Financial Cycles and Credit Growth Across Countries

By Nuno Coimbra and Helene Rey*

Credit growth is an ubiquitous variable in the literature on crises and financial stability. Crises tend to be credit booms gone wrong. Jorda, Schularick and Taylor (2012) and Gourinchas and Obstfeld (2012) among others showed that credit growth is important to understand future macroeconomic outcomes. As Mian, Sufi and Verner (2015) and Krishnamurthy and Muir (2016) point out, the combination of low credit or mortgage spreads and an increase in quantity of credit pre-crisis point towards the importance of credit supply shocks in triggering financial crises. Furthermore, if financial crises were preceded by events in which credit was booming because of increased demand, funding costs would tend to go up as the quantity of credit would increase. This is a key observation and it makes it very important to understand the dynamics of credit creation and the channels through which credit booms become burst. In this paper, we take a look at the determinants of credit growth in a large cross-section of countries and link it to country specific funding costs and to characteristics of the banking systems using as a theoretical framework the Coimbra and Rey (2017) model of financial cycles with heterogeneous intermediaries.

I. Funding costs and credit expansion

Miranda-Agrippino and Rey (2015) shows that US monetary policy is a determinant of the global financial cycle. A looser US monetary policy decreases aggregate effective risk aversion, increases prices of risky assets worldwide and increases leverage of global banks in the US and abroad. Miranda-Agrippino and Rey (2015) documents that looser US monetary policy increases worldwide credit creation very significantly, as well as cross-border credit flows. Since the Dollar is a very important currency for the banking sector and in particular an important funding currency, these empirical results are consistent with a channel in which lower financing costs lead to increases in the credit supply. This mechanism is also shown very precisely in micro data for Turkey by Baskaya et al. (2017). It is also worth noting that in an international context, where demand shocks are not necessarily synchronised across countries, the existence of a global financial cycle is consistent with supply shocks such as the effect of US monetary policy on the cost of funds. Coimbra and Rey (2017) presents a model of financial cycles with heterogeneous intermediaries in which credit growth is driven in part by lower financing costs for the banking system. Korinek and Nowak (2017) also present a model with heterogeneous intermediaries and study the evolutionary dynamics of the system. In the Coimbra and Rey (2017) model, there are regions of the state space for which lower financing costs, for example due to looser monetary policy, lead to an increase in economic activity and lower systemic risk; but there are also cases, when when funding costs are low and risk shifting is important in which lower funding costs lead to higher economic activity but greater financial fragility. This happens because lower funding costs encourages the most risk taking institutions to increase their leverage more than the more conservative institutions. As a result the skewness of the leverage distribution is time varying and times of higher systemic risk coincides with periods where aggregate risk is con-

* Coimbra: PSE, 48 Boulevard Jourdan, 75014 Paris, nuno.coimbra@psemail.eu. Rey: LBS, Regents Park, London NW14SA, hrey@london.edu. Acknowledgements: We are grateful to Michele Andreolli for excellent research assistance. We thank our discussant Matteo Maggiori for very useful comments. Rey is grateful to the ERC (Grant 69572) for financial support.

centrated in the balance sheet of large risk taking intermediaries. Interestingly the elasticity of intermediary credit creation to their funding costs is higher the more risk taking they are. Hence a prediction of the Coimbra Rey (2017) model is that ceteris paribus banking systems whose leverage distribution is more skewed will have a higher elasticity of credit creation to funding costs. This is the very new and specific implication of the model that we take to the data in this paper.

II. Credit growth across countries

A. Empirical model

In Coimbra Rey (2017), there is a negative correlation between funding costs and leverage as a lower cost of funds relaxes the value-at-risk constraint of intermediaries and allows them to lend more. Funding costs are partly driven by monetary policy. In an international context bank funding costs will reflect at least partly movements in the Fed Funds rate. This is the case in our data where asset weighted mean cost of funds of countries correlate positively with the Fed Funds rate. More importantly the model predicts that the elasticity of credit creation is higher in a banking system where macroeconomic risk is concentrated in large balance sheets, i.e where the distribution of leverage across intermediaries is positively skewed. In order to test the implications of the model we therefore run:

$$DCredit_{c,t} = \beta_0 costfund_{c,t} + \beta_1 skew_{c,t} + \beta_2 costfund_{c,t} * skew_{c,t} + \theta_c + \theta_t + \epsilon_{c,t}$$

where $DCredit_{c,t}$ is the change in private credit to GDP ratio or the change in bank credit to GDP ratio at date t for country c; $skew_{c,t}$ is the asset weighted skewness of the distribution of leverage of banks in country c at date t and $costfund_{c,t}$ is the asset weighted mean cost of funds for the banks of country c at date t. θ_c and θ_t are country and time fixed effects. We expect β_0 to be negative and very importantly the interaction term between funding costs and skewness β_2 to be negative as well.

B. Variable Construction

We use bank level data from the Fitch Connect database. We use data from all the available banks in nominal USD at a yearly frequency during the period 1992 to 2016. The coverage is quite wide: it comprises more than 12,000 banks across 203 countries or territories. We use unconsolidated bank data in order to have in our sample both domestic banks and foreign owned subsidiaries. We use the following variables from the dataset: Assets, Liabilities, Equity and Interest Expenses over Average Interest-Bearing Liabilities. We then define leverage as assets over equity and funding costs as interest expenses over average interest-bearing liabilities. We filter leverage between 1 and 500 and funding costs between 0 and 100. Private credit by deposit money banks to GDP (%) and domestic credit to private sector (% of GDP) are taken from the Global Financial Development Database. In the regressions, we use these variables in first difference.

To move from bank-year data to country year data we computed asset weighted moments. The weights for bank i, in country c, in year t:

$$w_{ict} = \frac{Asset_{ict}}{\sum_{i \in c} Asset_{ict}}$$

The first three weighted moments for variable x_{ict} are defined as:

$$\bar{x}_{ct} = \sum_{i \in c} w_{ict} x_{ict}$$

$$(\sigma^x_{ct})^2 = \sum_{i \in c} w_{ict} (x_{ict} - \bar{x}_{ct})^2$$

$$SK(x)_{ct} = \sum_{i \in c} w_{ict} \left(\frac{x_{ict} - \bar{x}_{ct}}{\sigma^x_{ct}} \right)^3$$

We do not need small sample corrections as we have a sample close to population. We use asset weighted mean for funding cost variables and asset weighted skew-

ness for the leverage distribution. Summary statistics on leverage skewness, funding costs and credit are presented in Table 1.

Table 1 about here

C. Results

Results are presented in Table 2 for private credit and Table 3 for bank credit. All the regressions have country and year fixed effects and errors are clustered by country. We find a negative correlation between cost of funds of banks of a given country and domestic credit creation as measured by total private credit or bank credit. This negative correlation holds irrespective of whether we focus on large financial areas with major central banks (US, EU and Japan) or whether we look at smaller economies, which are more likely to be price takers in world markets. As expected, a decrease in funding costs is associated with more credit creation, in the banking sector and more broadly. The level of skewness of the banking sector per se is not robustly associated with credit creation over the sample (except may be in the larrge financial areas). But the elasticity of credit with respect to funding cost is larger for banking systems which are more skewed as predicted by the model. This means that a lower cost of funds translates in higher credit creation when banking systems are dominated by intermediaries with more leveraged balance sheets. This result is robust for growth in private credit and less so for growth in bank credit where it is significant only for the main financial areas (US, EU and Japan). One explanation could be that measurement errors in the banking credit variable are higher for a number of our smaller countries. But this would deserve further investigation. We performed some robustness checks with alternative measures of funding costs such as total expenses over liabilities. Results were largely unchanged.

Table 2 about here

Table 3 about here

III. Conclusion

Credit has been found to be an important variable to predict financial crise. Is is therefore a first order issue to understand better credit creation and credit dynamics. Miranda-Agrippino and Rey (2015) shows the importance of US monetary policy in driving global credit creation and cross-border credit flows. Coimbra and Rey (2017) presents a model where funding costs play an important role in driving private credit creation and where systemic risk is endogenous. One of the prediction of that model, that the elasticity of private credit creation to funding costs is higher when the distribution of leverage in the financial system is more skewed holds in a broad cross country panel of banking systems. When we look at purely bank credit creation, the evidence is less strong. We see this paper as a step towards a better understanding of how international drivers such as US monetary policy interact with domestic banking systems structures to shape the dynamics of credit creation.

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Table 1—Country-Year Summary Statistics

Variable	**Mean**	**Std. Dev.**	**N**
Private credit	1.027	6.714	3910
Bank credit	1.002	5.159	3858
Funding cost	3.876	3.738	3936
Leverage skewness	0.877	2.886	3190

Table 2—Change in private credit over GDP

	(1)	(2)	(3)
Variables	DCredit	DCredit	DCredit
$costfund$	-0.187***	-0.394	-0.154**
	(0.0609)	(0.242)	(0.0646)
$skewness$	0.0984	0.308**	0.146
	(0.115)	(0.136)	(0146)
β_2	-0.0887**	-0.140**	-0.103**
	(0.0448)	(0.0645)	(0.0482)
Obs.	2880	659	2221
R^2	0.08	0.227	0.074
Sample	ALL	US+EU+Japan	Price takers

Table 3—Change in bank credit over GDP

	(1)	(2)	(3)
Variables	BCredit	BCredit	BCredit
$costfund$	-0.096**	-0.315**	-0.065
	(0.0484)	(0.159)	(0.0520)
$skewness$	0.0514	0.221*	0.963
	(0.0892)	(0.0827)	(00833)
β_2	-0.0474	-0.101**	-0.0582
	(0.0441)	(0.0456)	(0.0481)
Obs.	2851	651	2200
R^2	0.127	0.310	0.116
Sample	ALL	US+EU+Japan	Price takers

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