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Introduction

In these past years, due to the financial crisis that inflicted the world, the discussion on the impacts of credit supply on economic growth has resurfaced. A credit supply shock to a highly leveraged financial system showed that credit also has its perverse effects. In fact, there is no consensus in the direction of credit supply shocks, or its dissemination, on economic growth. Moreover, the relationship between financial deepening and growth has been greatly discussed in the economic literature.

Different points of view question the true impact of financial development on growth. On the one hand, Robinson (1952) argues that this relationship is one sided, where increases in income cause the financial market's natural development. Lucas (1988), moreover, works on a different argument, saying that too much emphasis is given to it and no causality can be inferred. On the other hand, endogenous growth models praise the importance that financial deepening has on income growth, through either technological innovations¹ or capital accumulation, both promoting a better allocation of resources. Therefore, in order to reconcile these different opinions, many authors acknowledge both the existence of an aggregate supply relationship, as in the endogenous growth literature, $per\ capita\ Income = f(Credit, X, \varepsilon)$, but also of aggregate demand, as in Robinson (1952), $Credit = g(per\ capita\ Income, Y, \nu)$.²

The demand side argument is based on the fact that increases in income generally lead to higher demand deposits, allowing financial institutions to increase the availability of loan funds. The supply side can be rationalized the following way, as argued in the speech made in 2006 by Mohan: without a financial system fully established, access to funds by individuals is scarce, limiting them by their assets. Therefore, the number of potential projects executed

¹ Aghion & Howitt (1992)

² X represents the exogenous variables that determine per capita income, Y the exogenous that affect credit and (ε, ν) a random vector of non-observables that affect per capita income and credit, respectively.

is restricted, hindering higher economic growth. Aspergis et al. (2007) confirms this bidirectional relationship in the long-run using a cross-country non stationary panel.

Nevertheless, the literature generally focuses on isolating the supply effect. King and Levine (1993) introduce a methodology to investigate its impact, using four different proxies for financial deepening. $M3/GDP$ measures the financial system's relative size to the economy, disregarding, however, the relevance of financial products. To correct this, the proportion of commercial banks domestic assets on the banking system as a whole³ examines this issue, but completely disregards non-banking institutions capable of providing financial services (i.e. monitoring or risk management). Besides, this measure not only ignores whom credit is allocated to but also, when central banks have great influence on commercial banks, it loses its capacity to differentiate these institutions. Finally, two related measures focus on correcting these problems: the proportion of credit allocated to non-financial private companies on total credit and on GDP.

Many studies base their methodology on King and Levine. The latter finds a positive association between financial deepening and growth in a cross-country panel, in which the proposed indicators' past values tend to forecast well economic growth rate. Analogously, Rosseau and Wachtel (WP 2009) extend King and Levine's database and use the same methodology to verify if this association diminished over time. They argue that rapid financial system dissemination and previous to a solid banking system with low inflation can diminish the impact of deepening on growth. They find that the impact in fact lowered over time, and it is inexistent in times of crisis. In addition, Nazmi (2005) acknowledges the positive effects of financial deepening, verifying that the de-regulation of the banking system in Latin America had long run effects only by strengthening it. Pires (2005) studies this relationship in a cross-section of Brazilian municipalities and also finds a positive impact of financial deepening on growth.

On the other hand, there are other studies that seek to derive the impact of financial deepening on economic growth on the industry level. Rajan and Zingales (1998) develop a methodology to determine the channel in which financial

³ Commercial banks domestic assets plus Central Bank domestic assets.

deepening, measured by the firm's dependence on external funding, affects growth, measured by the increase in the number and size of establishments. This method is based on the inclusion of deepening variables interacted with financial development variables, such as accounting standards, capitalization or credit to the private sector. They find that not only that financial deepening is an important element to economic growth, but also that firms highly dependent on external capital in developed financial environments grow more than those in undeveloped ones.

However, while the literature finds different results on this matter, they lack in some extent a convincing identification strategy. For example, King and Levine try to identify their model considering a predetermined relationship between the variables, in the sense of showing that Robinson's "where enterprise leads finance follows" may not be the only possibility: after all, idiosyncratic product shocks may not be correlated to previous financial development. However, the financial literature tends to reject this strategy, since both credit and money supply are good crises indicators; therefore, credit could lead to lower growth.

On this precise matter, Loayza and Ranciere (2006) try to reconcile these two existing views in the credit and growth literature: endogenous growth models and financial crises. Using a panel error correction model, they link the negative short run effects of financial intermediation to the fragility of the system, but also verify positive long-run effects in this type of intermediation. But their interpretation tends to be more correlational rather than trying to explicit a precise mechanism.

Another question on the identification strategy can be posed in Pires (2005). The author seeks to do a cross-section analysis of this relation in Brazilian municipalities using credit proxies and the number of branches as an instrument for credit. This can be a bit dubious insofar as that the correlation between bank branches and credit may not be strong enough. Suppose, for example, two identical cities in every sense, except that the first has a branch of a given bank and the second, two branches not far from each other of the same bank. The expected credit volume tends to be the same, since it would not make a difference from which bank the individual borrows money from. It is also worth mentioning

that many articles highlight the importance not only of bank concentration, but also competition, as proxies for the economy's banking sector.

On this note, the novelty of this paper is to present precisely an identification strategy that is both new and convincing. While many articles present time series and dynamic panel methodologies, this will explore the influence of the banking sector competition, important players in this market, on credit supply in a cross-section world. In a little more detailed fashion, consider the following linear system for the credit aggregate supply and demand relationship mentioned above:

$$\text{Income per Capita}_i = \mu_1 \cdot \text{Credit}_i + \mu_2 \cdot X_i + \varepsilon_i \quad (1)$$

$$\text{Credit}_i = \varphi_1 \cdot \text{Income per Capita}_i + \varphi_2 \cdot Y_i + v_i \quad (2)$$

The objective is to consistently estimate μ_1 , using an instrument belonging to the second equation but not the first. If a simple regression of income per capita on credit is run, the expected positive effects of income per capita on credit would be embedded in μ_1 's estimate, presenting an upward bias. What is argued in this paper is that the competition in the banking sector belongs solely to equation (2), where as competition intensifies, credit supply varies and alters income per capita. This way μ_1 can be consistently estimated. Note that this approach lets us contribute in another set of literature: how does the banking sector's concentration/competition affects income?

Investigating this new topic in more detail, it is possible to observe that its findings, both theoretical and empirical, are not definitive. On the one hand, there is the argument in which smaller localities benefit from a less competitive and concentrated banking structure, since that not only firms can benefit from forming closer ties to banks, but also the latter can incur smaller monitoring costs and may be more willing to supply more credit. Petersen and Rajan (1995) show that lower quality firms obtain more credit in more concentrated markets with lower fees. In a cross-section of small U.S. companies, they do not find that newer firms get more loans in more concentrated markets and this difference in credit supply diminishes as firms are longer in the market, which was predicted by their theoretical model. Mitchener and Wheelock (WP 2010), using Rajan and Zingales' (1998) methodology, find evidences that banking concentration generates positive growth in the manufacturing industry between 1899 and 1929

and, although insignificantly, firms highly dependent of external funding do not benefit from concentration in the banking industry.

Nonetheless, the opposite argument also exists. As banks enter the market and compete against each other, loan rates decrease and the amount of supplied credit increases. In addition, product quality can improve. Cetorelli and Gambera (2001) show empirically that a concentrated banking sector hinders growth in the economy as a whole and Guzman (2000) introduces a monopolist banking sector in the capital's law of motion and verifies it is depressed as competition in that market lessens, having, therefore, negative impacts on economic growth. Finally, Claessens and Laeven (2005) introduce Panzar and Rosse's (1987) H competition measure in order to differentiate competition from concentration. Based on Rajan and Zingales (1998) methodology on the cross-country industry level, they find that while concentration brings no impact to economic growth, competition increases bring positive and significant impact.

Nevertheless, it is important to distinguish this paper from the literature. In general, these articles use a concentration measure rather than an explicit competition indicator. Claessens and Laeven (2005) introduce the H competition measure exactly to make this distinction. Still, Panzar and Rosse's (1987) H is not very informative. In their article, it is mentioned that the hypotheses tests are only capable of identifying regions in which there is perfect competition or non-monopolistic regions. For the latter, monopoly's market power is not identified. Moreover, in case the statistic is in a region in which there is no monopoly or perfect competition, it is impossible to verify whether the firms are in monopolistic competition or in any oligopoly regime. Therefore, even though they try to distinguish banking concentration from competition, they use a not very informative statistic about the competitiveness of the banking sector.

A second important point to note is how these works try to identify the impact of concentration and financial deepening on growth. Since they used interactions between competition/concentration and financial need, the authors need to rely more on the controls' exogeneity. Even inference in the instrumental variable approach is limited, since they are limited by the number of instruments.

In this paper, not only the importance of banking competition will be acknowledged as a growth engine in Brazil, but also the number of banks will be shown as a good indicator of local competition variability. Note that no inference

will be made on the level of competition, but rather on its variability. Furthermore, it is important to emphasize that it is assumed that the only way banks affect growth is through credit supply, a common hypothesis in the literature. Otherwise, after showing that the number of banks indicates competition variability, this will be used as an instrument for credit in the growth regression.

To motivate this choice, consider a simplified analysis as in the previous example. Assume that the second city has two branches of different banks, having now a bank duopoly in the second city. In case there is more competition between banks, credit in equilibrium will be higher and rates lower. Therefore, changes in the level of competition between towns will affect the stock of credit.

Note that this approach requires differences in the level of competition between towns with different competitive structures, or, in another manner, profits per bank must vary as firms enter the market. If the competition degree does not vary across markets, equilibrium credit level will not vary among cities, since rates charged will be the same and demand split between banks, meaning that profits per bank would be the same. However, if this does not happen, the variability in the banking industry competition will be associated to the amount of credit in equilibrium and number of banks will be a good proxy for changes in the level of competition.

As a result, it is necessary to motivate how inference on competition variability in the Brazilian banking market should be made. Firstly, suppose that $Competition = h_1(NumberOfBanks)$ and $NumberOfBanks = h_2(TotalIncome)$. Then, it is possible to infer whether there is variation in the level of competition from the number of banks and total income. This query can be analyzed with the model proposed by Bresnahan and Reiss (1991).⁴

Thus, this paper is divided as following. The next section explains more thoroughly this paper's identification strategy. Next, the model used for inferring competition variability in the banking industry across Brazilian municipalities will be explained. Section 4 reviews the credit market in the last decade, when the "Interest and Banking Spreads in Brazil" project was first implemented, in order

⁴ This inference strategy is very similar to the one used in Coelho (2007). The difference here is that per firm entry-thresholds for the banking sector as a whole will be estimated, not only for private banks.

to reduce the high loan rates charged and promote credit dissemination in the country. Section 5 covers the dataset used in this paper for the estimation of both banking competition and impact of credit expansion on economic growth parts. Finally, section 6 presents the results and 7, the concluding remarks.