC. The availability of credit may provide an explanation, as during the build-up phase of the boom, domestically funded credit is able to fulfil the credit needs. However, during times of rapidly growing credit needs, during a boom the domestically funded credit may need to be substituted by FFC, with the latter being less restricted by, for example, the domestic deposit base.

These findings contribute to the policy discussion on credit cycles and globalization. The global financial crisis that started in 2007 – and that was preceded by excessive credit growth during the build-up of the cycle- resulted in some huge losses. This led to the introduction of macroprudential measures, including the countercyclical capital buffer, to dampen the cyclicality in bank credit. However, irrespective of the total level of credit, the funding of the credit in an economy should also get attention at the macro level. By enabling the total credit to outgrow the domestic deposit base a high level or inflow of FFC increases the domestic loan-to-deposit ratio and thereby the reliance on external funding. This in turn increases the vulnerability to economic reversals. Especially since external funding, including

wholesale funding, may dry up during downturns. One may argue that a domestically funded credit boom is less of an issue, since the credit is backed by (more stable) domestic deposits. Therefore, instead of steering the total level of credit in an economy, attention should be given to the composition and, more specifically, the funding sources of credit. Instruments that are specifically targeted at FFC, e.g. capital control-like instruments (e.g. Bakker and Chapple, 2002), could be regarded as more effective in this sense. Over the last years the trend has however been on liberalisation and, consequently, globalisation. Given that an increased reliance on external funding can also pose risk, the question here is whether policymakers should consider not just the benefits - such as growth opportunities - but also the challenges stemming from external funding.

7. Literature

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