

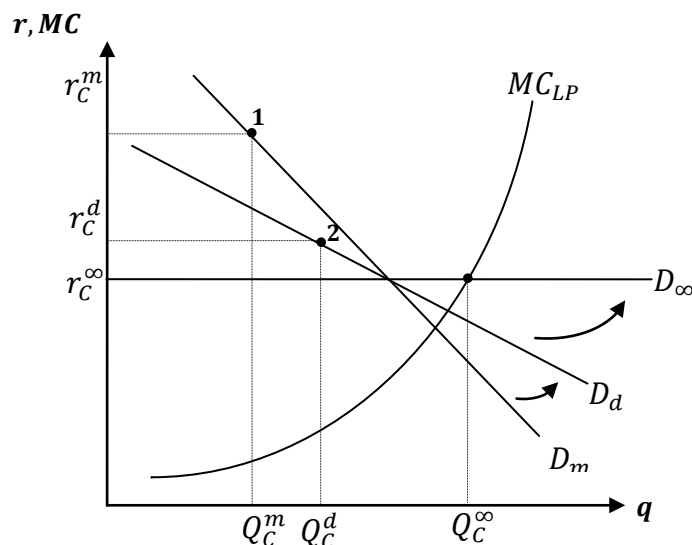
## 2 Identification Strategy

In this section, we will delve further into the details of how bank competition can induce a higher credit supply. Firstly, when many banks interact in a given market, different competitive structures can arise. On one extreme lies a monopolist, where only one bank is present in that market and it can set loan rates ( $r_C^m$ ) that maximize their profits disregarding the reaction of its competitors, supplying an inferior amount of credit ( $Q_C^m$ ). Note that this rate surpasses its marginal cost. When this setting involves more banks, this structure would imply a cartelized industry. On the other extreme lies perfect competition, where every bank in that market takes the loan rates ( $r_C^\infty$ ) as given. With the intense banking competition in this case, banks are required to bring their rates to their marginal costs. Therefore, monopoly rates are higher ( $r_C^\infty < r_C^m$ ) as well as perfect competition's credit supply ( $Q_C^\infty > Q_C^m$ ). Between these extremes lie the oligopolistic regimes, with rates and quantities lying somewhere between those poles.

However a question still remains: how does bank entry occur? The discussion above considers a fixed market size. With high barriers to entry, it is very possible to rationalize a large market with a single bank. However, in the lack of those it is likely that banks enter as long profits are positive, reducing those of the incumbent. This represents an increase in competition in this market.

Nevertheless, how should this competition degree vary? Figure 1 below analyses the competition dynamics in a market large enough to support a perfectly competitive regime. For a given market size, competition variation, or margins changes, are associated to market demand elasticity changes, here represented graphically by the curve's rotation. These changes arise from barrier to entry, which means that the greater these barriers, the fewer the firms in the market.

Figure 1 Competition Variability



In the monopolist example, when a second bank enters, competition should vary more than the perfect competition regime, since, in the latter, entry should not bring any impact to banking competition. Observe in figure 1 how margins<sup>5</sup> adjust from monopoly to duopoly. In an oligopolistic regime, this demand rotation could either be smooth, in which competition intensifies gradually as banks enter, converging to perfect competition, or abrupt, in which rotation might not occur, depending on how this market structure is formed. This rotation can be highly non-linear<sup>6</sup>.

One of this paper's main objectives is to present an identification strategy for credit in the growth regression. Competition variability, represented by the number of banks, could serve as a tool for identifying credit, since it clearly affects income per capita indirectly through loans, a variable of great interest to banks. Besides, this variability also affects credit stock, possibly non-linearly. For example, return to figure 1. In case entry occurs and no competitive variation happens, demand would not rotate and equilibrium would remain the same. Otherwise increase in competition would induce lower rates charged as well as higher credit supply. The greater the rotation, the greater both the increase in credit and the margin decline. With a lot of heterogeneity in this variation, the more non-linear credit is on banks. Note that this fact corroborates the credit identification in the growth regression: the more heterogeneous the degree of

<sup>5</sup> Defined by the difference between price and marginal cost.

<sup>6</sup> Observe this analysis disregards completely the effects of the ties banks and firms can form, making even more relevant to evaluate empirically the effects of competition on credit supply.

competition variation, the more important the non-linearity of banks in credit supply. Cetorelli and Gambera (2001) find evidence that concentration affects growth non-linearly and intermediate levels of concentration will induce optimal growth.

Note that even though an instrument to identify credit in the growth regression is necessary, it must also be exogenous in the system. This means that income per capita unobservable shocks must be unrelated to the instrument, number of banks. Also, the identification strategy used here considers bank entry in a market as determinant of the competitive regime. Therefore, it is necessary to analyze how bank entry occurs as market size varies.

Now, we will consider here that, given barriers to entry, banks enter as markets grow. In other words, banks will enter as long as profits are non-negative, which means that the market size should be large enough under the municipality structural environment to prevent the bank from incurring losses. Considering that from the bank's perspective what matters is the potential of deposits, the market size variable chosen will be total income. Note also that emphasis should be given to total income, not per capita. Furthermore, observe that both measures can be quite distinct. The former disregards any difference between individuals' income or its distribution, depicting only how much income is generated; the latter shows the town's mean income. If a bank paid attention to mean income, it would consider equal markets with the same income per capita, but with different population sizes, neglecting the potential of deposits of the municipality with a larger population.

Finally, wouldn't increases in income per capita cause higher total income? Here it will be argued that the answer lies in the very income per capita: population size. Imagine two cities in Brazil with the same total income: one in the northern region and the other in the south. In a given year, it is more likely that the city in the south needs fewer individuals to reach such income than the one in the north of the country. Thus, increases in income per capita do not necessarily mean the same for total income. Besides, this argument is reinforced under a cross-section analysis, since it would lose credibility under a time series or a panel context. Moreover, the correlation between per capita income and total income in Brazilian municipalities is 0.1594, corroborating the above analysis.