

# **COMPETITIVENESS OF THE COMMERCIAL CREDIT MARKET: MEASURING MARKET BEHAVIOR IN MEXICO**

## **Abstract**

Competitiveness in the commercial credit market is an essential characteristic that generates lower interest rates and allows people a greater opportunity to smooth their consumption over time. However, international reports argue that the Mexican credit market is not competitive, which has limited its benefits. In order to generate greater competitiveness in the sector, the Federal Government in Mexico undertook a Financial Reform in 2014.

This research takes elements from the Panzar & Rosse model (PR) and the Sullivan approach (SA), two methodologies among industrial organization theory, in order to identify if the commercial credit market in Mexico is competitive. On the one hand, PR indicates how changes in inputs' prices can affect the equilibrium revenues for institutions and based on this determine the market structure. On the other hand, SA uses the PR model but simplifies the analysis to determine the minimum number of firms required for having a competitive market. Based on the available data, this thesis follows the SA and analyzes the market structure of credit institutions in credit cards, personal loans, payroll loans, auto loans, and mortgages, separately. The results will allow testing the null hypothesis of a monopolistic structure, and therefore the non-existence of a perfectly competitive market. Based on the results, public policy reforms are suggested in order to make the regulation and measurement of commercial credit competition more efficient.

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## **CHAPTER I INTRODUCTION**

In the 1980s, the Mexican government took on the ambitious goal to be recognized as a more competitive country, with greater capabilities to attract foreign investments and to be seen abroad as a fully developed nation, leaving behind the poor growth and economic instability that had characterized the country in the prior two decades (Avalos & Hernández, 2006). Under this reforming ideology, the government carried out various actions aiming to boost the national economy. Among the principal actions taken by the President Carlos Salinas de Gortari was to refinance the external debt under better credit conditions, sign the North American Free Trade Agreement (NAFTA), and to privatize various sectors of the economy that were administered by the government, including telecommunications, steel industry and commercial banking (Murillo J. A., 2002).

Under this context, two main reasons forced the privatization processes to be carried out in a fast-tracked way in Mexico. First, NAFTA came into force in 1994, and the agreement required free trade in the sectors controlled by the Mexican government until that time. The US and Canadian governments indirectly urged Mexico to accelerate the privatization process in those sectors. In later years, the former President Carlos Salinas de Gortari declared that there was an ideological incompatibility between the idea of being a country that attracts foreign investment, participates in the NAFTA, and yet has state-controlled companies. Second, the government carried out huge infrastructure investments during the last years of the 1980s and early 1990s, which generated a deficit of 6.72% of GDP in 1992, according to World Bank data. For this reason, privatizations were seen as a source of additional revenue, which helped the government to face the federal deficit (Haber, 2005).

Regarding the commercial banking privatization, the process was made using auction schemes, allowing both domestic and foreign investors to participate. Due to the auctions scheme and the interests of the government in generating the greatest possible profits, state-owned banks were ceded to those bidders with more resources, without paying attention to the future competitiveness in the market. Several small banks were bought by large consortiums and merged into a single and large new bank. According to Haluk & Navarro (1999), the efforts made in 1992 by the government were only focused on accelerating the banking privatization process, without giving importance to who was buying the state-owned banks and without establishing new regulations to accompany the purchases by private agents.

A more competitive commercial bank sector allows greater channeling of savings from depositors to people who have opportunities to invest in projects that require capital in the short term, or who simply want to smooth their consumption along different periods, both of which generate economic growth. There are other studies that show that not only is the commercial banking sector concentrated in Mexico, but it is also not competitive (Negrin, et al, 2006). However, the studies carried out to date measure concentration and competitiveness, making an analysis based on methodologies that consider only the size of the assets of the banks.

It is frequently assumed that the entire available assets from commercial banks can be used to grant credits or loans to anybody. Fortunately for the purposes of this thesis, the National Banking and Securities Commission (CNVB by its acronym in Spanish) has data on the amount and weighted average interest rates of all the credits and loans granted by period. Moreover, not only is the commercial bank information published, but also the information relative to any credit institution that has granted a loan, such as Multi-Purpose Financial Societies (SOFOMES for its acronym in Spanish), department stores, car leasing companies, and mortgage institutions. Finally,

the CNBV has disaggregated information for different types of credits, such as credit cards, payroll loans, personal loans, auto loans and mortgages.

In this way, the objective of this research is to identify the behavior of credit institutions, if they behave as independent firms that generate a perfectly competitive sector, or if they have a behavior in which they collude, thus coordinating the observed outputs and prices. This analysis is done for all the credit institutions that participate throughout different sectors, such as credit cards, personal loans, payroll loans, auto loans and mortgages. In order to carry out this research, a methodology similar to that used by Sullivan (1985) is followed. The Sullivan approach tests the behavior of participating firms in the market. The null hypothesis indicates that companies act in a coordinated manner. This methodology assumes a Cournot market specification, uses conjectural variations and reduced form equations, allowing to identify the minimum number of firms that generate the number of credits and loans granted, at the observed weighted average interest rates. The literature review section also contrasts to a highly used model to measure the competitiveness of markets, the Panzar & Rosse model (1977), and the reasons why this methodology has not been chosen for the Mexican case.

The rest of this research document is organized as follows. Chapter II provides an overview of the Mexican commercial credit market, its evolution, structure, performance, the current concentration indexes, and the possible factors that currently are damaging the market. Chapter III analyzes the literature review, contrasts the Panzar & Rosse model and the Sullivan approach, and identifies gaps in the literature. Chapter IV deals with the general description of the data, the model specification and the reasons why that specification fits the Mexican case. Chapter V presents the results and applies robustness tests that simulate changes to the parameters according to possible shocks in the market. Chapter VI provides concluding remarks and policy recommendations that

could be applied by the Mexican authorities to promote the competitiveness of the commercial credit market. Appendices are presented at the end of the document, such that tables and figures in it can clarify and extend the content of this document.

## **CHAPTER II OVERVIEW OF THE MEXICAN COMMERCIAL CREDIT MARKET**

### **2.1 Background**

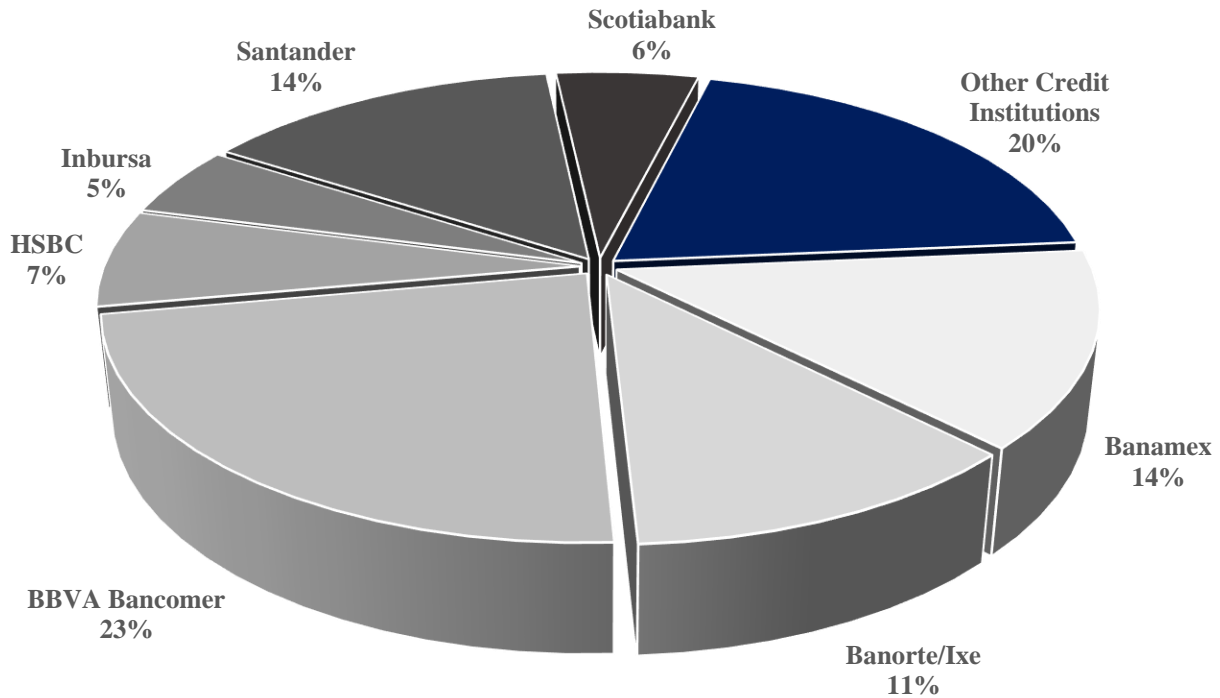
The privatization of the banking sector in the late 1980's was seen by the Mexican government as a business where banks were sold to large consortiums, without a tied federal regulatory framework. In this sense, both the government's business vision and the lack of adequate regulation led to two major problems. First, during the last years of the twenty-first century, there was a huge number of mergers and strategic acquisitions within the commercial banking sector, whose purpose was to increase the participation of banks and the largest generation of profits. Appendix A shows a map that identifies the mergers that were carried out between 1990 and 2015. It can be observed in it the formation of the so-called G7 group (*BBVA Bancomer, Santander, Banamex, Banorte Ixe, HSBC, Scotiabank, and Inbursa*), which are the biggest commercial banks in Mexico. Also, Appendix A shows the evolution of mergers and acquisitions among the G7 group between 1990-2017.

It is important to note that by June 2017, the G7 group accounted for 80% of the total assets in Mexico, corresponding to \$6.04 trillion pesos (\$302 billion dollars). Specifically, the three largest commercial banks owned more than 51% of total assets (Figure 1)<sup>1</sup>.

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<sup>1</sup> In 2018, *Banorte* will merge with *Interacciones*, which will make it the second biggest financial group in Mexico.

**Figure 1. Distribution of the Assets of Commercial Credit Institutions, October 2017**



Source: Own elaboration, with information from the CNBV's website.

Second, in order to accelerate the NAFTA process, Mexico yielded to Canadian and American pressures to allow the participation of transnational banks from these countries without any restriction on the capital that these could invest in the country. Although NAFTA agreement rules that foreign institutions can only invest up to 30% of the ordinary capital in national commercial banks:

*“Aggregate foreign investments in holding companies and in commercial banks are limited to 30 percent of common stock capital (“capital ordinario”).”*

A second clause was also included, indicating that the foregoing did not apply if foreign investments were carried out through a Mexican subsidiary<sup>2</sup>:

<sup>2</sup> For more information see: <https://www.nafta-sec-alena.org/Home/Texts-of-the-Agreement/North-American-Free-Trade-Agreement?mvid=1&secid=b55964ef-f08f-4554-a1a9-9bc888941cdc>

*“These percentage limits do not apply to investments in foreign financial affiliates...”*

As a consequence, large international institutions acquired less than 30% of the assets of small Mexican banks, formed an affiliation, and subsequently acquired the majority of the assets of that same bank, given that affiliations were no longer subject to the first clause (Haber, 2005). For example, that is how *Scotiabank* bought *Inversiones Lationamericanas (Inverlat)* in 1996, and how *Citibank Group* bought *Banco Confía* in 1998, and they began to operate in Mexico. Although the former is not necessarily bad in terms of harming the local market, it is also true that the lack of regulation and the privatization of commercial banking through an auction scheme created the perfect conditions for large foreign investors to gain a privileged position within the Mexican market, establishing indirect entry barriers for small national investors (Haluk & Navarro, 1999).

Finally, a third characteristic of the Mexican case is the immense spread that exists between the short-term interest rates<sup>3</sup> and the average interest rates at which credits are granted. In other words, there is a substantial difference between the rates paid to savers who invest their resources in the short run and the rates they must pay when getting a commercial credit or loan. The average spread between June 2010 and October 2017 was 23%. Nonetheless, if it is analyzed in detail according to different types of credits, the gap with respect to mortgages is 6%, and there is a gap of 8% with respect to auto loans. In the case of personal and payroll loans, the difference reaches levels of 28% and 25%, respectively. In the case of credit cards, there is an alarming gap of 42% (Figure 2), while in countries this spread is much smaller. For example, the credit cards spread in the United States is between 15% and 17%<sup>4</sup>.

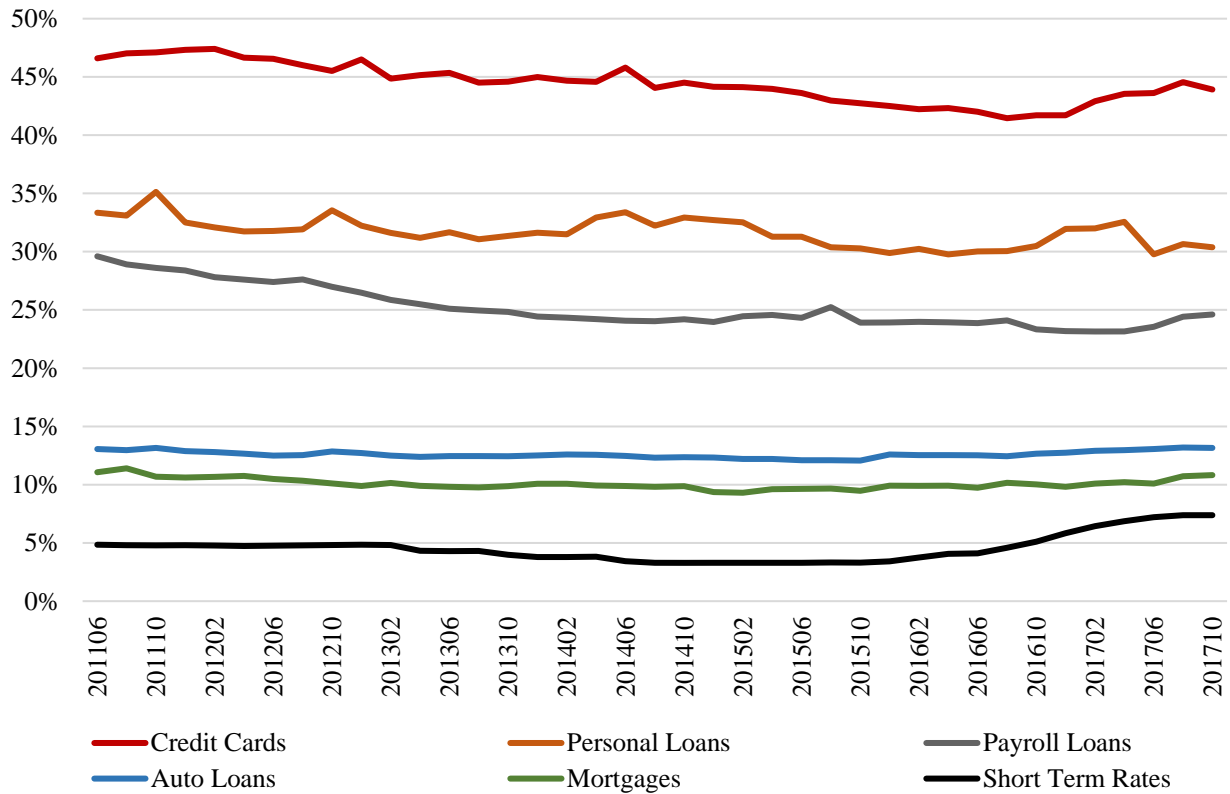
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<sup>3</sup> According to the OECD, short-term interest rates are “the rates at which short-term borrowings are effected between financial institutions or the rate at which short-term government paper is issued or traded in the market. Short-term interest rates are generally averages of daily rates, measured as a percentage”.

<sup>4</sup> For more information see: <https://www.valuepenguin.com/average-credit-card-interest-rates>



**Figure 2. Interest Rates for Commercial Credits, October 2017**



Source: Own elaboration, with information obtained from the CNBV's website.

As a result, the government's efforts only focused on having a successful process of privatization, carrying it out in the shortest possible time, and maximizing the profits derived from the sale of national banks. However, it seems that the government only intervened in the initial stage of this process, without establishing the necessary regulations for the new private system of commercial banking to be competitive in the medium and long-term. As a result, banks with foreign capital have considerably dominated the commercial credit market, which seems to have allowed them to obtain extraordinary profits due to the spreads in the interest rates paid by their customers.

## 2.2 Concentration in the Commercial Credit Market

Several studies indicate that the credit institutions concentration has generated extraordinary gains for firms' owners, which have not translated into an improvement in the quality of the services offered to Mexicans (Yildirim & Philippatos, 2007). Greater competition within the financial sector generates a reduction in the interest rates that are paid by the sector's users. Additionally, greater competition within the sector promotes the creation of new financial products according to the characteristics of the clients' payment capacity. Among the various financial products, there are different types of commercial credits, which facilitate people's consumption, since they allow credit users to smooth their consumption levels over time. With this in view, it has been suggested that authorities have to be concerned about the competitiveness levels and their impact on interest rates and consumption indicators (Shaffer, 1989). In the case of Mexico, awareness of the situation was captured through the 2014 Financial Reform<sup>5</sup>, where one of its five purposes was "to modify the legal framework in order to increase competition levels among private institutions that grant access to the credit market"<sup>6</sup>.

However, Bikker & Haaf (2002) agree with the World Bank (2003), emphasizing that "There is not a single accepted measure of bank competition. For lack of a better measure, an index of bank concentration is often used as an indicator of bank competition". For this reason, in several countries, regulatory authorities have decided to handle this issue using concentration measures. The ideal way to estimate concentration would be the Lerner index, which measures the market power of each company. The Lerner index requires information such as the market price of the products and the marginal cost of each company. However, this information is difficult to obtain

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<sup>5</sup> Enacted in January.

<sup>6</sup> For more information regarding the purpose of the Financial Reform, [https://www.gob.mx/cms/uploads/attachment/file/110408/PNIF\\_ver\\_1jul2016CONAIF\\_vfinal.pdf](https://www.gob.mx/cms/uploads/attachment/file/110408/PNIF_ver_1jul2016CONAIF_vfinal.pdf)

and in some cases, it lacks veracity. Another way to measure concentration, and perhaps the most commonly used indicator, is the Herfindahl-Hirschman Index (HHI), which is a measure of the size of firms in relation to the industry. It ranges from 0 to 1, where lower levels indicate no concentration, while higher levels indicate an extremely concentrated market (Herfindahl, 1950; Hirschman, 1945).

In this regard, in the United States, the Federal Trade Commission (FTC) and the Department of Justice worked together to define thresholds that are considered suitable for mergers and acquisitions. If an industry's HHI is less than 0.15, the FTC guidelines suggest that a competitive market exists. The 0.15-0.25 interval indicates a moderately concentrated market, while an HHI greater than 0.25 indicates a highly concentrated market. In addition, the FTC prevents any merger or acquisition of companies from being executed if that increases the HHI by 0.02 points. Although these thresholds apply to all types of markets and not only the banking sector, this system has effectively worked in the United States, given the flexibility that the authorities have to analyze each case in detail.

Regarding competition levels measurement, the Mexican case is particular. As a consequence of the Financial Reform, in 2016 the Federal Commission of Economic Competition (COFECE by its acronym in Spanish) established different scenarios to evaluate competition levels, which can be confusing. In general, COFECE prevents mergers or acquisitions if the HHI increases by 0.01 or if the HHI is higher than 0.25. Even if those standards are not met, COFECE established a clause where it may allow a merger as long as participating companies justify that they are competing with each other the potential benefits from acquisitions or mergers<sup>7</sup>.

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<sup>7</sup> Technical Criteria for the Calculation and Application of a Quantitative Index to Measure Market Concentration, DOF 14-05-201, [http://dof.gob.mx/nota\\_detalle.php?codigo=5392185&fecha=14/05/2015](http://dof.gob.mx/nota_detalle.php?codigo=5392185&fecha=14/05/2015)

Nevertheless, as noted in the literature review, it is possible that there are highly concentrated markets with few participants that compete on prices, such that the null hypothesis of collusion could be rejected. This is, concentration and competitiveness can coexist simultaneously. According to the Antitrust Source (2017), this is the reason why COFECE created the clause that allows markets to operate with an HHI greater than 0.25, as the institution knows this scenario could happen. However, two facts raise questions of impartiality and third parties' interests. First, the lack of explicit procedures for firms to show that there is competition, even though the HHI is greater than 0.25; Second, the lack of specific criteria under which COFECE can approve a merger if the HHI is greater than 0.25.

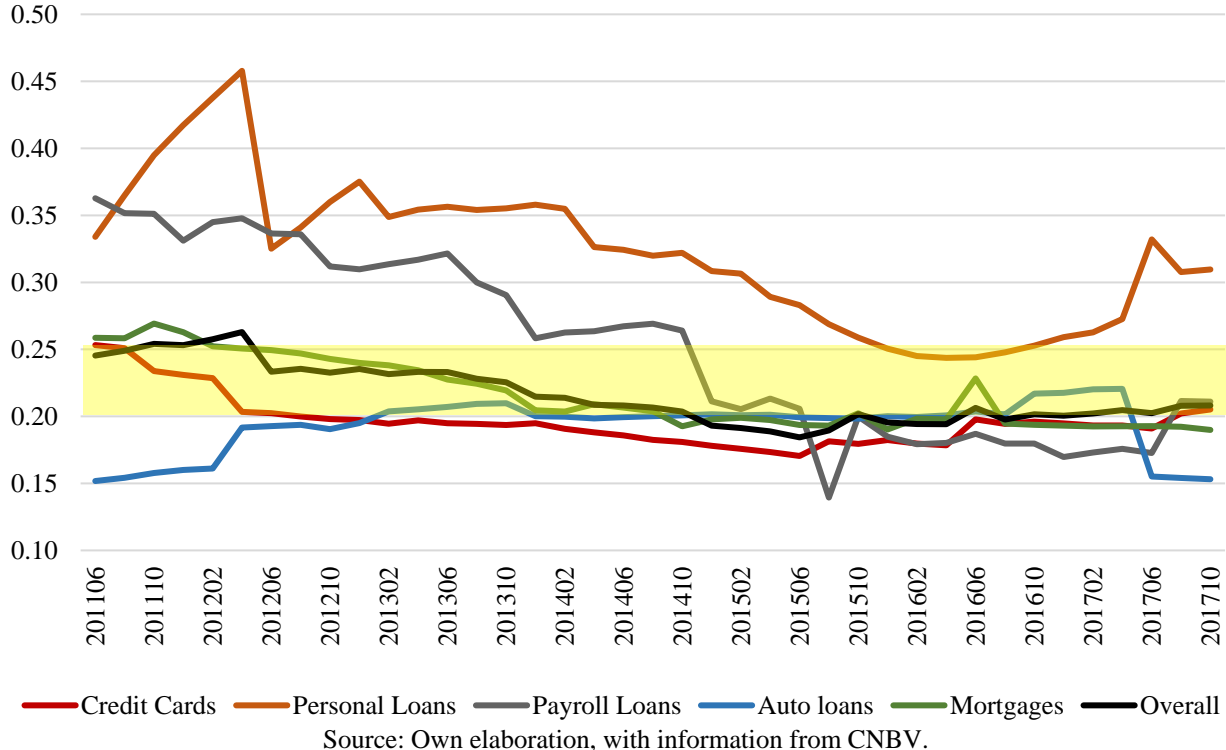
Figure 3 shows the HHI levels since June 2011. The HHI of the overall credit market is published by the CNBV, while the rest of the indicators were estimated based on public information. When analyzing the overall HHI levels, it can be observed that the credit market index is within the permitted levels. In October 2017, the HHI was 0.21. Likewise, since June 2012, the HHI of the overall sector has been acceptable levels, according to the CNBV. Authorities have limited themselves to mention that the commercial banking sector presents a slight concentration. However, the CNBV performs monthly stress tests for all credit institutions, simulating systemic risks derived from defaults. The results indicate that all the credit institutions approve the tests, there is no systemic risk, despite the fact that the commercial banking sector presents a slight concentration. (Comisión Nacional Bancaria y de Valores, 2017).

However, this presents three problems. First, the stress tests are carried out taking the total of the assets, but it is possible that a systemic risk could be started within a specific type of credit and then spread to the rest of the credit institution. For example, defaults initiated in mortgages might affect the total liquidity of the bank, as happened in the financial crisis of 2008. Second, as already

mentioned, the HHI is a measure of concentration and not competition, so both can or cannot coexist. That is, low levels of concentration do not necessarily involve competition. Second, although the HHI is only a measure of concentration, it allows seeing the huge contrast that exists with other types of credits, such as personal loans. It is possible that the HHI is biased due to a large number of credits offered, although most of them are granted by a few firms.

For this reason, it is convenient to analyze each type of credit separately. Data might have a problem over time due to abrupt changes in the HHI, however, even that, interesting things can be concluded from the previous graph. In October 2017, the payroll credits subsector presented an HHI of 0.23, while the credit cards subsector of 0.21, both within the limits for slightly concentrated markets. On the other hand, mortgages and auto loans subsectors are ranked among competitive markets category, with an HHI of 0.19 and 0.15, respectively. In contrast, the personal loans subsector is highly concentrated, having an HHI of 0.31.

**Figure 3. HHI levels, Concentration of Commercial Credits, June 2011-October 2017**



Source: Own elaboration, with information from CNBV.

Consequently, even with the reforms implemented, various reports consider Mexico as a non-competitive country within the financial sector (Index of Economic Freedom<sup>8</sup>, 2018; IMD World Competitiveness Rankings, 2017). Hence, it is pertinent to apply a methodology that allows us to measure the competitiveness. In particular, this research is focused on the commercial credit market in Mexico. Once a uniform measurement of competitiveness is generated, future regulation in terms of competition for each type of commercial credits could be improved. This could help the Mexican authorities to implement policies that promote greater competition in the credit market, increase the general levels of financial inclusion, reduce the high-interest rates presented in the Mexican scenario, and increase consumption levels. The present research and findings could be extrapolated not only to the commercial credit markets of other countries but also to diverse markets, such as pharmaceutical, telecommunications, amongst others.

## **CHAPTER III LITERATURE REVIEW**

### **3.1 Panzar & Rosse Model**

The present project is inspired by Panzar & Rosse (1977) and Sullivan (1985). The former shows that, through a comparative static analysis on the general supply and demand information of a group of companies, it is possible to know if firms have a perfectly competitive behavior, they behave as monopolistic competitors, or they are totally colluded. To do this, the PR model obtains the conjectural variations of the companies and assumes the existence of well-behaved supply and demand functions, that is, first derivatives with the expected behavior. PR uses market information: the total revenues of participating firms, the input prices used in production and

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<sup>8</sup> Under the “Financial Freedom” category, Mexico is ranked 60.0, which corresponds to a “Mostly unfree-Moderate-free” level.

analyzes income elasticities with respect to changes in the input prices. If the sum of the elasticities equals 1 then the market is competitive (increases in the input prices generates proportional increases in revenues). However, if the sum of elasticities is between 0 and 1 then there is a monopolistic competition (increases in the input prices increase less than proportionally the revenues). Finally, if the sum of the elasticities is zero or negative then there is a monopolistic market (increases in input prices reduces the firms' revenues).

The PR is an empirical approach, and one of its main applications has been developed in the banking sector across different countries. For example, it has been applied in developed countries, such as the United States (Shaffer, 1982), Canada (Nathan & Neave, 1989) and Germany (Hempell, 2002). Similarly, it has been applied to developing countries such as Brazil (Belaisch, 2003), Mexico (Negrin, et al., 2006) and Mongolia (Purevjav & Kim, 2013). The conclusions of these studies agree on the existence of monopolistic competition in their respective countries.

However, based on previous studies, to contrast the degree of competitiveness between the countries would be erroneous because each one used a different approach, considered different dependent variables (total revenues, total interest revenues, total revenues for loan losses, ratio of total revenues over assets), as well as different control variables (economies of scale, demand, risk, business mix, market share, size of banks) based on the information available in each country. Furthermore, the nature of PR uses the aggregated data from any market and concludes its competitiveness level, without analyzing each subsector in it.

Therefore, applying this approach to the Mexican market could generate distortions, since there are credit institutions which exclusively offer specific types of credits. For example, analyzing the entire Mexican market would imply to simultaneously analyze the competitiveness of 114 credit institutions, while only 32 institutions participate in the credit cards subsector, and

26 in the mortgage subsector. Therefore, there is a high likelihood that the result of the entire market indicates a perfectly competitive behavior, regardless of whether the behavior of the credit cards subsector is monopolistic, or there is collusion behavior in mortgage subsector. Considering areas of opportunity in PR's model, Bikker, et al. (2012) suggest a more robust analysis. By using data over 20 years, 63 countries and 17,000 banks, conclude that the PR model is not always suitable to measure the degree of bank competition, arguing that the PR model requires additional information (costs, non-measurable exogenous variables, better control by the size of banks, etc.) to obtain results with greater accuracy.

### **3.2 Sullivan Approach**

In contrast to the PR model, Sullivan (1985) points out that conjectural variations can also be used to identify the behavior of the firms. That is, regardless of the real number of firms that participate in the market, the SA identifies the behavior of the firms, if they are coordinated and therefore acting together. The null hypothesis of the SA is that companies behave as a monopoly. In other words, Sullivan points out that the observed outputs and equilibrium prices could only have been generated if the companies behaved in a monopolistic way. In case of rejecting the null hypothesis, it is concluded that the companies are not coordinated and therefore do not collude.

It is important to note that SA does not identify if a market is competitive or not, it only allows to reject the null hypothesis that indicates a monopolistic behavior in the market. That is, if the null hypothesis cannot be rejected, then a monopolistic behavior prevails in the market and therefore it is not competitive. The advantage of Sullivan's approach in comparison to the general PR model is that it allows each type of credit to be analyzed individually. On the other hand, Sullivan's generalized model suggests that is feasible to compare results amongst countries, given that the information it uses only depends on equilibrium quantities and prices, without discussing



particularities of each region that affect the demand and supply functions. Moreover, Sullivan presents a general cost function, which allows including the existence of taxes that are reflected in the equilibrium amounts and prices, what in turn impacts the number of firms participating in the market.

Sullivan applied his methodology in the American tobacco market. He analyzed 153 tobacco firms that participated in the market and found that these firms were behaving as only 2.88 main firms that led the market (assuming zero marginal costs). This meant that at least nearly 3 big groups were formed among the 153 firms, that groups decided the observed outputs and prices, which allowed to reject a monopolist behavior. Likewise, he carried out a sensitivity analysis, increasing both the marginal costs and the tax rates imposed by the government, without generating unexpected results. In all cases, it was significantly rejected that firms were not behaving as a single monopolistic tobacco supplier in the market.

Following a methodology similar to Sullivan, Goldberg & Knetter (1999) analyze beer exports in Germany and corrugated paper in the US. They modify the model presented by Sullivan and obtain the residual elasticity of the demand that exports face in each country of destination. Regarding beer market, it is concluded that the residual demand in each country of destination is related to perfect competition behaviors (which is consistent with the actual large number of local beer producers). Regarding the exports of corrugated paper from the US, it is concluded that the residual demand reflects an imperfect competitiveness behavior (which makes congruence, since there are countries that are net importers of this product).

On the other hand, Hannan & Liang (1993) use the same approach to analyze the behavior of the short and long-term deposit market, based on information from 300 randomly selected banks in the US. They manage to identify that the money market deposits banks are not price takers, that

is, there is a slight degree of monopolistic competition, while in the long-term certificates there is a competitive behavior. In contrast, Kim & Cotterill (2008) makes a comparison between a structural model and a model similar to that of Sullivan (reduced-form model), concluding that the latest models may bias the results. These authors determined that for the cheese market in the US, changes in costs have greater effects on consumers when the market behaves under a Nash-Bertrand competition compared to Cournot's competition model. However, using a reduced-form methodology the effects are not captured straightforwardly. Finally, Ledvina & Sircar (2011) made a similar analysis, however, they assumed asymmetric linear marginal costs to define the number of active companies, whereas this thesis uses the average short-term rates.

### **3.3 Gaps in Literature**

In this regard, this project resumes the PR model, but analyzes the behavior of credit institutions individually and not aggregated. Unlike the PR studies carried out so far, it is proposed to investigate separately the market structure of the credit cards, personal loans, payroll loans, auto loans and mortgages, without assuming that all available assets are only used for a single category of loans. In addition, considering the criticisms made to the PR model, the analysis will be made using the flexibility of Sullivan's approach.

However, this research goes further and innovates, since studies based on SA usually assume minimal and constant marginal costs for each firm. In this case, this project proposes to use variable marginal costs over time, considering that the vast majority of credits granted in Mexico follow a variable rates scheme. In conclusion, this document summarizes the principles used both by PR and SA; adds an analysis of the specific commercial credit markets and allows variable costs to be assumed according to the reality of the credit sector in the country.

## CHAPTER IV METHODOLOGY

### 4.1 Data

Following SA, the data needed corresponds to the number of credits or loans granted by each bank, the price at which these were made (weighted average interest rate to be paid by the clients), as well as the short-term rates that banks faced. The data in this study corresponds to the five types of financial products offered in Mexico, namely:

- 1) Credit Cards,
- 2) Personal Loans,
- 3) Payroll Loans,
- 4) Auto Loans, and
- 5) Mortgages.

All necessary information is public and was retrieved from the CNBV's website<sup>9</sup>. However, CNBV is only responsible for gathering the information that the credit institutions must submit, but it does not have the right to challenge its quality, neither require banks to modify their information if there is any inconsistency. In this case, if the original data from credits granted or weighted average interest rates presented atypical values or typing errors, according to personal criteria, some observations were dropped and in some other cases a linear combination was used to replace that values, based on the information corresponding to the immediate previous period and the immediate subsequent period. On the other hand, the CNBV has not made the databases compatible over time, so people interested in consulting this information should pay special

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<sup>9</sup> <http://www.cnbv.gob.mx/Paginas/Informacion-Estadistica.aspx>

attention in the case of institutions that have been merged, that have changed their legal and business name, or firms who report information through their subsidiaries.

## 4.2 Descriptive Statistics

Table 1 shows the mean and standard deviation of the three variables used for this research, according to each type of financial product. Appendix A contains a table of the major modifications that were applied to the original data, as well as some descriptive statistics.

**Table 1. Output, Prices and Short-Term Rates Statistics**

	<b>Credit Cards</b>	<b>Personal Loans</b>	<b>Payroll Loans</b>	<b>Auto Loans</b>	<b>Mortgages</b>
<i>Quantity</i>					
Mean	1,246,233	341,042	375,053	31,864	55,577
StdDev	1,988,509	1,005,968	518,575	69,856	88,499
<i>Price</i>					
Mean	44.36	31.56	25.01	12.61	10.41
StdDev	11.27	25.09	6.84	3.67	1.62
<i>Short – term rates</i>					
Mean	4.51	4.60	4.56	4.59	4.59
StdDev	1.18	1.26	1.19	1.22	1.05
<i>N</i>	691	1,138	477	1,060	1,546
Periods	39	40	40	40	101
Frequency	Bimonthly	Bimonthly	Bimonthly	Bimonthly	Monthly
Dates	06/11-10/17	04/11-10/17	04/11-10/17	04/11-10/17	07/09-11/17
Credit Institutions	22	43	15	40	26

Source: Own elaboration, with information from CNBV.

In all cases the expected relationship is observed: That is, a negative correlation between the short-term rates and the amounts of credits/loans granted, as well as a positive correlation between the short-term rates and the prices of these loans. This is because increments in short-term rates would lead to a decrease in the number of credits offered, as the short-term rates are channeled

through increments in prices, so people would have lower incentives to ask for a loan. However, the correlation proved to be weak between short-term rates and quantities, regardless of the type of financial product, as shown in Table 2.

**Table 2. Pearson's Correlation between Quantities/Prices and Short-Term Rates**

	<b>Credit Cards</b>	<b>Personal Loans</b>	<b>Payroll Loans</b>	<b>Auto Loans</b>	<b>Mortgages</b>
<i>Quantity</i>	-0.14	-.024	-0.12	-0.09	-0.36
<i>Price</i>	0.86	0.72	0.78	0.63	0.48

Source: Own elaboration, with information from CNBV.

### 4.3 Model Specification

The model specification follows the methodology used by Sullivan (1985), applying the same steps to the Mexican financial sector. Each  $i$  credit institution faces a profit maximization equation, where revenues are given by the interest rates that are paid by borrowers, times the number of credits and loans granted. The costs are given by a fixed cost, the cost of funding each granted credit, and an individual variable cost of each credit:

$$\pi_i = P[Q(r)] \cdot q_i(r) - TC_i[q_i(r)]$$

$$Q(r) = \sum_i q_i(r)$$

$$TC_i[q_i(r)] = FC_i - r \cdot q_i(r) - VC_i[q_i(r)]$$

$$\pi_i = P[Q(r)] \cdot q_i(r) - FC_i - r \cdot q_i(r) - VC_i[q_i(r)]$$

The maximum profits are given the first order condition, where each firm maximizes its profits subject to its perceptions of how other firms' outputs will respond to its own. These perceptions

are summarized by the quantities  $\alpha_i(r) = \sum_{j \neq i} \frac{\partial q_j(r)}{\partial q_i(r)}$ . Therefore  $1 + \alpha_i(r) = \frac{\partial Q(r)}{\partial q_i(r)}$  represents the change in the total output given small changes in the output chosen by the  $i$  credit institution.

$$\frac{\partial \pi_i}{\partial q_i(r)} = \frac{\partial P[Q(r)]}{\partial Q(r)} \cdot \frac{\partial Q(r)}{\partial q_i(r)} \cdot q_i(r) + P[Q(r)] - r - \frac{\partial VC[q_i(r)]}{\partial q_i(r)}$$

$$\alpha_i(r) = \sum_{j \neq i} \frac{\partial q_j(r)}{\partial q_i(r)} \quad \rightarrow \quad 1 + \alpha_i(r) = \frac{\partial q_i(r)}{\partial q_i(r)} + \sum_{j \neq i} \frac{\partial q_j(r)}{\partial q_i(r)} = \sum_j \frac{\partial q_j(r)}{\partial q_i(r)} = \frac{\partial Q(r)}{\partial q_i(r)}$$

$$\frac{\partial \pi_i}{\partial q_i(r)} = \frac{\partial P[Q(r)]}{\partial Q(r)} \cdot [1 + \alpha_i(r)] \cdot q_i(r) + P[Q(r)] - r - MC_i[q_i(r)] = 0$$

Is possible to simplify the previous equation, by  $P'(r) = \frac{\partial P[Q(r)]}{\partial Q(r)} \frac{\partial Q(r)}{\partial r}$ , the change in prices with respect to short-term interest rates changes, and  $Q'(r) = \frac{\partial Q(r)}{\partial r}$ , the change in total output with respect to short-term interest rates changes.

$$\frac{\partial \pi_i}{\partial q_i(r)} = \frac{\partial P[Q(r)]}{\partial Q(r)} \frac{\partial Q(r)}{\partial r} \frac{\partial r}{\partial Q(r)} \cdot [1 + \alpha_i(r)] \cdot q_i(r) + P[Q(r)] - r - MC_i[q_i(r)] = 0$$

$$\frac{\partial \pi_i}{\partial q_i(r)} = \frac{P'(r)}{Q'(r)} \cdot [1 + \alpha_i(r)] \cdot q_i(r) + P[Q(r)] - r - MC_i[q_i(r)] = 0$$

For simplicity, even though each firm faces its own marginal costs, such as administrative expenses, we can assume that all credit institutions face a minimum marginal cost, let's say  $c$ .

$$MC_i[q(r)] \geq c$$

$$\frac{P'(r)}{Q'(r)} [1 + \alpha_i(r)] q_i(r) + P[Q(r)] - r - c \geq \frac{P'(r)}{Q'(r)} [1 + \alpha_i(r)] q_i(r) + P[Q(r)] - t - MC_i[q(r)] = 0$$

$$\frac{P'(r)}{Q'(r)} \cdot [1 + \alpha_i(r)] \cdot q_i(r) + P[Q(r)] - c \geq 0$$

Finally, after rearranging the terms and summing this result over all the  $i$  firms in the market, leading to  $n^*(r, c) = \sum \frac{1}{1+\alpha_i(r)}$ . This can be interpreted as the minimum firms that followed the same behavior and led to the observed prices and quantities. In the Cournot case where firms are competing in outputs,  $i - 1$  firms do not change their output levels when  $j$  changes its own,  $\alpha_i(r) = 0$ , and therefore  $n^* = \sum \frac{1}{1} = n$  is indeed just the actual number of firms in the market. In contrast, in a perfectly competitive market,  $i - 1$  firms changes their output in the exact opposite proportion to changes made by firm  $j$ ,  $\alpha_i(r) = -1$ , and  $n^*(r, c) = \sum \frac{1}{1+\alpha_i(r)} \rightarrow \infty$ . Finally, when firms have a colluded behavior  $n^*(r, c) = 1$ . Thus, the numbers equivalent is a meaningful scale on which to measure the level of competition in an industry.

$$\frac{P'(r)}{Q'(r)} \cdot q_i(r) + \frac{P(r) - r - c}{1 + \alpha_i(r)} \geq 0$$

$$\frac{1}{1 + \alpha_i(r)} \geq -\frac{P'(r)}{Q'(r)} \cdot \frac{q_i(r)}{[P(r) - r - c]}$$

$$n^*(r, c) = \sum \frac{1}{1 + \alpha_i(r)} \geq -\frac{P'(r)}{Q'(r)} \cdot \frac{Q(r)}{[P(r) - r - c]}$$

<b>Commercial Credit Market in Mexico Summary</b>
$\text{Max } \pi_i = P[Q(r)]q(r) - FC - rq(r) - VC$
$\pi_i' = \frac{P'(r)}{Q'(r)} [1 + \alpha(r)]q(r) + P(r) - r - c \geq 0$
$\sum \frac{1}{1 + \alpha_i} \geq -\frac{P'(r)}{Q'(r)} \frac{Q(r)}{[P(r) - r - c]}$

#### 4.4 Statistical Estimation

In relation to the statistical model, we have two reduced-form equations that represent the relation between the endogenous variables (prices and total outputs), and the exogenous variable

(short-term interest rates), which are externally defined by the market. Linear relationships were assumed, with the aim of simplifying the model, including the existence of intercepts and errors, both normally distributed. In the case of the outputs, the logarithm is used for simplicity, due to the large amounts of credits granted and the facility of interpreting the results in percentage changes.

$$\ln(Q_{i,z}) = \beta_0^1 + \beta_1^1 r_{i,z} + e_{i,z}^1$$

$$P_{i,z} = \beta_0^2 + \beta_1^2 r_{i,z} + e_{i,z}^2$$

- ✓  $i$  credit institution.
- ✓  $z$  periods.
- ✓  $Q_{i,z}$  are the total credits granted by the  $i$  credit institution during period  $z$ .
- ✓  $P_{i,z}$  is the weighted interest rate by the  $i$  credit institution during period  $z$ .
- ✓  $r_{i,z}$  is the short-term rate faced by the  $i$  credit institution during period  $z$ .

$$\widehat{Q}(r) = \exp^{\ln(\widehat{Q})} = \exp^{\beta_0^1 + \beta_1^1 r}$$

$$\widehat{Q}(r)' = \frac{\partial \widehat{Q}(r)}{\partial r} = [\beta_0^1 + \beta_1^1 r] \cdot [\beta_1^1]$$

$$\widehat{P}(r) = \beta_0^2 + \beta_1^2 r$$

$$\widehat{P}(r)' = \frac{\partial \widehat{P}(r)}{\partial r} = \beta_1^2$$

A two-way fixed-effects model is used since there are two factors that could bias the results, credit institutions and the time (Wooldridge, 2002). Regarding the former, there are individual characteristics of the institutions (such as the size of the institution, consumer confidence, spending on advertising, etc.) which are difficult to change over time. Therefore, incorporating dichotomous variables that identify each credit institution allows modeling characteristics of the transversal units that do not change over time but affect the outcome of interest. In relation to time changes, the short-term rates presented a great variability in recent years, given that the Central Bank of Mexico raised the objective rates repeatedly. In this way, all credit institutions were affected by a



common factor, so it is also appropriate to add dichotomous variables that isolate the effects of each period (monthly and bimonthly, according to the type of financial product). Finally, getting together both the model specification and the statistic estimation we have:

$$\begin{aligned} \sum \frac{1}{1 + \alpha_i(r)} &\geq -\frac{P'(r)}{Q'(r)} \frac{Q(r)}{[P(r) - r - c]} = -\frac{\beta_1^2}{[\exp^{\beta_0^1 + \beta_1^1 r}] \cdot [\beta_1^1]} \frac{\exp^{\beta_0^1 + \beta_1^1 r}}{[\beta_0^2 + \beta_1^2 r - \bar{r} - c]} \\ &= -\frac{\beta_1^2}{\beta_1^1} \frac{1}{[\beta_0^2 + \beta_1^2 r - \bar{r} - c]} = -\frac{\beta_1^2}{\beta_1^1} \frac{1}{[\hat{P} - \bar{r} - c]} \\ n^*(\bar{r}, c) &= \sum \frac{1}{1 + \alpha_i(\bar{r})} \geq -\frac{\beta_1^2}{\beta_1^1} \cdot \frac{1}{[\hat{P} - \bar{r} - c]} \end{aligned}$$

Once the model has been specified, it can be estimated through the two-way fixed effects, showing that the behavior of the firms is affected by changes in short-term interest rates and by marginal costs. If the short-term interest rates decrease, then it is easier for small credit institutions to compete, since the cost of money is reduced. In response, the large companies that control the market ally and get coordinated to prevent new incoming institutions from increasing their market share. Once big institutions behave as coordinated units they can exclude small participants. In contrast, if the short-term interest rates increase, of course small companies will not be able to participate in the market, so big institutions lose the incentives to ally and begin to behave as a perfect competitor. The same happens with marginal costs, higher costs prevent small institutions from participating, so big institutions have no incentives to ally and behave as perfect competitors.

## CHAPTER V RESULTS

In this chapter, the estimation results for the SA model are discussed. First, the general results of the econometric model are shown. Then, the relevant interaction between supply and demand

are shown, as well as a sensitivity analysis, which allows testing if a monopoly behavior prevails in the market.

### **5.1 The Estimation Results for the Sullivan Approach**

After performing the data analysis through a two-way fixed effects specification, Table 3 shows that it is possible to conclude that for any type of credit there is a negative and significant relationship between the number of credits granted and the short-term rates. This is, an increase in the cost of capital that credit institutions have to pay in order to obtain resources and then be able to grant credits has a negative impact on the liquidity of the market since banks reduce the credit supply. However, this does not occur with the same magnitude throughout the different types of credits. For example, in both credit cards and auto loans, a one percentage point increase in short-term rates reduces by 0.5% the number of credits granted. In contrast, payroll loans, mortgages and personal loans have a higher variability, since a one percentage point increase in short interest rates reduces the credit supply by 4.4%, 9.5%, and 13.8%, respectively.

Regarding the demand side, something similar happens. An increase of one percentage point in the short-term rates will increase the weighted rate of the credit cards by 0.898 percentage points. This is, increases in the cost of credit cards do not fully reflect the increase in the market funding cost of credit institutions. The above could be due to the elasticity in this subsector. It is possible that if the credit cards' weighted rates are increased exactly to the same extent, then the institutions could lose clients, so proportional changes would lead to an adverse scenario in their profits. With respect to auto loans, something similar happens, with an impact of 1.082 on the weighted rates.

That is, in both cases there seems to be a 1:1 relation between the short-term rates and the price of the loans, probably due to the elasticity of these subsectors. On the other hand, payroll

loans, personal loans, and mortgages had a different behavior. In these cases, an increase of one percentage point in the short-term rates generated an increase of 2.220, 2.335 and 2.753 points in the weighted rates, respectively. The former indicates a ratio greater than 1:2, which has a negative impact on market prices. The mortgages subsector is alarming because the repayment average period in Mexico is 18.3 years.

**Table 3. Reduced-Form Estimates**

	<b>Credit Cards</b>	<b>Personal Credits</b>	<b>Payroll Credits</b>	<b>Auto Loans</b>	<b>Mortgages</b>
<i>ln(Quantity)</i>	-0.005***	-0.138**	-0.044***	-0.005**	-0.095***
StdDev	0.001	0.063	0.018	0.02	0.021
$R^2$	0.988	0.945	0.987	0.890	0.952
<i>Price</i>	0.898***	2.335**	2.220**	1.082**	2.753*
StdDev	0.469	1.091	0.967	0.526	1.508
$R^2$	0.916	0.957	0.933	0.834	0.702

Note: \*\*\*, \*\*, \* indicates that results are significant at 99%, 95% and 90%, respectively.

## 5.2 Testing for Monopoly Behavior

Results shown in this section's tables allow rejecting if there a monopolistic behavior in each subsector. The baseline corresponds to the point estimate when short-term rates equal their average values ( $\mathbf{r} = \bar{\mathbf{r}}$ ) and zero marginal costs exist ( $\mathbf{c} = \mathbf{0}$ ). Under that scenario, the obtained value corresponds to the behavior that credit institutions adopted when participated in the market, leading to the observed interaction between outputs and prices. Horizontal movements show a sensitivity analysis if short-term rates decreases/increases up to a maximum of two standard deviations ( $\mathbf{r} = \pm 2\text{StdDev}$ ). Vertical movements assume increases in marginal costs. That is, what could happen if the institutions had external shocks that would increase their marginal costs.

In both cases, increases in short-term rates and linear marginal costs lead to a more competitive behavior of the firms. The logic is as follows: at the beginning,  $n$  institutions participated in the market, offering  $\bar{Q}$  amount of credits at an observed price  $\bar{P}$ . In case of increasing the cost of short-term rates or marginal costs. Table 4 shows that under the base point estimate, a minimum of 5 credits institutions were collaborating so that we can conclude that firms in the credit cards do not have a colluded behavior so that we can reject the monopoly structure.

**Table 4. Credit Cards. Overall  $n^*(r, c)$  and Sensibility Analysis**

$c \backslash r$	-2 StdDev	-1 StdDev	$r = 4.51$	1 StdDev	2 StdDev
<b>0.00</b>	4.72	4.88	5.05	5.23	5.43
<b>1.00</b>	4.86	5.02	5.20	5.40	5.61
<b>2.00</b>	5.00	5.18	5.37	5.57	5.80
<b>3.00</b>	5.15	5.34	5.54	5.76	6.00
<b>4.00</b>	5.31	5.51	5.73	5.96	6.22
<b>5.00</b>	5.48	5.69	5.93	6.18	6.45

**Figure 4. Minimum Credit Institutions in the Credit Cards Market**

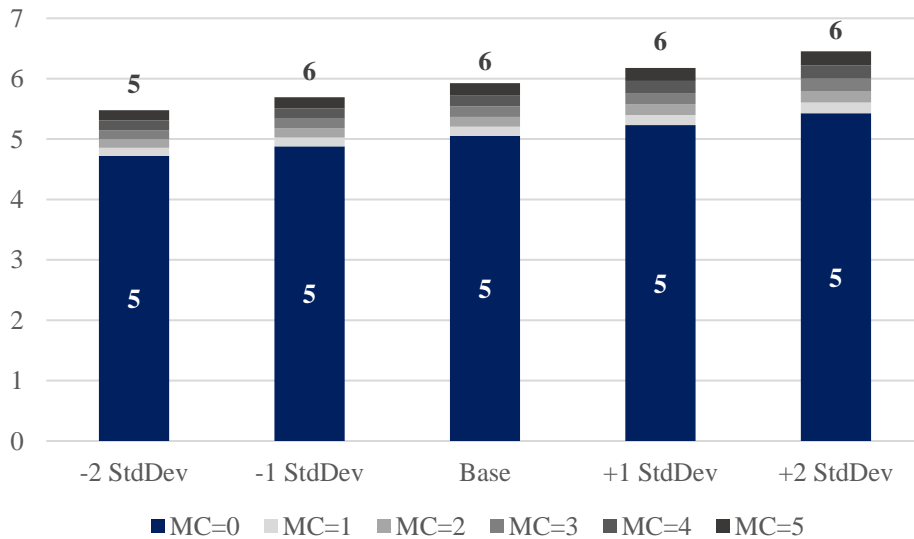


Table 5 is a particular case, since both the base scenario and various combinations under the sensitivity analysis indicates that the personal loans sub-sector seems to have a monopoly structure, so that the results show that only one company participates in the market. Therefore, it is possible that Mexico faces a colluded market regarding personal credits. That is, regardless of whether there are actually 40 credit institutions in the subsector, it may be the case that they have agreed on the quantity and prices which are traded in the market.

**Table 5. Personal Loans. Overall  $n^*(r, c)$  and Sensibility Analysis**

$c \backslash r$	-2 StdDev	-1 StdDev	$r = 4.60$	1 StdDev	2 StdDev
<b>0.00</b>	0.86	0.92	0.99	1.07	1.16
<b>1.00</b>	0.91	0.97	1.05	1.14	1.24
<b>2.00</b>	0.96	1.03	1.12	1.22	1.34
<b>3.00</b>	1.02	1.10	1.20	1.32	1.46
<b>4.00</b>	1.08	1.18	1.29	1.43	1.60
<b>5.00</b>	1.16	1.26	1.40	1.56	1.76

**Figure 5. Minimum Credit Institutions in the Personal Loans Market**

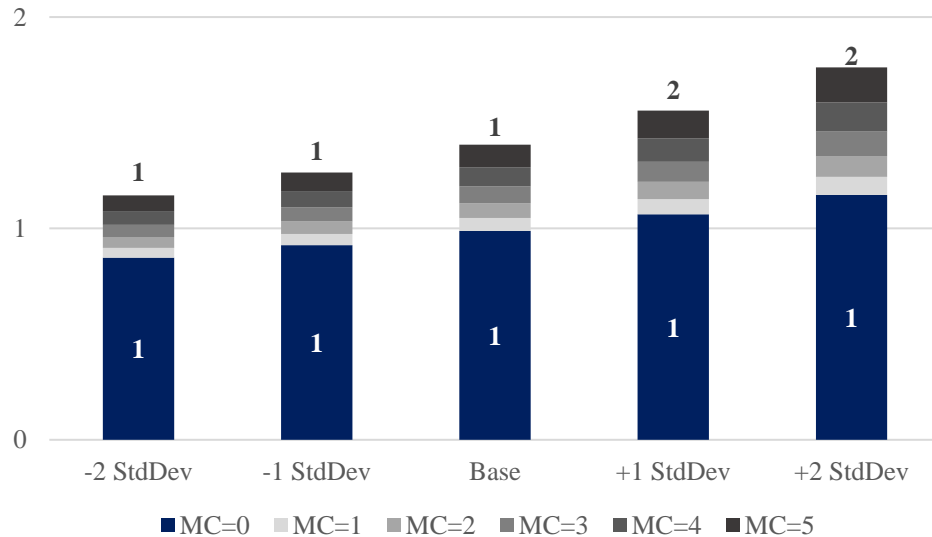


Table 6 shows that something similar happens to payroll credits, although not so severe. It suggests that in this market firms were behaving as a duopoly, although unlike personal credits,

the sensitivity analysis does show significant changes at the time of increasing the short-term rates and the marginal costs.

**Table 6. Payroll Loans. Overall  $n^*(r, c)$  and Sensibility Analysis**

$c \backslash r$	-2 StdDev	-1 StdDev	$r = 4.56$	1 StdDev	2 StdDev
<b>0.00</b>	1.94	2.03	2.14	2.25	2.38
<b>1.00</b>	2.02	2.12	2.23	2.36	2.49
<b>2.00</b>	2.10	2.21	2.33	2.47	2.62
<b>3.00</b>	2.20	2.31	2.45	2.60	2.77
<b>4.00</b>	2.30	2.43	2.57	2.74	2.93
<b>5.00</b>	2.40	2.55	2.71	2.90	3.11

**Figure 6. Minimum Credit Institutions in the Payroll Loans Market**

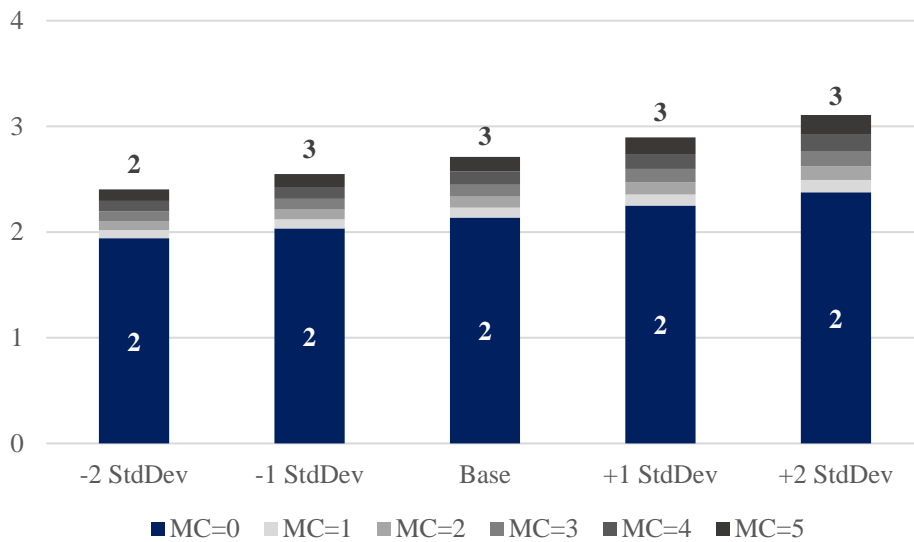


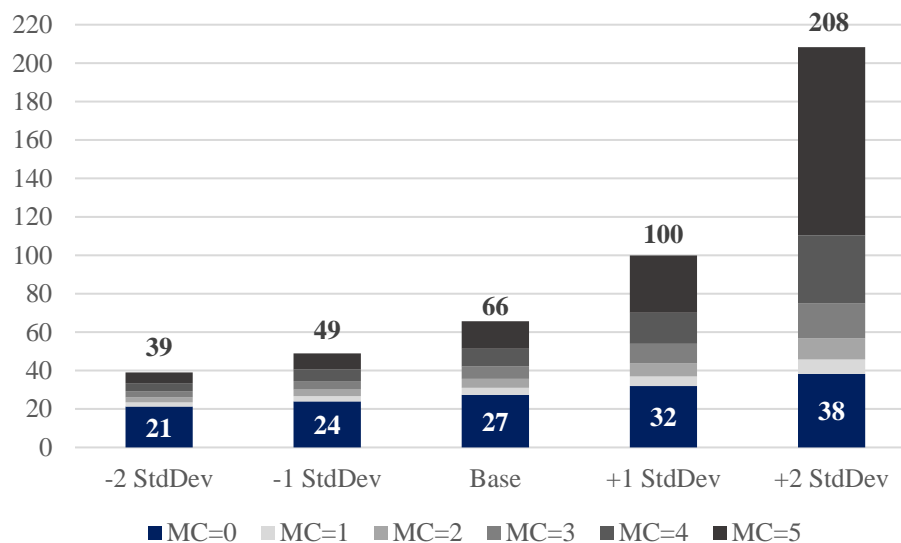
Table 7 shows great competitiveness within the auto loans subsector. Currently, there are 40 institutions competing in the sector. Based on the SA, the base point estimation indicates that there are at least 25 companies that generated the equilibrium figures. In addition, the sensitivity analysis indicates that small changes in the cost structure lead to an increase in the number of companies needed to generate such quantities and prices. This is probably due to the fact that there are

institutions dedicated exclusively to car loans, unlike other sectors in which their participants offer a large number of services<sup>10</sup>.

**Table 7. Auto Loans. Overall  $n^*(r, c)$  and Sensibility Analysis**

$c \backslash r$	-2 StdDev	-1 StdDev	$r = 4.59$	1 StdDev	2 StdDev
<b>0.00</b>	21.30	23.96	27.38	31.93	38.30
<b>1.00</b>	23.43	26.68	30.99	36.96	45.77
<b>2.00</b>	26.03	30.11	35.71	43.87	56.86
<b>3.00</b>	29.27	34.54	42.12	53.96	75.05
<b>4.00</b>	33.45	40.50	51.33	70.07	110.35
<b>5.00</b>	39.01	48.95	65.71	99.90	208.31

**Figure 7. Minimum Credit Institutions in the Auto Loans Market**



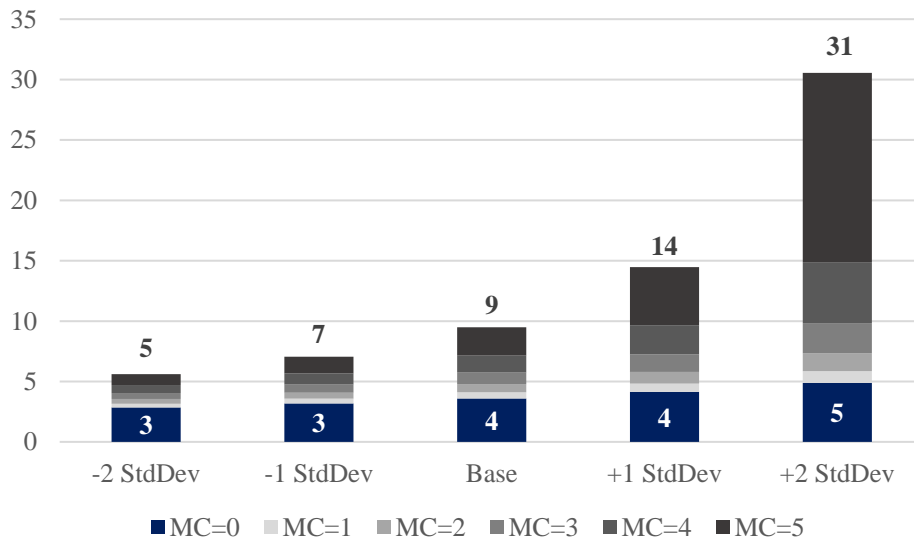
Finally, Table 8 shows the case of mortgages. The base point estimate shows that there is a competitive market on at least 3.6 institutions. The sensitivity analysis also indicates that there are great changes in the behavior of the institutions participating when modifying the parameters.

<sup>10</sup> For example, Volkswagen introduced Volkswagen Bank in 2008 and until 2013 it was dedicated exclusively to automotive loans, although later it diversified its services. Nissan, Ford and Kia Motors are some other auto companies that have used subsidiaries dedicated to auto loans.

**Table 8. Mortgages. Overall  $n^*(r, c)$  and Sensibility Analysis**

$c \backslash r$	-2 StdDev	-1 StdDev	$r = 4.59$	1 StdDev	2 StdDev
<b>0.00</b>	2.85	3.18	3.60	4.14	4.88
<b>1.00</b>	3.16	3.58	4.11	4.83	5.86
<b>2.00</b>	3.55	4.08	4.79	5.80	7.35
<b>3.00</b>	4.05	4.75	5.74	7.25	9.84
<b>4.00</b>	4.70	5.67	7.15	9.66	14.88
<b>5.00</b>	5.61	7.05	9.49	14.48	30.55

**Figure 8. Minimum Credit Institutions in the Mortgage Market**



Based on these results, it is not possible to observe a repetitive pattern throughout the credit institutions. In all cases, the effect of changes in short-term rates on quantities was negative and significant; and on prices it was positive and significant, both variables behave as expected. However, there is only one problem of a monopoly behavior in the personal loans, regardless of the actual number of institutions participating in the market. A future analysis suggests that elasticities of these types of credits may be studied to determine the reasons why the effects are greater in personal loans, payroll loans, and mortgages compared to effects on credit cards and auto loans.



Finally, further research should examine why personal and payroll loans resemble a monopolistic and duopolistic behavior, respectively. In the case of other loans, they have a specific use and are usually used for planned purchases (auto and mortgages) or purchases that do not normally involve committing a significant amount of people's income (credit cards). However, it could be that personal and payroll loans are being used for unforeseen events and that their service represents a large amount of people's income (for example, a hospital expense, the replacement of a broken down machine in a production company, etc). In this case, probably credit institutions know that their clients are using these type of credits in such way so that they could collude and collect higher interest rates or restrict the supply of these type of loans.

## **CHAPTER VI CONCLUSIONS & POLICY SUGGESTIONS**

The economic and political context in Mexico promoted large financial institutions to increase their presence in the financial sector from the end of the last century onwards. However, although the objective was to reach competitiveness in the sector, the Mexican authorities have not made a correct measurement of competitiveness in the commercial credits market. Its efforts have only been limited to measure concentration and replicate other methodologies used internationally. As such, the new regulation introduced in 2014 leads to subjective interpretations when carrying out mergers or acquisitions of financial institutions, as it does not specify what the criteria are when authorities should decide on competitiveness issues.

In order to analyze the competitiveness in the sector, the PR and SA methodologies that have been applied in diverse settings were analyzed. Advantages and weaknesses of the PR and SA have been identified, and it was concluded that the use of the SA model was a more suitable methodology to study the behavior of the Mexican firms from the commercial credit market.

Results show that negative shocks on the funding costs faced by credit institutions lead to reductions in the equilibrium credits granted and increments in the weighted rates that have to be paid by customers. This phenomenon occurred throughout the credit cards, personal loans, payroll loans, auto loans and mortgages products, which supports the model used. On the other hand, for all of these types of credits, the null hypothesis of a monopolistic behavior is rejected, with the exception of personal loans. However, it is still pending to investigate the reasons why the effects of changes in the funding costs are transferred to clients in different magnitudes, as well as to define the reasons why personal credits seem to have a monopolistic behavior.

Except for the case of the personal loans, the results show that the rest of the commercial credit areas are competitive in Mexico. However, the current Mexican regulation has not incorporated an efficient measure of competitiveness. In this sense, it is of prime importance to improve both measures. Not only by the impact shown in the banking sector in Mexico but considering the possible application of this methodology in contested areas that frequently faces opposition and criticism regarding the premises of a competitive market and which are regulated by the COFECE. However, until this is done, the Mexican government should analyze carefully any merger, fusion or acquisition of institutions, as consequences of highly concentrated markets could impose a burden on clients operating in this sector. For example, during 2018 there will be a merger between a G7 institution and another specialized in granting credits to subnational governments. However, as Berger et al (2005) point out, these financial institutions have participated for nearly 20 years in Mexico and have generated great fidelity (lending relationship) among Mexicans, so if the government stops this merger it will face social criticism.

On the other hand, if the market is already competitive, then the Mexican government should intervene and generate incentives to increase the participation of any kind of credit institution.

While there are positions against governmental intervention in the financial markets, there are ways to do it in such a way that the impact is lower. It is proposed a decrease in the taxes rates that have to be paid when getting a credit up to a maximum amount, if it was granted by an institution whose clients are considered in the low-income segment of the population<sup>11</sup>. Another way to promote credits competitions is to change capitalization indexes for small lenders. According to national and international regulations (such as Basel III), capitalization indexes must be in line with the size of the institutions. However small banks cannot face such a large capitalization index, which has been an entry barrier for potential lenders. Finally, all these findings could be presented to the regulatory authorities as a new package aimed to enhance economic competitiveness.

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<sup>11</sup> Since the year 2000, 19 banks have begun operations in Mexico, of which 11 have focused on the low-income portion. Despite this, they have not had a large share in commercial banking. Only Dondé Banco, Banco Azteca and Banco Ahorro Famsa are the ones that have had a relevant participation.

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**Appendix B: Original Data, Descriptive Statistics.**

	<b>Credit Cards</b>	<b>Personal Loans</b>	<b>Payroll Loans</b>	<b>Auto Loans</b>	<b>Mortgages</b>
<i>Quantity</i>					
Mean	1,075,682	276,308	300,191	29,732	55,577
StdDev	1,839,745	898,616	475,168	68,165	88,499
<i>Price</i>					
Mean	42.65	31.00	27.91	12.43	10.41
StdDev	13.99	25.53	24.12	3.82	1.62
<i>Short – term rates</i>					
Mean	4.55	4.60	4.58	4.61	4.59
StdDev	1.19	1.22	1.17	1.20	1.05
Original <i>N</i>	854	1,474	629	1,170	1,546
Periods	39	40	40	40	101
Frequency	Bimonthly	Bimonthly	Bimonthly	Bimonthly	Monthly
Dates	06/11-10/17	04/11-10/17	04/11-10/17	04/11-10/17	07/09-11/17
Original Institutions	32	57	21	44	26
Dropped Institutions	10	14	6	4	0
Dropped Observations	163	336	152	110	0

Source: Own elaboration, with information from CNBV.

Appendix C: Fixed Effects.

