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THE DETERMINANTS OF PROFITABILITY IN THE BANKING SECTOR: EVIDENCE FROM MEXICO

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To my family

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I wish to show my gratitude to:

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Abstract

The present study aims at analyzing the most relevant factors, thus, determinants that impact the profitability of banks in Mexico. Using the financial statements of the banks in Mexico, three panel data sets were constructed to evaluate the most relevant variables employing a fixed effects model for two periods, namely 2007-2019 and 2001-2019. Analyzing internal components, industry specific and macroeconomic elements, this study found that the most relevant, consistent and statistically significant explanatory variables for profits (measured by ROAA and ROAE) were liquidity, credit risk, costs and the Mexican Stock Market Index; in contrast, macroeconomic variables did not seem to have large effects across all types of banks, just bigger ones appear to be mostly affected by them.

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Chapter 1

Introduction

Banks are central agents in any economy, and having a sound banking sector is crucial to financial and economic stability in a country. They are an effective channel in the creation of new businesses, they provide assistance for the growth of firms through loans, the central bank relies intensively on them for economic acceleration, they provide financial security to agents, among many other attributes (Menicucci and Paolucci, 2016; Chavarín, 2016). The importance and centrality of banks is indisputable; therefore, having a healthy banking sector increases the possibility of growth and stability. Furthermore, their poor management, could have potential major disruptions in the economy. Using econometric techniques with panel data for mainly two periods, namely 2001-2019 and 2007-2019, internal components, industry specific and macroeconomic elements, the present work aims at analyzing the main aspects, thus, determinants, that influence the banks' profits, measured by Return on Average Assets and Return on Average Equity, in Mexico.

The present study has three main contributions. First, it enlarges the current literature on determinants of banks' profitability in Mexico, which in general, has been limited. It is important to have an overview of the banking sector from different perspectives since they are crucial agents in the financial system and their management is relevant for the economy. Second, most of the reviewed studies used industry specific variables such as market power or market share, but very few considered the stock market as an explanatory variable. This study incorporates the Mexican Stock Market Index (IPC) because it hypothesizes that as banks grow larger, their network does as well, meaning that their relation with larger firms will most likely grow; in this sense, changes in the market captured by the stock market index, may influence the banks

profits as well. In Mexico, the index is calculated considering a sample of 35 firms from different sectors that operate in the country; therefore, we would expect that if there is a reward from the market towards these companies, then, the banks profits could benefit as well, we believe this to be specially true for larger banks. Third, it encourages scholars to examine this particular research question in order to provide additional evidence about the factors influencing the banks profits, specially for Mexico.

The document is arranged in the following way. Section 2 describes in detail the variables used, why were they employed and how did other authors utilize them. Section 3 briefly examines the literature that have scrutinized in the determinants of banks' profits around the world. Section 4 discusses the data used and its treatment for the final data bases. Section 5 addresses the descriptive statistics and correlations from the information. Section 6 uncovers the econometric model. Section 7 present the findings of the present work and compare the results with the previous studies. Finally, Section 8 concludes.

Chapter 2

Variables

In the determinants of banks' profitability literature, the question is adressed with basically three types of variables. The first type are internal variables, in which equity, assets, costs, management, credits, risks, among others are considered. The second type are market associated variables. In general, the market power measured by the Herfindahl-Hirschman Index and the market share calculated by the particular banks' assets relative to total industry assets, are the most common variables to assess the market effects on profits. Nonetheless, in the present work IPC (the Mexican Stock Market Index) is also incorporated as an independent variable which may, arguably, have some market effects in banks' profitability. The third type are macroeconomic variables; these are often used because they are independent of the decisions of the managers, and all banks are exposed to them. The most commonly used variables are economic growth and inflation.

Most independent variables, particularly the internal variables, with the exception of size, are measured with ratios. As Menicucci Paolucci (2015) establish, ratios are used because they are inflation-invariant. They also state that the numerator and denominator in ratios are measured in monetary terms, therefore profits could actually capture the real effects from the inflation rates which vary over time.

2.1 Internal Variables

ROE/ROAE (Return on Equity/Return on Average Equity) - This is one of the most used variables in the literature to measure profits. It is a ratio of the net return and the shareholders' capital or equity, this is also an indicator for profits since it compares how much is the net return of the bank relative to what has been offered by shareholders, in other words, it measure their returns relative to the value of what they invested. Compared to the Return on Assets (ROA) indicator, ROE is a much more variable. This is due to the fact that total assets are more complicated to vary than equity. One of the drawbacks of this measurement is that it ignores the higher risk that is associated to high leverage and the effect that regulation has on it (Medeiros and Martins, 2016). Particularly for this work, the average was used, meaning that the Return on Average Equity indicator was utilized as a dependent variable.

ROA/ROAA (Return on Assets/Return on Average Assets) - In the literature of determinants of banks profitability, Return on Average Assets is the other most used variable to approximate the profitability of a Bank. It is basically a ratio of the net return to total assets. Specifically for the analysis, the yearly averages were used in this study (ROAA). Menicucci and Paolucci (2016), Li (2007) also state that ROA can be considered to compare operating performance of banks, which may be an important factor when analyzing banks' profits. ROA also indicate how the funds and assets are being managed to generate revenues (Menicucci and Paolucci, 2016; Dietrich and Wanzenried, 2014). It is also argued that banks usually report a lower ROE due to a lower leverage ratio, in which having another measurement for profits, such as ROA, is useful.

Profits indicators are measured in ratios, this allow us to observe the relative movement in variables, rather than looking at the absolute terms. In this way, the heterogeneity within the data, namely, information of large and small banks, could be useful to measure profits. It could be argued that since small banks face less operative costs, they could have, relatively, larger profits than bigger banks. Moreover, since variables could act different on profits we included the two indicators of profits, namely ROAA and ROAE, in order to have additional certainty about the results. Furthermore, each one may capture effects not considered by the other, as Petria *et. al.* (2015) state, a possible drawback or ROA is the existence of the off-balance sheet assets

are not considered in this measurement, in which ROE is more accurate (Goddard *et. al.*, 2004 in Petria *et. al.*, 2015). It is important to consider that we chose ROAA and ROAE over ROA and ROE for mainly two reasons. The first has to do with the fact that when we use the average, meaning, ROAA and ROAE the transactions over the whole year are captured specially during the fiscal year, this could also possibly assess the fact that decisions in one month do not only impact that particular one, but future periods as well; second, since the previous study used the average as well, we wanted to have the same variable for comparison. As Dietrich and Wanzenried (2014) state the average captures asset movements on a fiscal year.

Size - The natural logarithm of the total assets variable was used. As Dietrich and Wanzenried (2014) point out, measuring size with the total assets could not be ideal, specially for the largest banks, which have high off-balance sheet activities. Nonetheless, a uniform measure of bank size is needed and this is an standard and useful way to do it. Al-Harbi (2019) and Li (2007) state that size is introduced as a way to account for economies or diseconomies of scale, where the former have positive effects and the latter have negative impact. Using this definition, it is a fact that bigger banks have larger amounts of total assets, but arguing that they have a purely positive impact on banks' profits is not obvious. There is evidence that using this measurement of size, effects on profits could go both sides, positive or negative. Petria *et. al.* (2015), Öhman and Yazdanfar (2018), Dietrich and Wanzenrie (2014) argue that increasing size could generate economies of scale, and thus, performance. Menicucci and Paolucci (2016) say that larger banks could also be benefited from economies of scope, with reduced risks and product diversification, and argue too that this could potentially lead larger banks to enter into markets where small banks can't. In contrast, profits could also be negatively affected given that larger banks could possibly be affected more by bureaucracy, rigidities and inefficiencies (Öhman and Yazdanfar, 2018; Dietrich and Wanzenried, 2014).

Capital Asset Ratio - This variable is included to test a possible effect from capitalization on profits. The variable is constructed as the ratio between equity and the total assets. It is used to observe how much capital lies behind the bank, is a way to measure the strength or adequacy of the capital. Li (2007) argues that capital strength could have a positive effect on profits because the higher the ratio, the less necessity there is of external funding, thus, higher profits. It is also asserted that well capitalized

banks are less risky; more secure in the sense that they are more resistant against financial crisis and may be able to provide security for depositors; they are also considered to be less likely to go bankrupt; and it is argued that a bank with more capital strength has access to funding at a lower cost, increasing profits (Al-Harbi, 2019; Menicucci and Paolucci, 2016; Medeiros and Martins, 2016; Li, 2007). On contrast, an exceedingly elevated level of capitalization could possibly mean that banks' operations are highly cautious could ignore investment opportunities; moreover, in line with the risk-return hypothesis, there is an inverse relation between capitalization and profits, since they tend to borrow less and have lower risk, returns could be lower too. (Öhman and Yazdanfar, 2018, Ghosh, 2016). Effects of capital adequacy on profits are not self evident, thus results could indicate a positive or negative impact.

Deposit Asset Ratio - It is a ratio that gives information about how much money the bank owes (to depositors) in relation to the amount of assets possessed by the bank. As Menicucci and Paolucci (2016) assert, banks rely substantially on deposits to allocate credits. Banking sector, specially commercial banks, try to find clients in need of credit, get profits on interests and are committed to have sufficient funds for those customers who wish to withdraw money. Therefore, imposing a constraint on demands for loans, must have an impact on the opportunity cost of deposits. Al-Harbi (2019) argues that since deposits represent a primary source of funds at a low cost, its enlargement could positively affect profits on the basis that demand for loans continues. The author also states, in the same way as Menicucci and Paolucci (2016) do, that the lack of loan demand are causes for deposits to become costlier in terms of funds, and that reduces profits. If people stop demanding loans, opportunity cost of money increases, and that makes every monetary unit to be more expensive given that options for releasing it diminish. Dietrich and Wanzenried (2014), argue that a higher growth rate of deposits may help in the business expansion and this could lead to greater profits; nonetheless, it is also stated that this is not necessary since the bank need to be able to transform those deposits into actual additional income. Finally, we could see that deposits represent a cost for the bank since more deposits mean more operating costs, Medeiros and Martins (2016) argue that management has to be very efficient to transform those deposits into future profits. In this sense the deposit asset ratio could go in both directions.

Loan Asset Ratio - There are mainly two elements used to construct a total loan

variable, namely, outstanding loan and the due loan portfolios. These variables indicate how much has the bank lend to agents and how much it is owed by them. Outstanding loan measures the credits that have been payed, and due loan are the loans that remain unpaid by the agent. Both are considered assuming that due loans will be paid and the bank, and eventually, it will be able to use them. As banks receive interests for all loans they offer, it is expected that profits could be higher as loans go higher. However, literature is not conclusive about a positive effect, there are some possible causes that may offer an explanation for a negative relationship. As banks grow, their loan supply does as well, this could also mean an increase in costs (Al-Harbi, 2019). Other reasons could be that a higher growth in volume of loans could affect credit quality; additionally, if the increase in loans is due to lower margins, then profits could be diminished (Menicucci and Paolucci, 2016).

Loan Deposit Ratio - This is an indicator for liquidity, it is constructed as a ratio of the total loan and the deposits. It gives information about how much income the bank is receiving from credits and how much it owes in deposits. It could be seen as an indicator for the freedom that the bank possess in order to make operations in the market. Chavarín (2016) uses the same variable; however, Adelopo *et. al.* (2018) calculates liquidity using liquid assets divided by total customer and short-term funding. The first was used to compare results with an study for the same country. Results on this variable are mixed but they are further explored in the results section. Adelopo *et. al.* (2018) and Ahokpossi (2013) use these variable, plus short-term funding as a proxy for credit risk, arguing that the higher is the value of the ratio, the higher the exposure of the bank to default risk.

Credit risk - It was measured with the preventive estimation of credit risk, which basically measures the proportion of the credit that won't have a viability for payment, over total loans. Medeiros and Martins (2016) assert that when credit risk is higher credit quality decreases, which lead to lower profitability. Adelopo *et. al.* (2018) points out that banks may be able to encounter credit risk by two means. The first is being their exposure to significant default rates on loans; the second, is due to inadequate reserves or insolvency. Ahokpossi (2013), as mentioned before, used loans to deposits and short term funding as a proxy for credit risk, finding a positive relationship with profits (using net interest margin). Dietrich and Wanzenried (2014) mention that theory supports the idea that an increased exposure to credit risk is more likely to be

related to a decrease in profits. Most studies using credit risk as a determinant appear to have enough reasons to believe that it is negatively associated to banks' benefits.

Costs - This variable measures the administrative cost relative to total assets. There is no actual debate on whether the costs offer a positive or negative impact, evidence is clear that they decrease the level of profitability in bank; rather the degree to which they affect profits is addressed.

2.2 External Variables

Market Share - This variable was measured by the banks assets relative to the total amount of existing assets in the period. It is possible to argue that if a bank has a larger share of the market, then it could have more profits. The variable was constructed using the relationship of every bank to a common variable that encompassed all banks which is *Total Banca Multiple* which basically has the aggregated information for all the banks in all the periods. Since this information is calculated for all years, independently if a new bank appears, or one disappears, it was easier to make it the benchmark. The total assets of every bank was compared directly to the aggregated, this eliminates the issue that arises when the quantity of banks changes over time (mergers, bankruptcy, etc.). It is important to note that addressing market concentration or market power in the banking sector is not the main scope of this work, further analysis is needed in order to address the question of whether the baking sector is concentrated and efficient or not.

IPC - This is the Mexican Stock Market Index, it is calculated considering a pool of firms operating in the economy and it provides information about the financial environment of the country since it reflects the evolution of the stock market. Given that banks trade an enormous amount of money in the economy, it is natural to think that stock markets which are directly related to big companies, could possibly have an effect in the banks' profits. Notwithstanding, most studies explored in the literature review on determinants of banks' profits did not use an stock market index as an external variable. The IPC is a direct observation of market behavior; furthermore, it could be seen as a measure of confidence. It is expected that as banks grow larger, their network does as well, meaning that they are most likely to have interactions with bigger firms. In this sense, it is hypothesized that if companies are rewarded by the market,

this will have a positive impact on banks' profits, specially for larger banks. Monthly data was obtained from the public information of the Central Bank, specifically, the growth rate of the index was used as an explanatory variable of profits. Dietrich and Wanzenried (2014) included the value of shares relative to the GDP as an indicator of the degree of financial market development.

Inflation - The inflation rate was used, measured with the National Consumer Price Index annual growth. As Dietrich and Wanzenried (2014) point out, the effect that inflation has on bank profits, depends on the growth rate of wages and operating expenses in relation to inflation. They also stated that if banks do not anticipate inflation and do not adjust their interest rates, then costs may increase faster and profits could be reduced. Additionally, Ahokpossi (2013) claims that inflation also might be seen as a risk given that it could affect margins; this is the case if lending and deposit rates adjust in different speed and extent to the monetary shocks presented in the economy. Adelopo *et. al.* (2018) argue that inflation affects costs, thus reducing profits. However, inflation could increase firms' incentives to produce more, since they could potentially make more profits, consequently this could positively affect banks' benefits through loans.

IGAE - This is the Global Indicator for Economic Activity which is used to get our indicator for economic growth. Our data has a monthly periodicity, and therefore using GDP would not be as accurate since it is constructed quarterly. In order to have monthly information we would have to impute the rest of the data, and it will most likely have impacts on dispersion and variance. This indicator includes Primary, Secondary and Tertiary Activities, although fishing, forest usage, corporations and other service activities are not used in its calculation. Economic growth affects all banks, they all face the same macroeconomic conditions; however, the way situations are addressed are different. Generally speaking, economic growth could be associated with higher profits, given the created opportunities in a growing economy; the fact that as disposable income raises the demand for loans and supply of deposits will have most likely an increase as well; that poor economic conditions may also affect profits by generating credit losses; and that higher economic growth is also associated with lower probabilities of default and higher access to credit (Al-Harbi, 2019; Adelopo *et. al.*, 2018; Ghosh, 2016; Medeiros and Martins, 2016; Dietrich and Wanzenried, 2014; Li, 2007). Thus, it is most likely expected that economic growth rate will have a positive

relation with profits.

Chapter 3

Literature Review

The issue addressed in this work has has been exhaustively examined by academics worldwide; nevertheless, regions such as Latin America, and specially Mexico, have been overlooked. The literature about determinants of banks' profits in Mexico has been scarce; out of the literature reviewed only one article regarding this specific issue was found (there are others regarding market power or efficiency, but their scopes are different). Applying a dynamic panel data regression using the first lag of the profitability, Chavarín (2016) analyzed the determinants of commercial banks' profitability in Mexico for the period 2007-2013. He calculated the profits using Return on Average Assets (ROAA) and Return on Average Equity (ROAE) where ROAE had the most robust results. He found that the first lag of the profits was positive and significant with a relatively high coefficient (around .40) arguing that it reflects barriers of entry and obstacles to competition. He mentions capital and income coming from final balance commissions and fees as the main factors, having a positive impact on profits, and costs with a negative effect on them.

As mentioned, the literature addressing this particular question is extensive, in terms of the variables of profits most studies use Return on Assets (ROA) and Return on Equity (ROE) as proxies, although the Net Interest Margin (NIM) is also employed. The current work uses both Return on Average Assets (ROAA) and Return on Average Equity (ROAE) to approximate profits. Some studies have used cross-country data, while others focused on a single country analysis. Moreover, most works utilize panel data, having a pool of banks over the course of several years, were the most common econometric techniques used to address the research question are, fixed effects or random effects models, and dynamic panel data regressions.

For example, Adelopo *et. al.* (2018) used a fixed effects model using panel data from the Economic Community of West African States' bank data base from 1999 to 2013 to analyze the determinants of profits in the periods before, during and after the financial crisis; Menicucci & Paolucci (2016) utilized a linear regression model on panel data from the top 35 banks in the European banking sector during the period 2009-2013; Capraru & Ihnatov (2014) analyzed with a linear equation and robust check with dummy variables the data retrieved from 143 commercial banks in central and eastern European countries, for 2004-2011; Dietrich and Wanzenried (2014) used information from an unbalanced data set comprising 10,165 banks in 118 countries around the globe, encompassing high, middle and low-income countries, to examine the banks profits with dynamic panel regressions; applying a fixed effects model to a data set of 686 banks Al-Harbi (2019) investigated the effects on banks' profits of developing and underdeveloped countries in the Organization of Islamic Cooperation from 1989 to 2008; Petria *et. al.* (2015) explored the impact on profits with a fixed effects model using yearly data of 1098 Banks from the European Union during 2004-2011: Athanasoglou *et. al.* (2006) looked at determinants of profits for credit institutions in the South Eastern European region for 1998-2002, applying both fixed and random effects models into an unbalanced panel data set.

There are other studies, however, that focus on a single country analysis such as this one. For example, Öhman and Yazdanfar (2018) used OLS, Fixed Effects and Feasible Generalized Least Squares to examine the determinants in commercial banks with a sample for the period 2005-2014 in Sweden; Medeiros and Martins (2016) analyzed the case of Portugal with a pool of 27 domestic and foreign banks and a fixed effects model in a pre-crisis period 2002-2007 and a post-crisis period 2008-2011; Bolarinwa *et. al.* (2019) evaluated the banks profitability in Nigeria using a dynamic panel estimation with the Generalized Methods of Moments, they took 15 commercial banks operating in Nigeria for a panel data covering ten years, 2005-2015; Ally (2014) looks at the case of 23 banks in Tanzania, comprehending large, medium and small banks for the period 2009-2013, they estimated the impacts using a fixed effects model; focusing solely on commercial banks, with a total of 69 banks, Almaqtari *et. al.* (2018) studied the profitability of banks' in India employing pooled, fixed and random effects covering 2008 to 2017; with a fixed effects model, Ali and Puah (2019) examined internal determinants for banks in Pakistan, considering 24 commercial banks in 2007-2015;

regarding the period 1985-2001 and applying a linear and a dynamic regression (with the Generalized Method of Moments) for Greek banks, Athanasoglou *et. al.* (2008) explored how internal and external variables affect banks' profits.

The variables used across studies are similar, most of which are divided in bank-specific, industry-specific, and macroeconomic variables; some being more consistent and significant than others. In general, the variables used for profits are ROA and ROE; for internal variables, bank size, capitalization, costs and credit risk are the most common; accounting for industry specific predictors, the market power or market share are typically used; finally, the distinctive macroeconomic explanatory variables are GDP growth rate and inflation rate. Of course, the specific objectives of each work require particular variables that are not always present in other studies.

Bank size for example, is present in most studies; however, it has been found to have mixed effects. Dietrich and Wanzenried (2014) in terms of ROAA found no evidence that larger banks are more profitable; nonetheless, using ROAE the variable appeared to have positive effects on profits. Petria *et. al.* (2015) found the opposite for European banks, finding influence from size on the return on assets but not on the return on equity. Al-Harbi (2019) found no impact and Capraru and Ihnatov (2014) results show a negative and significant relation with profits, specially using return on equity; on contrast, Adelopo *et. al.* (2018), Almaqtari *et. al.* (2018), Menicucci and Paolucci (2016), Ally (2014), Bolarinwa *et. al.* (2019), Ali and Puah (2019) all found, in general, a positive and significant relationship with size. Others Chavarín (2016) found it insignificant for most cases for the dynamic model, but positive in the static one.

Something similar happens with the level of capitalization. Dietrich and Wanzenried (2014) results show that well capitalized banks tend to have higher profits when they are measured by ROAA and using either all banks or just those from high-income countries; conversely, the opposite effect emerges when ROAE is used, were they observe that the coefficient is consistent across the levels of income of countries (low, middle or high income), being negative and significant. Adelopo *et. al.* (2018) argue that the effect depends on whether a pre-crisis, crisis or post-crisis scenario is considered. Menicucci and Paolucci (2016), Medeiros and Martins (2016), Ally (2014) and Athanasoglou *et. al.* (2008) support the idea that well capitalized banks have higher profits.

As expected, for the cases of costs, the evidence strongly suggest that they have a negative impact on profits. Meaning that lowering costs will lead to an increase in profits. (Adelopo *et. al.*, 2018; Petria *et. al.*, 2015; Dietrich and Wanzenried, 2014; Al-Harbi, 2019; Athanasoglou *et. al.*, 2008; Ally, 2014; Bolarinwa *et. al.*, 2019).

Credit risk is mostly leaning towards a negative relationship with profits (Petria *et. al.*, 2015; Dietrich and Wanzenried, 2014; Capraru & Ihnatov, 2014; Ally, 2014; Athanasoglou *et. al.*, 2008), although there are some exceptions. Adelopo *et. al.* (2018) for example, found that the effect of credit risk actually depends on whether your looking at banks before, during or after the crisis.

The effect of macroeconomic variables is also mixed. For example, Adelopo *et. al.* (2018) argues that the effect that macroeconomic variables have on profits, such as GDP and inflation, depends on the analyzed period being this before, during or after the financial crisis; Ally (2014) argues that macroeconomic variables doesn't seem to have an effect in banks' profitability; Petria *et. al.* (2015) observe that inflation do not quite offer an explanation for profits movements, but GDP was found to have a positive and significant effect on them; Medeiros and Martins (2016) results indicate a negative and significant impact with GDP; Dietrich and Wanzenried (2014) results show that neither inflation nor GDP help explaining profits changes for high-income countries, although this result seems to be the opposite in middle and low-income countries, where both variables appear to be important determinants; Athanasoglou *et. al.* (2008) argue that the impact of inflation and cyclical output are clear; on one hand, expected inflation was found to have a positive and significant influence; on the other, they argue that the symmetry or asymmetry of the business cycle plays an important role since it seems that the profits are positively correlated with with the business cycle when it is above its trend. Other studies such as the one performed by Bolarinwa *et. al.* (2019) found a positive impact on profits by both GDP growth rate and inflation, the former was positive in three dynamic models, but the latter only for the differenced ROA model.

Chapter 4

Data

The data used in the current analysis encompassed the financial statements of banks in Mexico. It was obtained from the available public historical information of the *National Banking and Securities Commission (CNBV)* which is a national independent identity that supervises and regulates banks in Mexico. The information acquired encompassed more than 80 banks over the course of almost 19 years, namely, December 2000 until December 2019. Out of the total, only about half presented sufficient information for analysis, meaning, information for at least six years; and only about 25 banks had data for the 19 years.

4.1 Data Treatment

Specifically, the data retrieved from the CNBV were financial statements, for each one of the more than 80 banks operating (or that operated previously) in Mexico. Meaning that there were more than 80 data bases which had to be integrated in a single one with the relevant variables needed for the analysis. This is precisely what was done, the 80 data bases were cleaned and ordered to be merged with one another. Additionally, some of the variables were not internal variables, but macroeconomic variables and had to be included in the final data base, such as Inflation, the Mexican Stock Market Index (IPC), and the Global Indicator for Economic Activity (IGAE). These variables were obtained from the public information provided by the Central Bank and the National Institute of Statistics and Geography.

The merged Data Base had, for all banks, almost 30 relevant variables that included

internal, macroeconomic and constructed variables (mainly the ratios described in the previous sections). Since the panel data was unbalanced, three subsets were created out of this merged data base to make different regressions considering different banks and periods. The first data based encompassed only the banks that had information for at least six years, after 2006. The second comprised banks that possessed data for at least 10 years after 2006. The final subset had only the banks that owned complete information[1] for the 19 years, 2000 to 2019. It is worth mentioning that this data base is associated with the larger banks, meaning that those that have been present since the beginning of the century are also, in general, the bigger banks.

In order to be clear, information was available since 2000; nonetheless, given that the Return on Average Assets (ROAA) and Return on Average Equity (ROAE) were used, the first yearly average was measured using data from 2000 to get the ROAA and ROAE for 2001; therefore, our regressions are made without considering 2000 explicitly, since their values are accounted for in the average of the return on assets and equity of the next period.

Originally a fourth data set was constructed, it included the same banks than the 19 year data set with two additional banks, IXE and ING, which both had information from 2000 to 2013. Initially it appeared that these banks, along with *Interacciones*, could potentially add additional information since they were the only ones that were present for the initial years of the century and not for the last (this was due to the fact that they were merged with larger banks) but the results had no difference; therefore, this last data set was not used.

[1]Interacciones had 18 years of data, but it was included since only the data for last year was missing. *Banco Azteca* and Credit Suisse were also included since they had information since 2003.

Chapter 5

Descriptive Statistics

The following tables show the descriptive statistics for the three data bases used in the panel data regressions. The only case where values were extremely high and variance seemed abnormally elevated, was in the Loan_Deposit Ratio. Since ratios are used, it is common to have extremely high or low denominators, which lead to extreme values. Given these unusual values, specially for the variance, it is expected that the variable will have no effect in profits. For all cases and for both estimators, although modest, profits have been positive. As Chavarín (2016) stated, these moderate profits to some extent contradict the argument that banks in Mexico did not suffer a direct effect from the international financial crisis. One more thing to be noted is that the banks with the largest history, meaning also most of the largest banks in Mexico, posses, as expected, the highest profits of the three groups.

Table 5.1. Descriptive Statistics, Six Year Banks

	count	mean	sd	min	max
ROAA	6168	.0034279	.0636597	-1.011357	.3369827
ROAE	6168	.0745693	.1750387	-1.513051	.7967825
ln_Size	6358	10.31001	1.998545	4.844878	14.62388
Capital_Asset	6358	.1715312	.1789147	.0090238	1
Loan_Asset	6358	.4141343	.2800992	0	1.075828
Deposit_Asset	6358	.3946888	.2477797	0	.8622335
Loan_Deposit	5829	65.02386	2607.278	0	177418.9
Credit_Risk	5810	-.1836613	4.506178	-228.2917	0
Ad_Cost	6168	.0772325	.1103576	-.0005889	1.45436
IGAE	7020	.0191177	.0278207	-.0753935	.0558241
Inflation	7020	.0415603	.0105901	.0213081	.0677305
IPC	7020	.0741385	.1970203	-.3861	.782
Market_Share	6358	.0244705	.0496022	.000021	.2684263

Table 5.2. Descriptive Statistics, Ten Year Banks

	count	mean	sd	min	max
ROAA	5578	.0085096	.0438744	-.3505336	.3369827
ROAE	5578	.0888614	.1513939	-.8685688	.7967825
ln_Size	5702	10.5057	1.924073	4.844878	14.62388
Capital_Asset	5702	.1544826	.1495632	.0090238	1
Loan_Asset	5702	.414741	.2711203	0	1.075828
Deposit_Asset	5702	.4117809	.2455799	0	.8622335
Loan_Deposit	5269	70.09106	2741.638	0	177418.9
Credit_Risk	5243	-.1977047	4.743379	-228.2917	0
Ad_Cost	5578	.0673274	.0818239	-.0005889	.4982337
IGAE	5772	.0191177	.0278211	-.0753935	.0558241
Inflation	5772	.0415603	.0105903	.0213081	.0677305
IPC	5772	.0741385	.1970234	-.3861	.782
Market_Share	5702	.0267995	.0518174	.000021	.2684263

Table 5.3. Descriptive Statistics, Complete Year Banks

	count	mean	sd	min	max
ROAA	5151	.0099904	.0225898	-.252319	.0955849
ROAE	5151	.1058572	.1730255	-2.392785	.6834976
ln_Size	5173	10.94663	1.810742	5.249012	14.62388
Capital_Asset	5173	.114951	.1013396	.0032468	.9963947
Loan_Asset	5173	.378778	.2348008	0	.9337941
Deposit_Asset	5173	.3986783	.2198641	0	.8591142
Loan_Deposit	4984	21.44246	639.5432	0	22378.11
Credit_Risk	4860	-.2031289	4.926578	-228.2917	0
Ad_Cost	5151	.0455542	.0570313	.0021358	.4293481
IGAE	5208	.0197407	.0260994	-.0753935	.0581966
Inflation	5208	.0421861	.0097793	.0213081	.0677305
IPC	5208	.1368078	.2270412	-.3861	.782
Market_Share	5173	.039304	.0615293	.0000799	.2684263

5.1 Correlation Matrix

The following tables show the correlation between the profits estimators and the independent variables used in the model. Three tables are presented, one for each data set used in the model. It is clear that non of the explanatory variables used, has a high correlation with others in order to be concerned about a multicollinearity issue. Furthermore, it is worth mentioning two specific cases, the size of the bank and the administrative costs. The former appears to be positively correlated with profits, having one of the largest coefficients; the latter has one of the highest negative correlative values with profits, in the Six Year Banks data base. Notwithstanding, with the other data bases the correlation values of administrative costs with profits are mixed; being, as expected, negative with ROAE; but having a counter intuitive result with ROAA since the value resulted to be positive (although very small).

The four external variables, namely, IGAE, Inflation, IPC and Market Share, all seem to be consistent in all cases. IGAE, IPC and Market Share, all three appear to be positively correlated with profits, albeit with a relatively small degree. Inflation, in the

three cases has a negative sign, nevertheless, the degree is very close to zero, allowing us to consider that it has no correlation with profits.

Table 5.4. Correlation Matrix, Six Year Banks

	ROAA	ROAE	Size	Cap_A	Loan_A	Dep_A	Loan_Dep	Credit_R	Ad_Cost	IGAE	Inf	IPC	Mkt_S
ROAA	1												
ROAE	0.820	1											
ln_Size	0.258	0.428	1										
Capital_Asset	-0.154	-0.249	-0.516	1									
Loan_Asset	0.113	0.0135	-0.133	0.379	1								
Deposit_Asset	0.0159	0.00902	0.135	-0.0233	0.540	1							
Loan_Deposit	-0.112	-0.118	-0.0564	0.0559	0.0421	-0.0495	1						
Credit_Risk	0.0146	0.0367	0.0503	-0.0360	0.0515	-0.0362	-0.000505	1					
Ad_Cost	-0.425	-0.355	-0.422	0.642	0.226	0.0644	0.0454	0.000714	1				
IGAE	0.119	0.0927	0.0625	-0.0496	-0.00141	0.0112	-0.0739	0.00675	-0.0865	1			
Inflation	-0.0843	-0.0507	-0.0336	0.0300	0.00101	0.00789	0.0214	0.0122	0.0642	-0.348	1		
IPC	0.0536	0.0679	-0.0167	-0.0148	-0.0965	-0.0866	0.00181	0.0106	-0.0579	0.273	-0.183	1	
Market_Share	0.0767	0.210	0.745	-0.178	-0.0109	0.115	-0.0128	0.0171	-0.193	-0.00418	0.00597	0.0246	1

Table 5.5. Correlation Matrix, Ten Year Banks

	ROAA	ROAE	Size	Cap_A	Loan_A	Dep_A	Loan_Dep	Credit_R	Ad_Cost	IGAE	Inf	IPC	Mkt_S
ROAA	1												
ROAE	0.791	1											
ln_Size	0.196	0.381	1										
Capital_Asset	0.145	-0.0871	-0.450	1									
Loan_Asset	0.159	0.0747	-0.0694	0.400	1								
Deposit_Asset	-0.0389	-0.0166	0.114	-0.00642	0.572	1							
Loan_Deposit	-0.182	-0.148	-0.0630	0.0672	0.0454	-0.0542	1						
Credit_Risk	0.0246	0.0466	0.0563	-0.0427	0.0559	-0.0364	-0.000436	1					
Ad_Cost	0.100	-0.0333	-0.346	0.541	0.293	0.158	0.0701	0.0000193	1				
IGAE	0.0899	0.0906	0.0729	-0.0546	-0.0148	0.0115	-0.0773	0.00674	-0.0609	1			
Inflation	-0.0788	-0.0542	-0.0506	0.0386	0.0174	0.00649	0.0225	0.0131	0.0588	-0.349	1		
IPC	0.0567	0.0750	-0.0412	0.000402	-0.0800	-0.0875	0.00185	0.0112	-0.0403	0.273	-0.186	1	
Market_Share	0.0540	0.207	0.765	-0.167	0.000585	0.1000	-0.0139	0.0184	-0.211	-0.00289	0.00254	0.0219	1

Table 5.6. Correlation Matrix, Complete Year Banks

	ROAA	ROAE	Size	Cap_A	Loan_A	Dep_A	Loan_Dep	Credit_R	Ad_Cost	IGAE	Inf	IPC	Mkt_S
ROAA	1												
ROAE	0.837	1											
ln_Size	0.229	0.288	1										
Capital_Asset	0.221	-0.0787	-0.246	1									
Loan_Asset	0.340	0.226	0.150	0.218	1								
Deposit_Asset	0.0401	0.0341	0.249	0.0215	0.669	1							
Loan_Deposit	-0.102	-0.0813	-0.0988	0.152	0.00949	-0.0687	1						
Credit_Risk	0.0483	0.0411	0.0637	-0.0700	0.0588	-0.0418	-0.00407	1					
Ad_Cost	0.0774	-0.0140	-0.187	0.216	0.186	0.301	0.0144	-0.00877	1				
IGAE	0.0450	0.0698	0.0467	0.0131	-0.0286	-0.0403	-0.000209	0.00825	-0.0169	1			
Inflation	-0.0447	-0.0310	-0.0733	-0.0178	0.0359	0.0319	0.0406	0.0161	0.0158	-0.358	1		
IPC	0.0555	0.112	-0.156	-0.0270	-0.0682	-0.0650	-0.0358	0.0191	0.00127	0.314	-0.198	1	
Market_Share	0.116	0.160	0.772	-0.0863	0.111	0.235	-0.0216	0.0219	-0.125	-0.00206	0.000590	0.00732	1

Chapter 6

Econometric Model

Given that the data based had a comprehensible amount of time in monthly panel data, a fixed effects model was proposed to address the main question of this work. This type of approaches aim at controlling for time invariant factors in order to examine how the dependent and independent variables relate within an entity, in this case, a bank. In the previous sections, the predictors were defined and it was argued how they could be of use when explaining profits. They were chosen from an internal, market, and macroeconomic perspective in order to elucidate how banks' profitability changes.

The fixed effects model has been widely used in these type of studies since its main advantage relies on the fact that it accounts for movements in the dependent variable only through time changing variables; meaning that all other constant explanatory variables are withdrawn or controlled for. Each bank has unique characteristics that make it differ from others, such as assets, debts, loans, internal costs or market share. These are directly observable and measurable variables; we can actually calculate how much assets a bank possess, or how many loans has the bank given and therefore we are able to determine their evolution, growth or shrinkage overtime. Nonetheless, there could be other time invariant factors, or some unobserved variables that we are unable to measure that could possibly affect the profitability of the bank. If those effects exist, they would be desirable to control for in order to extract the net effect out of our predictors. This is the main reason why the fixed effects model is extremely useful, it allow us to control for those variables that we are able to observe and measure; and furthermore, for those that we can't. This would not be possible in a purely cross sectional data or time series analysis; in panel data we have both, a pool of individuals and their characteristics, all measured across time.

Lets consider the simplest example, imagine we have a sample of N banks in a highly competitive market, operating under the similar internal circumstances, such as asset management, debt, loans and costs; but with some regional differences. For instance, suppose distance to work varies considerably across banks but is time invariant, thus fixed over time (assume that individuals are employed at the same workplace for several periods of time). If we believe that being closer to work could potentially have effects on a workers productivity, then we are assuming a correlation between internal variables and distance to work. In this sense, a fixed effect model is ideal, since the distance could be considered as a fixed effect across time, but different cross-sectionally. If distance to work is time invariant, then, it will have no effect on profits; instead, changes in profits movements will be given by other causes.

There are, however, situations in which it is suspected that some fixed effects are actually not correlated with the explanatory variables. This is the main difference between the fixed effects and the random effects models, if there is a suspicion that the unobserved variables are uncorrelated with the explanatory variables, then those effects are precisely that, random. Hence, a random effects model should be employed. When using fixed effects, even though we cannot observe them, we suspect they are correlated with our predictors, they are time invariant and therefore possible to control for.

The simple univariate theoretical equation for the fixed effects model may be written as:

$$y_{it} = \beta x_{it} + u_{it}$$

Where y_{it} represents the independent variable, x_{it} the explanatory variables with its respective coefficient β, and u_{it} the error term.

Given that we are only accounting for time changing variables effects, the error term becomes particularly important since it may allow us to search for those time invariant impacts, thus, fixed effects. In this sense, u_{it} may be decomposed into two different terms:

$$u_{it} = \alpha_i + \epsilon_{it}$$

Where α_i constitutes the time invariant factors, thus fixed, effects; and ϵ_{it} the

idiosyncratic error term which contains all the information of those effects that influence the independent variable but that could not be accounted for. We assume, of course, that our predictors are not correlated with the idiosyncratic error.

In order to have additional evidence about the type of model more suitable for the data, this study performed the Hausman test. All the results from the Hausman tests are shown in the Appendix of this work, there is one for every regression made, meaning, for each regression in the six year bank, ten year banks and complete year banks data bases. As expected, they reinforced and suggested the idea that the fixed effects model was more suitable for the econometric analysis than the random effects model. The Hausman test is perform to detect endogeneity, it focuses on the fact that the error term for each entity is uncorrelated with the error term of the others. However, if it is, then the estimation will be biased and the fixed effects model should not be used. We have a sample of different banks, in which case we may be able to assume that the error terms with one another should not be correlated. In order to assess this proposition the Hausman test was performed; as expected, the results rejected the hypothesis that the available data was more suited with random effects than with fixed effects, meaning that the error term for each particular bank was statistically uncorrelated with the others. The following equation was estimated for three different data bases, one including the banks that after 2006 had at least six years of information, another one that incorporates banks with at least ten years of data after 2006, and a third one encompassing only the banks that had all data available for the period 2000-2019.

$$profitability_{it} = \beta_0 + \beta_1 ln\_Size_{it} + \beta_2 Capital\_Asset_{it} + \beta_3 Loan\_Asset_{it} + \beta_4 Deposit\_Asset_{it} + \beta_5 Loan\_Deposit_{it} + \beta_6 Credit\_Risk_{it} + \beta_7 Ad\_Cost_{it} + \beta_8 Igae_{it} + \beta_9 Inflation_{it} + \beta_{10} IPC_{it} + \beta_{11} Market\_Share_{it} + u_{it}$$

Where profitability was measured by Return on Average Assets and Return on Average Equity for each bank i in every period t.

Moreover, we made a test to see whether or not the time dummy variables were significant, this is, to address if all coefficients for all years were jointly equal to zero or

not. The test suggested the need for Time Fixed effects only for the models using ROAE as a dependent variable, meaning that we reject the null hypothesis of the test that all coefficient for all the available years are jointly zero. However, when the test was applied to the model with clusters, the null hypothesis was rejected for both ROAA and ROAE, encouraging the use of the Time Fixed Effects model, therefore it was used in the present study. The main difference between Fixed Effects and Time Fixed Effects is that the latter controls for those factors affecting all individuals equally. In this case, inflation and economic growth will have the same effect in all agents in every period. It is not possible for one bank to be affected by one inflation and another bank by another inflation, it is the same for both. Fixed effects considers time invariant effects, thus fixed, where every agent is affected by the variable in the same way in every period but differently cross-sectionally. It is worth mentioning that the tables shown for the time fixed effects model estimations, in the results section, are not shown completely, only the variables we are interested in appear. This is because when estimating time fixed effects to find impacts on profits, one dummy variable is created for each period of time, and we are not interested in the coefficients of those dummy variables, but rather in the consistency of the results of our explanatory variables.

In addition, as an exploratory analysis, the information from the complete year banks data base was divided in three different samples in order to examine the banking sector in Mexico before (2001-2006), during (2007-2009) and after (2010-2019) the financial crisis. The Fixed Effects and the Time Fixed effects models were used for these three stages. We had three different data bases; however, only the data base with the complete banks information (2000-2019) was suitable for the analysis. Both the six year banks and the ten year banks data bases were not appropriate since the samples were unbalanced since many of the banks were not present in the period before the crisis. Moreover, some banks in those data bases would have had very limited observations, this is also due to the fact that many banks in those data bases did not have any information for the years previous to the financial crisis; therefore, this information was omitted. The complete banks data base did not have these issues, the banks had basically the same observations for the whole period and they were all present before, during and after the financial crisis, although one of its drawbacks is the lack of data, given that we divided the sample in three sub-samples.

The following tables show the list of banks utilized in each regression for every period.

Table 6.1. Six Year Banks, Period of Regression: 2007-2019

Abc Capital	Banco Walmart	Consubanco	J.P. Morgan
Accendo Banco	Bancoppel	Credit Suisse	Monex
Actinver	Bank of America	Deutsche Bank	Mufg Bank
Afirme	Bankaool	Forjadores	Multiva
American Express	Banorte	HSBC	Santander
Autofin	Banregio	Inbursa	Scotiabank
Banamex	Bansi	ING	The Bank of New York Mellon
Banca Mifel	Barclays	Inmobiliario Mexicano	Ve por mas
Banco Ahorro Famsa	BBVA Bancomer	Interacciones	Volkswagen Bank
Banco Azteca	Biafirme	Intercam Banco	
Banco Base	Cibanco	Invex	
Banco del Bajío	Compartamos	Ixe	

Table 6.2. Ten Year Banks, Period of Regression: 2007-2019

Abc Capital	Banco del Bajío	Compartamos	Monex
Accendo Banco	Bancoppel	Consubanco	Mufg Bank
Actinver	Bank of America	Credit Suisse	Multiva
Afirme	Banorte	Deutsche Bank	Santander
American Express	Banregio	HSBC	Scotiabank
Autofin	Bansi	Inbursa	Ve por mas
Banamex	Barclays	Interacciones	Volkswagen Bank
Banca Mifel	BBVA Bancomer	Intercam Banco	
Banco Ahorro Famsa	Biafirme	Invex	
Banco Azteca	Cibanco	J.P. Morgan	

Table 6.3. Complete Year Banks, Period of Regression: 2001-2019

Accendo Banco	Banco del Bajío	Credit Suisse	J.P. Morgan
Afirme	Bank of America	Deutsche Bank	Monex
American Express	Banorte	HSBC	Mufg Bank
Banamex	Banregio	Inbursa	Santander
Banca Mifel	Bansi	Interacciones	Scotiabank
Banco Azteca	BBVA Bancomer	Invex	Ve por mas

Chapter 7

Results

The original data suggested the presence of heteroscedasticity, and since the theoretical model assumes homoscedasticity we had to control for it; in fact, data also presented serial autocorrelation. The previous conclusions were drawn out of the different tests we performed, namely: the Wald test to detect heteroscedasticity, in which the null hypothesis suggests the presence of homoscedasticity, which, in every regression made, appeared to be rejected; the Wooldridge test for serial autocorrelation in panel data, in which the null hypothesis suggest no serial correlation, which, in every case we rejected it. All results are shown in the Appendix, there is one table for every regression made, meaning, for each regression in the six year bank, ten year banks and complete year banks data bases, for every one of the tests. To address these particular issues and in order for our results to be robust, the fixed effects models had to be done considering clusters, where the cross-sectional variable used was Banks. This method is helpful to control for autocorrelation and heteroscedasticity. In this sense, our standard errors which are shown in parenthesis in every table, are robust for autocorrelation and heteroscedasticity.

Therefore, several different estimations were made. As mentioned before, we had three different data bases, one which considered the banks with at least six years of data after 2006, another one with banks that had information for at least ten years, after 2006 as well, and one last one that comprised the Banks that possessed complete data, namely 2001-2019. For each of the data bases ROAA and ROAE were used as dependent variables for different estimations. For each, the fixed effects model and the time fixed effects model were calculated with the raw information, meaning that they were done directly, not controlling for heteroscedasticity or autocorrelation. Then, the

same two models for the two dependent variables were estimated, but now controlling for both issues with the clusters method, using Banks as our cross-sectional variable.

The results in this work were found to be consistent across the two different types of models, through the three different data bases and in the two profits approximations. All estimations presented below belong to the calculations carried out with robust standard errors, this is, errors resulting from the clusters method. Although it is worth mentioning that for the first type of models, namely those done directly, without controlling for heteroscedasticity or autocorrelation, results were fairly consistent with the literature. Having the size, in general, as significant and positive, costs negative and significant for most cases, credit risk being negative and significant (although with a fairly low coefficient), IPC being positive and significant in most cases, all which are consistent with the robust estimations for fixed effects and time fixed effects they are all shown in the appendix of this work.

In the clusters regressions, both in the fixed effects and the time fixed effects models, the liquidity term, measured by the loan-deposit ratio, was negative and significant in practically all cases. However, its impact was nearly zero. Comparing our results with those that Chavarín (2016) found for Mexico in the period 2007-2013 in his dynamic panel regression model, we are able to observe that his results on this variable appeared to be insignificant in virtually all cases with robust standard errors.

The credit risk, measured by the preventive estimation of credit risk over total loans, in all cases, namely in both profits approximations, across all models and data bases, had consistent results with those found in the literature; we must mention that they were specially robust for ROAE relative to those obtained with ROAA. Coefficients were negative and significant, with a particular higher effect in the data base containing the banks with the most abundant data, this is, the one that comprise mostly the bigger banks, suggesting that they have more sensibility to credit risk than smaller ones. This could be due to the fact that larger banks have more clients with more voluminous contracts which lead to higher risk if one of them defaults. This result deviates with what Chavarín (2016) found for Mexico, where he concluded that credit risk, measured by provision for loan losses to total loans, was insignificant in explaining profits. It is also possible that results are different because in some estimations the author did not take into account those banks with the greatest losses, which in fact,

could potentially deviate the credit risk effects on profits. As stated previously results were consistent with those found in the literature, in both significance and sign, although in general our coefficients were smaller. For example, Dietrich and Wanzenried (2014) found credit risk, measured by loan loss provisions relative to total assets, to be significant and negative in most cases. The same is true for the credit risk results in Capraru and Ihnatov (2014) and Athanasoglou *et al.* (2008) were the impact on profits was, in general, significant and negative. What Adelopo *et al.* (2018) found for credit risk, measured by the net loans to deposits and short-term funding, was also a negative relation but with higher coefficient than the ones obtained in this work. Petria *et al.* (2015) had similar results for the European banking sector, but with a coefficient with a greater negative effect of credit risk measured by the ratio of impaired loans to gross loans, specially for the case or ROE.

In relation to the administrative cost, it seems to be the variable with the highest coefficients, being, as expected, negative and significant for virtually all cases. In both in ROAA and ROAE this was found to be the case, but the effect seems much larger in ROAE. Nonetheless, just for the banks with the largest data set available, namely, the 19 years, this variable was found to be insignificant in both fixed effects and time fixed effects. Chavarín (2016) found for Mexico in 2007-2013, although using operating costs, that this variable was significant (negative), but insignificant when excluding banks with the largest losses. Adelopo *et. al.* (2018) also found that these coefficients had a negative impact on profitability; they argue that costs are significant in all periods, namely before, during and after the crisis. This might be the only variable were results are, in general, not mixed. For example, other authors estimating costs such as Petria *et. al.* (2015), Dietrich and Wanzenried (2014), Al-Harbi (2019); Athanasoglou *et. al.* (2008); Ally (2014) and Bolarinwa *et. al.* (2019) all argue that reducing costs will have a positive effect on profits. There is practically no debate on the direction of the results; the magnitude, however, is something that varies over studies.

The last variable that was strongly consistent was IPC, which is the Mexican Stock Market Index calculated with some of the biggest and most liquid firms in Mexico. As expected, it was positive and significant for most cases [1], and it was specially robust for

[1]Interpretation for IPC in the Time Fixed Effects Model was omitted because all firms are facing the same IPC, and this model controls for variables affecting all individuals equally, therefore its interpretation is not quite as accurate as in the entity fixed effects model.

ROAE. None of the revised literature used a stock market index as an independent variable, therefore there is no practical comparison about the results. However, it is worth noting that as the data bases include banks with more information, and specially when considering only those banks with 19 years of data, which are associated with the largest ones in our data set, IPC's significance and effect become stronger. These results are found to be consistent with the hypothesis that given that larger banks have larger firms as clients, then it is possible that when the market is rewarding those companies, this has positive effects on the banks profits.

The macroeconomic variables, such as economic growth measured by the Global Indicator for Economic Activty (IGAE), and inflation rate, had no statistically significant results for the six nor ten year data bases. Considering the banks with 19 years of information, which are more associated to the larger banks, inflation had an exceptionally positive and significant effect, specifically in ROAE. For Mexico, Chavarín (2016) did not use the inflation as an independent variable, therefore no direct comparison can be held; nevertheless, for GDP he found it to be, in general, positively affecting profits. Literature has mixed opinions about the effects of inflation in profits. For example, Adelopo *et. al.* (2018) found that inflation has in general a negative impact on profits, although it is also argued that its effect vary when considering the period before, during or after the crisis. On contrast, Dietrich and Wanzenried (2014) using information from Fitch-IBCA Bankscope (BSC) database, and estimating a model for 118 countries, found this effect to be positive and significant effect on profits for low- and middle-income countries, where Mexico could be placed according to Chavarín (2016), but not for the high-income countries. As mentioned before, the interpretation of the coefficients resulted in the Time Fixed effects model are ignored. This is due to the fact that the model controls for variables that influence all entities equally, as it is, macroeconomic variables do affect them in the same way. There is no bank experiencing a different inflation or economic growth than other.

At last, similar results where found for Market share, as the information grows, and smaller banks are not considered in the data, market share appears to be significant and negative, this is true for ROAE solely in complete year banks data base under the Time Fixed Effects model. This would mean that an increase in assets, relative to those in the market, actually have an inverse effect on profits. This result is quite interesting since it suggests that due to an increase in the market share of the bank, which can be

seen as higher concentration in the market, actually reduces the banks profits. This result evinces that competition might actually have positive effects on banks' profitability. Adelopo *et al.* (2018) found market power, measured in the same way, to have mixed results, depending on the period of analysis, previous, during or post crisis. Furthermore, Petria *et al.* (2015) observed the same results as this work for banks in the European Union, in the period from 2004-2011. Same as this study, they provide evidence that concentration in the market reduces profits, meaning that competition actually has positive impact in the banks' profitability. In contrast, Chavarín (2016) for Mexico in 2007-2013 found market share to be insignificant in practically all cases.

Results showed that competition could possibly have positive effects on banks profits, this could be due to the fact that in the banking sector banks are actively in contact with each others in the interbank market. Competition may provide means to approach clients in a more efficient way; if an agent is looking for prices (generally speaking, for any financial instrument) in several banks, this could encourage them to lower the prices in order to keep the clients. We must consider that banks are inside a market where they have other banks as competitors and prices still play a crucial role in the distribution of the market in terms of competitiveness, meaning market share or market power. Furthermore, each bank has its own way to address counterparty credit risk, in this sense some banks may be trying to compete with others by reducing prices, but their risk management must follow a betterment in performance and efficiency as well; there is no point in reducing prices if risk taken by the bank are too high and expected gains are not as elevated. These increases in efficiencies could potentially be a source of the enlargement in profits. A further and deeper analysis in market constraints, barriers of entry, efficiencies, must be held to find a more conclusive argument; however, this is not the main scope of this work.

The results for size found in both models are, in general, consistent with what has been found in the literature. They indicate that the size of the bank, measured as the natural logarithm of the total assets of the bank, have a positive and significant effect in profits, specially for ROAE and for the banks with the complete data, associated with only the largest banks. In the Fixed Effects model, size was significant and positive with a relatively high coefficient for the data base comprising the banks with the most data, which is associated with the larger banks. They were all positive and significant and also higher for ROAE than for ROAA. In the Time Fixed Effects model, the

coefficient was positive and significative in all cases for ROAE, but ROAA was statistically significant only in the 19 year banks data base. As Adelopo *et al.* (2018) found in a fixed effects model for the period 1999 to 2013, banks size was significant for all periods, namely before, during and after the crisis; Chavarín (2016) for Mexico in the period of 2007-2013 and Menicucci and Paolucci (2016) applying a linear regression model on the pooled sample for European banks in 2009-2013, found this result to be consistent with theirs, arguing that total assets have a positive impact on profits. Adelopo *et al.* (2018) observed that profits could be either positively or negatively affected by size for two main factors. As banks grow larger they become more profitable because of economies of scale, but as they do, they also tend to get higher costs and become harder to manage. There are however, some studies in the literature that found different results, Dietrich and Wanzenried (2014) results for example, they show no evidence that larger banks are more profitable for ROAA but they do have a positive effect with ROAE as the dependent variable. Finally we could mention Capraru and Ihnatov (2014) that found this predictor to have a negative influence on profts, and Al-Harbi (2019) who observed an insignificant coefficient.

In relation with the Loan Asset ratio and the Deposit Asset ratio, they were insignificant in every single scenario, for both the time fixed effects the fixed effects models. These ratios were not calculated by Chavarín (2016); however, Menicucci & Paolucci (2016) for the European banking sector during the period 2009-2013, found Deposits ratio to be positive and significant and Loans Ratio was actually insignificant for both ROA and ROE.

The capital asset ratio has positive and significant effect, although uniquely for the banks with the largest data history and for ROAA, both in the time fixed effects and the fixed effects model. This result seems to be consistent with the literature, for example Menicucci & Paolucci (2016) and Öhman and Yazdanfar (2018) found similar results, were capital strength appeared to be an important determinant, having in general a positive effect on profits. Chavarín (2016) for Mexico also found this to be the case, although with higher values for the coefficients, than our study. Petria *et al.* (2015) found it to be insignificant, arguing that two things happen, high capital adequacy could possibly reduce the risk of a bank, and also because banks do not take advantage from the leverage effect. Finally Adelopo *et al.* (2018) argue that its effect changes depending on the period analyzed (before, during or after the crisis).

One of the main contributions of this study is the inclusion of the Mexican Stock Market Index, namely, the IPC into the analysis of determinants. Considering the results, we could assert that the relation between the IPC and the bank's profits is non trivial. Companies that rely strongly on the performance of these indicators and markets will potentially have a larger impact on the banks profits. There is, however a strong drawback these kind of relations. Since they have a positive relation, whenever the market improves, the banks will do as well, and profits will rise; on the contrary, if the situation deteriorates, then profits will most likely decrease. The results found in this analysis suggests a positive relation between IPC and profits, meaning a pro-cyclical association with the market, which at the same time, advocates for keen and sharp hedging strategies. Having extraordinarily large profits is not as usual as having substantial losses, the current situation with the pandemic caused by COVID-19 showed it pretty well. Once the biological anomaly became a global issue, markets started to react, the stock markets were dramatically damaged and economies were severely injured. These type of situations exhort the best performance out of the financial institutions since the economy relies greatly on them. There are, however, priorities that must be evaluated by decision makers, in order to address this crisis. We could consider the substantial quantity of firms that went under bankruptcy when the crisis arrived, which aggravate the counterparty credit risk that banks face. This unmasks two underlying issues, one is that banks could try to lend more, increase the credits, or extend them in order to get late but more secure payments, to help the re-bounce of the economy; nonetheless, this could potentially result in losses given the credit risk. On the other hand they could try to protect their assets, reduce credits, or increase charges and commissions and take a more secure position to avoid losses; either way decisions are absolutely non trivial. With the results found in the analysis and considering the current crisis, it is naturally to anticipate that these unexpected losses experienced by the financial system, which most likely will be manifested by the IPC indicators, will impact negatively on banks profits; in future analysis the magnitude could be evaluated with the coefficients obtained in the present work.

Table 7.1. Fixed Effects Regression, Period: 2007-2019, Clusters, Six Year Banks

	(1)	(2)	(3)	(4)
	ROAA	ROAA	ROAE	ROAE
ln_Size	-0.00117	-0.00144	0.0281	0.0267
	(0.00476)	(0.00513)	(0.0200)	(0.0205)
Capital_Asset	0.00597	0.00669	0.0486	0.0537
	(0.0407)	(0.0430)	(0.165)	(0.168)
Loan_Asset	0.0316		-0.00218	
	(0.0302)		(0.0774)	
Deposit_Asset	-0.0196		-0.0332	
	(0.0308)		(0.0846)	
Loan_Deposit	-0.00000397***	-0.00000360***	-0.0000123***	-0.0000120***
	(0.000000596)	(0.000000264)	(0.00000177)	(0.00000114)
Credit_Risk	-0.0000738	0.00000428	-0.000648***	-0.000578***
	(0.0000896)	(0.0000376)	(0.000226)	(0.0000769)
Ad_Cost	-0.636***	-0.636***	-0.997***	-0.990***
	(0.0670)	(0.0693)	(0.171)	(0.165)
IGAE	0.0237	0.0274	0.0115	0.0100
	(0.0292)	(0.0303)	(0.135)	(0.138)
Inflation	-0.00794	-0.0109	0.247	0.233
	(0.0512)	(0.0524)	(0.213)	(0.205)
IPC	0.00448	0.00292	0.0496***	0.0517***
	(0.00459)	(0.00433)	(0.0175)	(0.0174)
Market_Share	-0.122	-0.142	0.0467	0.133
	(0.114)	(0.101)	(0.430)	(0.363)
_cons	0.0645	0.0737	-0.140	-0.143
	(0.0568)	(0.0575)	(0.228)	(0.231)
N	5580	5580	5580	5580
R^2	0.732	0.727	0.373	0.371
adj. R^2	0.731	0.727	0.371	0.370
F	67724.2	33567.4	54584.5	52785.6
p	5.55e-85	2.42e-77	5.14e-83	1.80e-81

Standard errors in parentheses

* p<0.10, ** p<0.05, *** p<0.010

Table 7.2. Fixed Effects Regression, Period: 2007-2019, Clusters, Ten Year Banks

	(1)	(2)	(3)	(4)
	ROAA	ROAA	ROAE	ROAE
ln_Size	0.00260	0.00264	0.0251	0.0240
	(0.00529)	(0.00537)	(0.0176)	(0.0186)
Capital_Asset	0.0226	0.0234	0.0612	0.0662
	(0.0425)	(0.0442)	(0.194)	(0.194)
Loan_Asset	0.00854		-0.000262	
	(0.0276)		(0.0696)	
Deposit_Asset	-0.00559		-0.0252	
	(0.0321)		(0.0992)	
Loan_Deposit	-0.00000405***	-0.00000396***	-0.0000119***	-0.0000117***
	(0.000000809)	(0.000000488)	(0.00000235)	(0.00000182)
Credit_Risk	-0.0000351	-0.0000138	-0.000606**	-0.000549***
	(0.000104)	(0.0000458)	(0.000296)	(0.000148)
Ad_Cost	-0.490***	-0.486***	-1.084**	-1.087**
	(0.159)	(0.165)	(0.516)	(0.526)
IGAE	0.0152	0.0156	0.0975	0.0955
	(0.0267)	(0.0265)	(0.145)	(0.148)
Inflation	-0.0328	-0.0336	0.221	0.213
	(0.0508)	(0.0507)	(0.222)	(0.216)
IPC	0.00708	0.00681	0.0515**	0.0528***
	(0.00455)	(0.00431)	(0.0193)	(0.0178)
Market_Share	-0.145	-0.150	0.0357	0.0952
	(0.123)	(0.116)	(0.444)	(0.375)
_cons	0.0173	0.0180	-0.109	-0.110
	(0.0642)	(0.0643)	(0.220)	(0.215)
N	5068	5068	5068	5068
R^2	0.443	0.442	0.251	0.250
adj. R^2	0.442	0.441	0.249	0.249
F	167201.1	45920.1	46230.6	40573.1
p	8.62e-79	5.27e-68	5.07e-69	4.60e-67

Standard errors in parentheses

* p<0.10, ** p<0.05, *** p<0.010

Table 7.3. Fixed Effects Regression, Period: 2001-2019, Clusters, Complete Year Banks

	(1)	(2)	(3)	(4)
	ROAA	ROAA	ROAE	ROAE
ln_Size	0.00384**	0.00388**	0.0338*	0.0341*
	(0.00175)	(0.00173)	(0.0176)	(0.0171)
Capital_Asset	0.0381***	0.0457***	-0.101	-0.0385
	(0.0115)	(0.0109)	(0.249)	(0.262)
Loan_Asset	0.0171		0.110	
	(0.0157)		(0.120)	
Deposit_Asset	-0.0187		-0.167	
	(0.0178)		(0.150)	
Loan_Deposit	-0.00000275***	-0.00000256***	-0.0000108***	-0.00000869***
	(0.000000435)	(0.000000604)	(0.00000296)	(0.00000199)
Credit_Risk	-0.000135***	-0.0000751**	-0.00177***	-0.00128***
	(0.0000398)	(0.0000296)	(0.000284)	(0.000398)
Ad_Cost	-0.104	-0.106	-0.768	-0.800
	(0.183)	(0.193)	(1.613)	(1.697)
IGAE	-0.0101	-0.00825	0.0648	0.0752
	(0.0255)	(0.0244)	(0.203)	(0.200)
Inflation	0.0178	0.0203	0.601**	0.615**
	(0.0437)	(0.0423)	(0.289)	(0.281)
IPC	0.00986**	0.00990**	0.121***	0.125***
	(0.00382)	(0.00422)	(0.0349)	(0.0375)
Market_Share	-0.0726	-0.0728	-0.956	-0.913
	(0.0665)	(0.0646)	(0.674)	(0.663)
_cons	-0.0288*	-0.0311*	-0.196	-0.234
	(0.0149)	(0.0155)	(0.154)	(0.176)
N	4824	4824	4824	4824
R^2	0.121	0.105	0.094	0.082
adj. R^2	0.119	0.103	0.092	0.080
F	52545.0	48761.8	16573.6	25563.9
p	1.18e-47	9.37e-47	6.83e-42	1.57e-43

Standard errors in parentheses

* p<0.10, ** p<0.05, *** p<0.010

Table 7.4. Time Fixed Effects Regression, Period: 2007-2019, Clusters, Six Year Banks

	(1)	(2)	(3)	(4)
	ROAA	ROAA	ROAE	ROAE
ln_Size	-0.00310	-0.00445	0.0884**	0.0862**
	(0.00787)	(0.00721)	(0.0380)	(0.0370)
Capital_Asset	0.0000216	-0.00319	0.283	0.270
	(0.0469)	(0.0461)	(0.244)	(0.233)
Loan_Asset	0.0308		0.0274	
	(0.0308)		(0.0771)	
Deposit_Asset	-0.0192		0.00159	
	(0.0317)		(0.0812)	
Loan_Deposit	-0.00000403***	-0.00000368***	-0.0000108***	-0.0000106***
	(0.000000612)	(0.000000287)	(0.00000212)	(0.00000151)
Credit_Risk	-0.0000600	0.0000257	-0.000789***	-0.000752***
	(0.0000852)	(0.0000419)	(0.000222)	(0.0000851)
Ad_Cost	-0.636***	-0.636***	-0.932***	-0.938***
	(0.0693)	(0.0703)	(0.152)	(0.149)
IGAE	0	0	0	0
	(.)	(.)	(.)	(.)
Inflation	0	0	0	0
	(.)	(.)	(.)	(.)
IPC	0.00940	0.00802	0.103**	0.102**
	(0.00651)	(0.00637)	(0.0399)	(0.0400)
Market_Share	-0.0897	-0.0947	-0.708	-0.736
	(0.111)	(0.112)	(0.484)	(0.466)
_cons	0.0826	0.102	-0.730*	-0.693*
	(0.0920)	(0.0768)	(0.414)	(0.390)
N	5580	5580	5580	5580
R^2	0.734	0.730	0.414	0.414
adj. R^2	0.726	0.722	0.397	0.396

Standard errors in parentheses

* p<0.10, ** p<0.05, *** p<0.010

Table 7.5. Time Fixed Effects Regression, Period: 2007-2019, Clusters, Ten Year Banks

	(1)	(2)	(3)	(4)
	ROAA	ROAA	ROAE	ROAE
ln_Size	0.00320	0.00297	0.0872**	0.0857**
	(0.00896)	(0.00848)	(0.0344)	(0.0327)
Capital_Asset	0.0260	0.0255	0.295	0.282
	(0.0524)	(0.0531)	(0.265)	(0.248)
Loan_Asset	0.00911		0.0191	
	(0.0287)		(0.0711)	
Deposit_Asset	-0.00470		0.0122	
	(0.0320)		(0.0918)	
Loan_Deposit	-0.00000407***	-0.00000398***	-0.0000106***	-0.0000106***
	(0.000000782)	(0.000000463)	(0.00000265)	(0.00000207)
Credit_Risk	-0.0000252	-0.00000273	-0.000745**	-0.000744***
	(0.000105)	(0.0000423)	(0.000290)	(0.000131)
Ad_Cost	-0.484***	-0.480***	-0.928*	-0.924*
	(0.166)	(0.172)	(0.495)	(0.508)
IGAE	0	0	0	0
	(.)	(.)	(.)	(.)
Inflation	0	0	0	0
	(.)	(.)	(.)	(.)
IPC	0.0122*	0.0119*	0.115***	0.114***
	(0.00611)	(0.00630)	(0.0389)	(0.0386)
Market_Share	-0.144	-0.149	-0.721	-0.757
	(0.114)	(0.116)	(0.481)	(0.460)
_cons	0.00928	0.0134	-0.731*	-0.700*
	(0.107)	(0.0968)	(0.391)	(0.353)
N	5068	5068	5068	5068
R^2	0.448	0.447	0.303	0.302
adj. R^2	0.430	0.429	0.280	0.279

Standard errors in parentheses

* p<0.10, ** p<0.05, *** p<0.010

Table 7.6. Time Fixed Effects Regression, Period: 2001-2019, Clusters, Complete Year Banks

	(1)	(2)	(3)	(4)
	ROAA	ROAA	ROAE	ROAE
ln_Size	0.00847**	0.00774**	0.0791**	0.0771**
	(0.00345)	(0.00356)	(0.0344)	(0.0364)
Capital_Asset	0.0588***	0.0624***	0.0973	0.141
	(0.0159)	(0.0190)	(0.328)	(0.354)
Loan_Asset	0.0203		0.138	
	(0.0168)		(0.122)	
Deposit_Asset	-0.0148		-0.124	
	(0.0153)		(0.112)	
Loan_Deposit	-0.00000240***	-0.00000237***	-0.00000718**	-0.00000645**
	(0.000000553)	(0.000000686)	(0.00000299)	(0.00000304)
Credit_Risk	-0.000152***	-0.0000904***	-0.00199***	-0.00153***
	(0.0000388)	(0.0000301)	(0.000279)	(0.000381)
Ad_Cost	-0.0800	-0.0823	-0.488	-0.503
	(0.175)	(0.182)	(1.521)	(1.574)
IGAE	0	0	0	0
	(.)	(.)	(.)	(.)
Inflation	0	0	0	0
	(.)	(.)	(.)	(.)
IPC	-0.00900	-0.00630	-0.00669	0.00837
	(0.00859)	(0.00788)	(0.0860)	(0.0870)
Market_Share	-0.135	-0.135	-1.681*	-1.689*
	(0.0824)	(0.0871)	(0.880)	(0.905)
_cons	-0.0756**	-0.0683**	-0.687**	-0.677*
	(0.0301)	(0.0309)	(0.328)	(0.356)
N	4824	4824	4824	4824
R^2	0.161	0.144	0.164	0.155
adj. R^2	0.121	0.103	0.123	0.114

Standard errors in parentheses

* p<0.10, ** p<0.05, *** p<0.010

7.1 Before (2001-2006), During (2007-2009) and After (2010-2019) the Financial Crisis Econometric Results

Since the literature is very limited for Mexico, the current sub-section elaborates an exploratory analysis of the determinants of profitability in the mexican baking sector in three stages, before (2001-2006), during (2007-2009) and after (2010-2019) the financial crisis. This analysis is performed in order to provide an overview of the different stages. It is not an exhaustive analysis of the financial crisis and its effects in the banking sector in Mexico, it is exploratory and it encourages other studies to address this issue with a deeper approach.

As before, all estimations presented below were calculated using robust standard errors, meaning, errors resulting from the clusters method. Although, it is worth mentioning that the first type of models, namely those done directly, without controlling for heteroscedasticity or autocorrelation are all shown in the Appendix. Moreover, as previously mentioned, the data base used for this particular approach was the complete year banks data base. Fundamentally, we used this data base because the banks had the same number of observations across all the period (2001-2019) and the panel was strongly balanced, meaning that basically the same pool of banks were present in all the stages. As indicated above, this is something that was not present in the other data bases. Nonetheless, there are some drawbacks with this particular approach. First, in contrast with the work of Adelopo *et. al.* (2018), where the information of banks for 15 different countries was used, we only use one, Mexico. In this sense, our results are limited given the data, we had one data base and furthermore, it had to be divided in three different samples, which substantially reduced the observations per model. Second, not all banks are considered and this reduces the heterogeneity in the sample. The following briefly explores the results obtained from the estimation of the models across stages.

The results obtained from the estimation show substantial divergences across the different periods considered, meaning that perhaps the associated determinants vary within stages. Notwithstanding, some others were very consistent; for example, the assets of the banks played a positive and significant role as a determinant for virtually

all periods, although not for all regressions. The loan asset ratio is basically insignificant for all cases and the loan deposit ratio shows a similar behavior as well, although it is significant in two cases during the crisis, and only in the Time Fixed Effects Model. In contrast, other variables appeared to be less stable; for example, the capital-asset ratio seems to have a positive and significant effect before and after the crisis, but not during the crisis. Something similar happens with the credit risk, where almost all coefficients for the stages before and after were significant; nonetheless, the most unusual result is that it was positive before the crisis, but for the subsequent stages, it was negative and significant. Deposits seem to be only significant before the crisis but not in the other stages. The most unusual and odd results where obtained from the administrative costs, they were not consistent as in the previous estimations. It has some serious unstable and counter-intuitive results. Coefficients are significant and negative in the stage previous to the crisis. Notwithstanding, for the period during the crisis coefficients appear to be extraordinarily high, significant and positive, which is extremely odd and counter intuitive. Results show that the cost is negative but not significant after the crisis.

Macroeconomic variables, namely IGAE and inflation also varied both in their magnitude and significance across periods, in fact, they were only significant during the crisis, where coefficients were found to be positive for the economic growth and negative for inflation. The Mexican Stock Market Index, namely the IPC, was also found to be significant and positive for the period during the crisis, but not for the others. Market share had also some very inconsistent results, as before, their coefficients are negative and statistically significant previous to the crisis; however, during and after results are not significant.

The results gathered from these sets of samples were neither particularly consistent with literature, nor with our previous estimations. There appear to be differences across stages, specifically, some coefficients suggested the presence of much more higher effects during the crisis. However, these results are neither conclusive nor exhaustive. We encourage future studies to address this question in order to have additional and clearer evidence.

The following tables show the econometric results for the analysis in the periods before (2001-2006), during (2007-2009) and after (2010-2019) the financial crisis.

Table 7.7. Fixed Effects Regression, Period: 2001-2006, Before Financial Crisis, Clusters, Complete Year Banks

	(1)	(2)	(3)	(4)
	ROAA	ROAA	ROAE	ROAE
ln_Size	0.00134	0.00277	0.0870**	0.111***
	(0.00557)	(0.00476)	(0.0355)	(0.0303)
Capital_Asset	0.0868***	0.0955***	0.970	1.118
	(0.0273)	(0.0260)	(0.694)	(0.715)
Loan_Asset	0.00948		0.151	
	(0.0131)		(0.216)	
Deposit_Asset	-0.0195		-0.325*	
	(0.0165)		(0.157)	
Loan_Deposit	0.000000854	0.00000123	0.0000172	0.0000233
	(0.000000682)	(0.000000768)	(0.0000143)	(0.0000141)
Credit_Risk	0.108***	0.109***	1.023**	1.039**
	(0.0265)	(0.0265)	(0.451)	(0.469)
Ad_Cost	-0.532**	-0.534*	-3.594	-3.626
	(0.254)	(0.271)	(2.205)	(2.561)
IGAE	0.00669	0.00461	0.437	0.399
	(0.0384)	(0.0361)	(0.357)	(0.378)
Inflation	0.134	0.153	2.611	2.929
	(0.137)	(0.141)	(1.796)	(1.942)
IPC	0.0108	0.0104	0.128	0.121
	(0.00646)	(0.00646)	(0.0746)	(0.0752)
Market_Share	-0.114*	-0.120*	-2.430***	-2.540***
	(0.0629)	(0.0591)	(0.554)	(0.555)
_cons	0.0181	-0.00190	-0.633	-0.974**
	(0.0643)	(0.0550)	(0.429)	(0.353)
N	1286	1286	1286	1286
R^2	0.549	0.541	0.412	0.396
adj. R^2	0.545	0.538	0.407	0.392
F	.	.	25007666.8	33174863.3
p	.	.	3.33e-75	4.62e-76

Standard errors in parentheses

* p<0.10, ** p<0.05, *** p<0.010

Table 7.8. Fixed Effects Regression, Period: 2007-2009, During Financial Crisis, Clusters, Complete Year Banks

	(1)	(2)	(3)	(4)
	ROAA	ROAA	ROAE	ROAE
ln_Size	-0.00175	-0.00229	0.0222	0.0129
	(0.00360)	(0.00282)	(0.0320)	(0.0289)
Capital_Asset	0.0162	0.0167	-0.0999	-0.111
	(0.0219)	(0.0164)	(0.158)	(0.145)
Loan_Asset	-0.00371		0.0218	
	(0.0223)		(0.142)	
Deposit_Asset	0.00828		0.0451	
	(0.0156)		(0.136)	
Loan_Deposit	-0.00136	-0.00303	-0.00982	-0.0147
	(0.00538)	(0.00214)	(0.0328)	(0.0201)
Credit_Risk	-0.00599	0.00187	-0.537	-0.433
	(0.0650)	(0.0728)	(0.475)	(0.518)
Ad_Cost	0.283***	0.286***	4.329***	4.353***
	(0.0778)	(0.0810)	(1.018)	(1.018)
IGAE	0.0319**	0.0300**	0.550***	0.528***
	(0.0116)	(0.0115)	(0.111)	(0.123)
Inflation	-0.137**	-0.133**	-0.546	-0.539
	(0.0583)	(0.0592)	(0.675)	(0.707)
IPC	0.00138	0.00117	0.0430**	0.0385*
	(0.00235)	(0.00183)	(0.0177)	(0.0188)
Market_Share	0.0837	0.0798	0.707	0.659
	(0.0632)	(0.0607)	(0.522)	(0.508)
_cons	0.0199	0.0295	-0.330	-0.190
	(0.0401)	(0.0311)	(0.366)	(0.327)
N	792	792	792	792
R^2	0.250	0.247	0.516	0.513
adj. R^2	0.239	0.238	0.509	0.508
F	5.699	6.353	50.62	50.52
p	0.000396	0.000315	2.03e-12	5.41e-12

Standard errors in parentheses

* p<0.10, ** p<0.05, *** p<0.010

Table 7.9. Fixed Effects Regression, Period: 2010-2019, After Financial Crisis, Clusters, Complete Year Banks

	(1)	(2)	(3)	(4)
	ROAA	ROAA	ROAE	ROAE
ln_Size	0.00589*	0.00661*	0.0221	0.0217
	(0.00307)	(0.00377)	(0.0201)	(0.0216)
Capital_Asset	0.0761**	0.0840**	0.150	0.179
	(0.0341)	(0.0369)	(0.204)	(0.193)
Loan_Asset	0.0101		-0.0485	
	(0.0134)		(0.0829)	
Deposit_Asset	-0.0223		-0.112	
	(0.0166)		(0.0975)	
Loan_Deposit	0.0000133	0.0000262	-0.000151	-0.000120
	(0.0000211)	(0.0000338)	(0.000117)	(0.000105)
Credit_Risk	-0.000112*	-0.0000680*	-0.000997***	-0.000906***
	(0.0000635)	(0.0000374)	(0.000158)	(0.000101)
Ad_Cost	-0.0534	-0.0342	-0.0251	-0.0466
	(0.0854)	(0.0752)	(0.394)	(0.439)
IGAE	0.0576	0.0733	0.362	0.554
	(0.0570)	(0.0694)	(0.419)	(0.556)
Inflation	-0.00782	-0.0228	0.385	0.245
	(0.0452)	(0.0548)	(0.320)	(0.406)
IPC	0.00419	0.00559	0.00550	0.0166
	(0.00342)	(0.00498)	(0.0228)	(0.0342)
Market_Share	-0.0812	-0.0639	-0.263	-0.00197
	(0.0785)	(0.0776)	(0.393)	(0.263)
_cons	-0.0557*	-0.0720*	-0.115	-0.192
	(0.0317)	(0.0397)	(0.222)	(0.252)
N	2746	2746	2746	2746
R^2	0.124	0.095	0.060	0.031
adj. R^2	0.120	0.092	0.057	0.028
F	116225.2	215025.1	39941.8	46721.7
p	1.28e-51	3.64e-54	2.77e-46	1.53e-46

Standard errors in parentheses

* p<0.10, ** p<0.05, *** p<0.010

Table 7.10. Time Fixed Effects Regression, Period: 2001-2006, Before Financial Crisis, Clusters, Complete Year Banks

	(1) ROAA	(2) ROAA	(3) ROAE	(4) ROAE
ln_Size	0.00230	0.00450	0.118	0.153**
	(0.00593)	(0.00513)	(0.0845)	(0.0700)
Capital_Asset	0.0910**	0.102***	1.110	1.289
	(0.0336)	(0.0312)	(0.851)	(0.813)
Loan_Asset	0.00814		0.125	
	(0.0125)		(0.195)	
Deposit_Asset	-0.0174		-0.278*	
	(0.0163)		(0.151)	
Loan_Deposit	0.000000917	0.00000126	0.0000177	0.0000231
	(0.000000741)	(0.000000809)	(0.0000148)	(0.0000143)
Credit_Risk	0.108***	0.109***	1.005**	1.016**
	(0.0269)	(0.0266)	(0.449)	(0.456)
Ad_Cost	-0.527*	-0.523*	-3.458	-3.390
	(0.255)	(0.271)	(2.106)	(2.421)
IGAE	0	0	0	0
	(.)	(.)	(.)	(.)
Inflation	0	0	0	0
	(.)	(.)	(.)	(.)
IPC	0.0121	0.0132	0.152**	0.170**
	(0.00810)	(0.00849)	(0.0731)	(0.0780)
Market_Share	-0.122*	-0.134*	-2.701***	-2.888***
	(0.0691)	(0.0675)	(0.783)	(0.790)
_cons	0.0133	-0.0143	-0.852	-1.299*
	(0.0645)	(0.0553)	(0.900)	(0.698)
N	1286	1286	1286	1286
R^2	0.556	0.551	0.428	0.417
adj. R^2	0.531	0.526	0.396	0.385

Standard errors in parentheses

* p<0.10, ** p<0.05, *** p<0.010

Table 7.11. Time Fixed Effects Regression, Period: 2007-2009, During Financial Crisis, Clusters, Complete Year Banks

	(1)	(2)	(3)	(4)
	ROAA	ROAA	ROAE	ROAE
ln_Size	0.00242	0.000106	0.0810*	0.0519
	(0.00432)	(0.00283)	(0.0426)	(0.0316)
Capital_Asset	0.0347	0.0302	0.161	0.0880
	(0.0278)	(0.0198)	(0.169)	(0.136)
Loan_Asset	0.00263		0.106	
	(0.0226)		(0.135)	
Deposit_Asset	0.0115		0.0603	
	(0.0158)		(0.132)	
Loan_Deposit	-0.00306	-0.00430*	-0.0368	-0.0323*
	(0.00599)	(0.00239)	(0.0322)	(0.0170)
Credit_Risk	-0.0321	-0.00802	-0.866**	-0.594
	(0.0597)	(0.0741)	(0.414)	(0.527)
Ad_Cost	0.301***	0.302***	4.582***	4.590***
	(0.0750)	(0.0821)	(0.872)	(0.899)
IGAE	0	0	0	0
	(.)	(.)	(.)	(.)
Inflation	0	0	0	0
	(.)	(.)	(.)	(.)
IPC	0.0101**	0.00835***	0.133***	0.112***
	(0.00366)	(0.00242)	(0.0336)	(0.0277)
Market_Share	0.0789	0.0692	0.541	0.444
	(0.0639)	(0.0612)	(0.612)	(0.586)
_cons	-0.0381	-0.00401	-1.053**	-0.650*
	(0.0495)	(0.0320)	(0.490)	(0.354)
N	792	792	792	792
R^2	0.302	0.288	0.570	0.557
adj. R^2	0.261	0.249	0.545	0.533

Standard errors in parentheses

* p<0.10, ** p<0.05, *** p<0.010

Table 7.12. Time Fixed Effects Regression, Period: 2010-2019, After Financial Crisis, Clusters, Complete Year Banks

	(1)	(2)	(3)	(4)
	ROAA	ROAA	ROAE	ROAE
ln_Size	0.0126*	0.0136*	0.0560	0.0673
	(0.00668)	(0.00700)	(0.0365)	(0.0408)
Capital_Asset	0.0953**	0.103**	0.255	0.307
	(0.0409)	(0.0427)	(0.245)	(0.251)
Loan_Asset	0.0171		-0.00984	
	(0.0161)		(0.0711)	
Deposit_Asset	-0.0180		-0.102	
	(0.0158)		(0.103)	
Loan_Deposit	0.0000594	0.0000739	0.0000660	0.000178
	(0.0000434)	(0.0000537)	(0.000217)	(0.000208)
Credit_Risk	-0.000122*	-0.0000709**	-0.00114***	-0.00100***
	(0.0000640)	(0.0000324)	(0.000177)	(0.000120)
Ad_Cost	-0.0556	-0.0295	-0.0485	-0.0238
	(0.0775)	(0.0616)	(0.362)	(0.362)
IGAE	0	0	0	0
	(.)	(.)	(.)	(.)
Inflation	0	0	0	0
	(.)	(.)	(.)	(.)
IPC	0.0150	0.0160	0.0614	0.0898
	(0.0118)	(0.0122)	(0.0759)	(0.0929)
Market_Share	-0.124	-0.127	-0.484	-0.400
	(0.0861)	(0.0931)	(0.477)	(0.457)
_cons	-0.138*	-0.153*	-0.505	-0.700
	(0.0785)	(0.0797)	(0.439)	(0.487)
N	2746	2746	2746	2746
R^2	0.166	0.144	0.111	0.096
adj. R^2	0.126	0.104	0.068	0.053

Standard errors in parentheses

* p<0.10, ** p<0.05, *** p<0.010

Chapter 8

Conclusions

Generally speaking the results could be seen as consistent with what was found in the literature. Specifically for Mexico, comparing results with those of Chavarín (2016) who addressed this particular research question, conclusions were mixed, some of which were consistent but not considerably consistent. This is possibly due for two reasons. First, the approach was different, the author used a dynamic model using the first lag of the profits as an explanatory variable, and a random effects model for the static approach. In contrast, this study faced the data with a fixed effects model and a time fixed effect model with robust errors for autocorrelation and heteroscedasticity. Second, the period employed by the author comprehended from 2007 to 2013; conversely, this work used data from 2007 to 2019 for two sets of data, and an additional one with information from 2001 to 2019.

The most consistent explanatory variables coefficients were found in liquidity, measured by the loan deposit ratio; credit risk, measured by preventive estimation of credit risk over total loans; administrative costs, and IPC (Mexican Stock Market Index). Liquidity had negative and significant effects, although their coefficients were very close to zero; credit risk had also small coefficients but they were highly significant and negative; the variable of administrative costs was arguably the one with the largest coefficients, these being negative and significative for virtually all cases. At last, IPC must be mentioned, its coefficients were highly consistent, having positive and significative values for the majority of the models; they also exhibited higher values for the data base associated with the largest banks and broadest data base (considering years). This is consistent with the idea that larger banks may be benefited relatively more than smaller banks when rewards are being given by the market. All these

variables had similar effects across all models, periods, databases (bank types) and profits approximations (ROAA and ROAE).

In contrast, macroeconomic variables, namely inflation and economic growth, were not as consistent or significative across models as the previous regressors. They didn't seem to be fundamental determinants of profits for all types of Banks; apparently only bigger banks were influenced by them, particularly by inflation. On one hand, the economic growth was found to be insignificant for virtually all cases; on the other, inflation had no effect for the data bases comprising solely banks having six and ten years of data after 2006. However, this effect was sharply increased in both magnitude and most importantly, significance, when the 19 years data base was considered. Results offered evidence that inflation was actually an important determinant considering the period 2001-2019, showing a highly significative and negative coefficients for the data base encompassing mostly bigger banks.

Our study suggests that effects of the determinants vary in both magnitude and significance according to the period and type of banks considered in the data set. Larger history of data, which is significantly related to the bigger banks, has an impact on coefficients, where some of them exacerbate when examining only these types of banks, such as inflation, market share, or size. Results also suggested that having a concentrated market actually diminishes profits; conversely, having more competition appears to be beneficial for banks, although data is not exceedingly strong in this point of view. Something we were able to observe is that size coefficients supported the idea that having bigger banks generated higher profits. This is not obvious considering the fact that absolute terms are ignored, and instead, variables that capture relative movements are used. The data bases comprehending mostly larger banks and a longer horizon, appear to have stronger effects on magnitude and significance, reinforcing the idea that bigger banks, having more assets, are more profitable.

This study provides evidence about the determinants of banks profitability in Mexico, it encourages scholars to address this research question in order to have better, more convincing and conclusive evidence. The scope of this work is not to provide a definitive answer to immediately increase the benefits of banks, it rather suggests to examine specific components in order to avoid the focus on less important elements and ameliorate banking management. Further research should incorporate additional

variables such as wages, working experience of employees, education, among others, and compare different methods in order to enrich the natural debate that arises when research questions are addressed.

Bibliography

Adelopo, I., Lloydking, R. & Tauringana, V. (2018), Determinants of bank profitability before, during, and after the financial crisis, *International Journal of Managerial Finance*, Vol. 14 No. 4, pp. 378-398. https://doi.org/10.1108/IJMF-07-2017-0148

Ahokpossi, C. (2013). Determinants of Bank Interest Margins in Sub-Saharan Africa. *IMF Working Papers*. Retrieved from https://www.imf.org/en/Publications/WP/Issues/2016/12/31/Determinants-of-Bank-Interest-Margins-in-Sub-Saharan-Africa-40289

Al-harbi, A. (2019). The determinants of conventional banks profitability in developing and underdeveloped OIC countries. *Journal of Economics, Finance and Administrative Science*, Vol. 24, No. 47, pp. 4–28. https://doi.org/10.1108/JEFAS-05-2018-0043

Ali, M., & Puah C. H. (2019). The internal determinants of bank profitability and stability: An insight from banking sector of Pakistan. *Management Research Review*. https://doi.org/10.1108/MRR-04-2017-0103

Ally, Z. (2014). Determinants of Banks' Profitability in a Developing Economy: Empirical Evidence from Tanzania. *European Journal of Business and Management*, Vol. 6, No. 31. Retrieved from: https://www.iiste.org/Journals/index.php/EJBM/article/view/16568/16971

Almaqtari, F. A., Al-Homaidi E. A., Tabash M. I., Farhan, N. H. (2018). The determinants of profitability of Indian commercial banks: A panel data approach. *International Journal of Finance and Economics*. https://doi.org/10.1002/ijfe.1655

Athanasoglou, P. P., Brissimis, S. N., & Delis, M. D. (2008). Bank-specific, industry-specific and macroeconomic determinants of bank profitability. *International Journal of Financial Markets, Institutions and Money*, 121–136. https://doi.org/10.1016/j.intfin.2006.07.001

Athanasoglou, P. P., Delis, M. D., & Staikouras, C. K. (2006). Determinants of Bank Profitability in the South Eastern European Region. *Journal of Financial Decision Making*, Vol. 2, pp. 1-17. Available at SSRN: https://ssrn.com/abstract=1146385

Bolarinwa, S. T., Obembe O.B., & Olaniyi, C. (2019). Re-examining the determinants of bank profitability in Nigeria, Vol. 46, No. 3, pp. 633–651. https://doi.org/10.1108/JES-09-2017-0246

Capraru, B., & Ihnatov, I. (2014). Banks' Profitability in Selected Central and Eastern European Countries. *Procedia Economics and Finance*, 587-591. https://doi.org/10.1016/S2212-5671(14)00844-2

Chavarín, R. (2016). Determinants of Commercial Bank Profitability in Mexico. *Econoquantum*, Vol. 12, No. 1. https://doi.org/10.18381/eq.v12i1.4855

Dietrich, A. & Wanzenried, G. (2014) The Determinants of Commercial Banking Profitability in Low-, Middle-, and High-Income Countries. *The Quarterly Review of Economics and Finance*. Available at SSRN: https://ssrn.com/abstract=2408370 or http://dx.doi.org/10.2139/ssrn.2408370

Ghosh, A. (2016). Banking sector globalization and bank performance: A comparative analysis of low income countries with emerging markets and advanced economies. *Review of Development Finance*. Vol. 6, Issue 1, pp. 58-70. https://doi.org/10.1016/j.rdf.2016.05.003

Goddard, J., Molyneaux P., & Wilson J.O.S (2004). Dynamics of Growth and Profitability in Banking. *Journal of Money, Credit and Banking*, Vol.36, No.6, pp.1069-1090. https://www.jstor.org/stable/3839101

Medeiros, M. T., & Martins, J. P. S. (2016). Internal and external determinants of

banks' profitability: The Portuguese case. *Journal of Economic Studies*, Vol. 43, No. 1, pp. 90–107. https://doi.org/10.1108/JES-09-2014-0166

Menicucci, E., & Paolucci, G. (2016). The determinants of bank profitability: empirical evidence from European banking sector. *Journal of Financial Reporting and Accounting*, Vol. 14, No. 1, pp. 86-115. https://doi.org/10.1108/JFRA-05-2015-0060

Öhman, P., & Yazdanfar, D. (2018). Organizational-level profitability determinants in commercial banks: Swedish evidence. *Journal of Economic Studies*, Vol. 45, No. 6, pp. 1175-1191. https://doi.org/10.1108/JES-07-2017-0182

Petria, N., Capraru, B., & Ihnatov, I. (2015). Determinants of Banks' Profitability: Evidence from EU 27 Banking Systems. *Procedia Economics and Finance*, Vol. 20, pp. 518-524. https://doi.org/10.1016/S2212-5671(15)00104-5

Li, Y. (2007). Determinants of Banks' Profitability and its Implication on Risk Management Practices: Panel Evidence from the UK in the Period 1999-2006. (Master's Dissertation, The University of Nottingham). Retrieved from http://eprints.nottingham.ac.uk/21374/2/07MAYuqiLi.pdf

Appendix

Table 1. Fixed Effects Regression, Period: 2007-2019, Six Year Banks

	(1)	(2)	(3)	(4)
	ROAA	ROAA	ROAE	ROAE
ln_Size	-0.00117*	-0.00144**	0.0281***	0.0267***
	(0.000682)	(0.000677)	(0.00265)	(0.00261)
Capital_Asset	0.00597	0.00669	0.0486**	0.0537**
	(0.00601)	(0.00605)	(0.0233)	(0.0233)
Loan_Asset	0.0316***		-0.00218	
	(0.00333)		(0.0129)	
Deposit_Asset	-0.0196***		-0.0332***	
	(0.00321)		(0.0124)	
Loan_Deposit	-0.00000397***	-0.00000360***	-0.0000123***	-0.0000120***
	(0.000000279)	(0.000000278)	(0.00000108)	(0.00000107)
Credit_Risk	-0.0000738	0.00000428	-0.000648**	-0.000578**
	(0.0000689)	(0.0000688)	(0.000267)	(0.000265)
Ad_Cost	-0.636***	-0.636***	-0.997***	-0.990***
	(0.00602)	(0.00605)	(0.0233)	(0.0233)
IGAE	0.0237*	0.0274**	0.0115	0.0100
	(0.0126)	(0.0127)	(0.0489)	(0.0489)
Inflation	-0.00794	-0.0109	0.247**	0.233*
	(0.0311)	(0.0313)	(0.120)	(0.120)
IPC	0.00448**	0.00292	0.0496***	0.0517***
	(0.00186)	(0.00186)	(0.00720)	(0.00714)
Market_Share	-0.122**	-0.142***	0.0467	0.133
	(0.0479)	(0.0476)	(0.186)	(0.183)
_cons	0.0645***	0.0737***	-0.140***	-0.143***
	(0.00779)	(0.00779)	(0.0302)	(0.0300)
N	5580	5580	5580	5580
R^2	0.732	0.727	0.373	0.371
adj. R^2	0.729	0.725	0.367	0.366
F	1370.3	1637.4	298.3	362.9
p	0	0	0	0

Standard errors in parentheses

* p<0.10, ** p<0.05, *** p<0.010

Table 2. Fixed Effects Regression, Period: 2007-2019, Ten Year Banks

	(1)	(2)	(3)	(4)
	ROAA	ROAA	ROAE	ROAE
ln_Size	0.00260***	0.00264***	0.0251***	0.0240***
	(0.000690)	(0.000677)	(0.00285)	(0.00280)
Capital_Asset	0.0226***	0.0234***	0.0612**	0.0662***
	(0.00610)	(0.00608)	(0.0253)	(0.0251)
Loan_Asset	0.00854**		-0.000262	
	(0.00335)		(0.0139)	
Deposit_Asset	-0.00559*		-0.0252*	
	(0.00327)		(0.0135)	
Loan_Deposit	-0.00000405***	-0.00000396***	-0.0000119***	-0.0000117***
	(0.000000264)	(0.000000261)	(0.00000109)	(0.00000108)
Credit_Risk	-0.0000351	-0.0000138	-0.000606**	-0.000549**
	(0.0000652)	(0.0000645)	(0.000270)	(0.000267)
Ad_Cost	-0.490***	-0.486***	-1.084***	-1.087***
	(0.0100)	(0.00992)	(0.0415)	(0.0411)
IGAE	0.0152	0.0156	0.0975*	0.0955*
	(0.0125)	(0.0125)	(0.0516)	(0.0516)
Inflation	-0.0328	-0.0336	0.221*	0.213*
	(0.0309)	(0.0309)	(0.128)	(0.128)
IPC	0.00708***	0.00681***	0.0515***	0.0528***
	(0.00184)	(0.00183)	(0.00761)	(0.00756)
Market_Share	-0.145***	-0.150***	0.0357	0.0952
	(0.0455)	(0.0449)	(0.188)	(0.186)
_cons	0.0173**	0.0180**	-0.109***	-0.110***
	(0.00799)	(0.00798)	(0.0331)	(0.0330)
N	5068	5068	5068	5068
R^2	0.443	0.442	0.251	0.250
adj. R^2	0.438	0.437	0.244	0.244
F	363.0	442.4	153.0	186.3
p	0	0	0	0

Standard errors in parentheses

* p<0.10, ** p<0.05, *** p<0.010

Table 3. Fixed Effects Regression, Period: 2001-2019, Complete Year Banks

	(1)	(2)	(3)	(4)
	ROAA	ROAA	ROAE	ROAE
ln_Size	0.00384***	0.00388***	0.0338***	0.0341***
	(0.000316)	(0.000319)	(0.00314)	(0.00316)
Capital_Asset	0.0381***	0.0457***	-0.101***	-0.0385
	(0.00364)	(0.00358)	(0.0362)	(0.0355)
Loan_Asset	0.0171***		0.110***	
	(0.00204)		(0.0203)	
Deposit_Asset	-0.0187***		-0.167***	
	(0.00216)		(0.0214)	
Loan_Deposit	-0.00000275***	-0.00000256***	-0.0000108***	-0.00000869***
	(0.000000316)	(0.000000317)	(0.00000314)	(0.00000314)
Credit_Risk	-0.000135***	-0.0000751*	-0.00177***	-0.00128***
	(0.0000407)	(0.0000405)	(0.000404)	(0.000401)
Ad_Cost	-0.104***	-0.106***	-0.768***	-0.800***
	(0.00934)	(0.00941)	(0.0928)	(0.0931)
IGAE	-0.0101	-0.00825	0.0648	0.0752
	(0.00857)	(0.00864)	(0.0851)	(0.0855)
Inflation	0.0178	0.0203	0.601***	0.615***
	(0.0220)	(0.0222)	(0.218)	(0.220)
IPC	0.00986***	0.00990***	0.121***	0.125***
	(0.00108)	(0.00108)	(0.0107)	(0.0107)
Market_Share	-0.0726***	-0.0728***	-0.956***	-0.913***
	(0.0190)	(0.0191)	(0.188)	(0.189)
_cons	-0.0288***	-0.0311***	-0.196***	-0.234***
	(0.00407)	(0.00401)	(0.0404)	(0.0397)
N	4824	4824	4824	4824
R^2	0.121	0.105	0.094	0.082
adj. R^2	0.115	0.099	0.087	0.076
F	60.05	62.32	44.97	47.55
p	0	0	6.01e-258	2.56e-258

Standard errors in parentheses

* p<0.10, ** p<0.05, *** p<0.010

Table 4. Time Fixed Effects Regression, Period: 2007-2019, Six Year Banks

	(1)	(2)	(3)	(4)
	ROAA	ROAA	ROAE	ROAE
ln_Size	-0.00310**	-0.00445***	0.0884***	0.0862***
	(0.00125)	(0.00123)	(0.00471)	(0.00461)
Capital_Asset	0.0000216	-0.00319	0.283***	0.270***
	(0.00734)	(0.00719)	(0.0276)	(0.0269)
Loan_Asset	0.0308***		0.0274**	
	(0.00344)		(0.0130)	
Deposit_Asset	-0.0192***		0.00159	
	(0.00335)		(0.0126)	
Loan_Deposit	-0.00000403***	-0.00000368***	-0.0000108***	-0.0000106***
	(0.000000286)	(0.000000285)	(0.00000108)	(0.00000106)
Credit_Risk	-0.0000600	0.0000257	-0.000789***	-0.000752***
	(0.0000706)	(0.0000704)	(0.000266)	(0.000263)
Ad_Cost	-0.636***	-0.636***	-0.932***	-0.938***
	(0.00620)	(0.00619)	(0.0233)	(0.0231)
IGAE	0	0	0	0
	(.)	(.)	(.)	(.)
Inflation	0	0	0	0
	(.)	(.)	(.)	(.)
IPC	0.00940	0.00802	0.103***	0.102***
	(0.00735)	(0.00740)	(0.0277)	(0.0277)
Market_Share	-0.0897*	-0.0947*	-0.708***	-0.736***
	(0.0500)	(0.0503)	(0.188)	(0.188)
_cons	0.0826***	0.102***	-0.730***	-0.693***
	(0.0136)	(0.0129)	(0.0510)	(0.0483)
N	5580	5580	5580	5580
R^2	0.734	0.730	0.414	0.414
adj. R^2	0.724	0.720	0.392	0.392
F	91.19	90.42	23.33	23.57
p	0	0	0	0

Standard errors in parentheses

* p<0.10, ** p<0.05, *** p<0.010

Table 5. Time Fixed Effects Regression, Period: 2007-2019, Ten Year Banks

	(1)	(2)	(3)	(4)
	ROAA	ROAA	ROAE	ROAE
ln_Size	0.00320**	0.00297**	0.0872***	0.0857***
	(0.00128)	(0.00126)	(0.00512)	(0.00507)
Capital_Asset	0.0260***	0.0255***	0.295***	0.282***
	(0.00743)	(0.00724)	(0.0298)	(0.0290)
Loan_Asset	0.00911***		0.0191	
	(0.00346)		(0.0139)	
Deposit_Asset	-0.00470		0.0122	
	(0.00341)		(0.0137)	
Loan_Deposit	-0.00000407***	-0.00000398***	-0.0000106***	-0.0000106***
	(0.000000271)	(0.000000268)	(0.00000109)	(0.00000108)
Credit_Risk	-0.0000252	-0.00000273	-0.000745***	-0.000744***
	(0.0000670)	(0.0000663)	(0.000269)	(0.000266)
Ad_Cost	-0.484***	-0.480***	-0.928***	-0.924***
	(0.0105)	(0.0105)	(0.0422)	(0.0419)
IGAE	0	0	0	0
	(.)	(.)	(.)	(.)
Inflation	0	0	0	0
	(.)	(.)	(.)	(.)
IPC	0.0122*	0.0119	0.115***	0.114***
	(0.00726)	(0.00727)	(0.0291)	(0.0291)
Market_Share	-0.144***	-0.149***	-0.721***	-0.757***
	(0.0477)	(0.0476)	(0.191)	(0.191)
_cons	0.00928	0.0134	-0.731***	-0.700***
	(0.0140)	(0.0135)	(0.0561)	(0.0542)
N	5068	5068	5068	5068
R^2	0.448	0.447	0.303	0.302
adj. R^2	0.426	0.425	0.275	0.274
F	24.26	24.50	12.99	13.11
p	0	0	1.64e-315	2.88e-316

Standard errors in parentheses

* p<0.10, ** p<0.05, *** p<0.010

Table 6. Time Fixed Effects Regression, Period: 2001-2019, Complete Year Banks

	(1)	(2)	(3)	(4)
	ROAA	ROAA	ROAE	ROAE
ln_Size	0.00847***	0.00774***	0.0791***	0.0771***
	(0.000720)	(0.000679)	(0.00703)	(0.00660)
Capital_Asset	0.0588***	0.0624***	0.0973**	0.141***
	(0.00478)	(0.00455)	(0.0466)	(0.0443)
Loan_Asset	0.0203***		0.138***	
	(0.00211)		(0.0206)	
Deposit_Asset	-0.0148***		-0.124***	
	(0.00224)		(0.0219)	
Loan_Deposit	-0.00000240***	-0.00000237***	-0.00000718**	-0.00000645**
	(0.000000323)	(0.000000324)	(0.00000315)	(0.00000314)
Credit_Risk	-0.000152***	-0.0000904**	-0.00199***	-0.00153***
	(0.0000416)	(0.0000415)	(0.000407)	(0.000403)
Ad_Cost	-0.0800***	-0.0823***	-0.488***	-0.503***
	(0.00967)	(0.00976)	(0.0944)	(0.0948)
IGAE	0	0	0	0
	(.)	(.)	(.)	(.)
Inflation	0	0	0	0
	(.)	(.)	(.)	(.)
IPC	-0.00900	-0.00630	-0.00669	0.00837
	(0.00632)	(0.00637)	(0.0617)	(0.0619)
Market_Share	-0.135***	-0.135***	-1.681***	-1.689***
	(0.0201)	(0.0203)	(0.197)	(0.197)
_cons	-0.0756***	-0.0683***	-0.687***	-0.677***
	(0.00822)	(0.00753)	(0.0803)	(0.0732)
N	4824	4824	4824	4824
R^2	0.161	0.144	0.164	0.155
adj. R^2	0.116	0.098	0.119	0.109
F	3.932	3.470	4.001	3.772
p	1.18e-75	4.27e-60	6.01e-78	6.65e-70

Standard errors in parentheses

* p<0.10, ** p<0.05, *** p<0.010

Table 7. Hausman Test Results, Six Year Banks, ROAA First Model

	Coefficients			
	(b) fixed1	(B) random1	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
ln_Size	-0.0011705	-0.0010881	-0.0000824	0.0000689
Capital_As t	0.0059666	0.0078202	-0.0018535	0.0004723
Loan_Asset	3.16E-02	3.27E-02	-1.07E-03	3.68E-04
Deposit_As t	-1.96E-02	-1.92E-02	-3.44E-04	2.63E-04
Loan_Deposit	-3.97E-06	-3.99E-06	1.17E-08	4.86E-09
Credit_Risk	-0.0000738	-0.0000732	-5.98E-07	7.45E-07
Ad_Cost	-0.6358771	-0.6325588	-0.0033184	0.000451
IGAE	0.0237273	0.0241679	-0.0004406	0.0002977
Inflation	-0.007945	-0.0094547	0.0015097	0.0005098
IPC	0.0044847	0.0046459	-0.0001613	0.0000758
Market_Share	-0.1218257	-0.1187282	-0.0030975	0.0148118

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(9) = (b-B)'[(V_b-V_B)$\hat{}$(-1)](b-B)
= 69.91
Prob>chi2 = 0.0000

Table 8. Hausman Test Results, Six Year Banks, ROAA Second Model

	Coefficients			
	(b) fixed2	(B) random2	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
ln_Size	-0.001435	-0.0013282	-0.0001068	0.0000681
Capital_As t	0.0066929	0.0086032	-0.0019104	0.0004591
Loan_Deposit	-3.60E-06	-3.61E-06	6.99E-09	3.14E-09
Credit_Risk	4.28E-06	5.64E-06	-1.36E-06	6.14E-07
Ad_Cost	-6.36E-01	-6.33E-01	-3.11E-03	4.31E-04
IGAE	0.0274077	0.0280971	-6.89E-04	3.12E-04
Inflation	-0.0108636	-0.012192	0.0013285	0.0004804
IPC	0.0029187	0.002954	-0.0000352	0.0000744
Market_Share	-0.1421644	-0.1401279	-0.0020365	0.0145519

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(7) = (b-B)'[(V_b-V_B)$\hat{}$(-1)](b-B)
= 72.20
Prob>chi2 = 0.0000

Table 9. Hausman Test Results, Six Year Banks, ROAE First Model

	Coefficients			
	(b) fixed3	(B) random3	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
ln_Size	0.0281123	0.0283114	-0.0001991	0.0003814
Capital_As t	0.0486041	0.0528499	-0.0042459	0.0025823
Loan_Asset	-2.18E-03	1.75E-03	-3.93E-03	2.04E-03
Deposit_As t	-3.32E-02	-3.30E-02	-2.15E-04	1.46E-03
Loan_Deposit	-1.23E-05	-1.23E-05	4.45E-08	2.71E-08
Credit_Risk	-0.0006484	-0.0006448	-3.66E-06	4.16E-06
Ad_Cost	-0.9966096	-0.9856256	-0.010984	0.0025154
IGAE	0.01149	0.0126098	-0.0011199	0.0016544
Inflation	0.2470122	0.2411591	0.0058531	0.0028323
IPC	0.0496123	0.0499022	-0.0002899	0.0004169
Market_Share	0.0466696	-0.044813	0.0914826	0.0785996

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(9) = (b-B)'[(V_b-V_B)$\hat{}$(-1)](b-B)
= 31.65
Prob>chi2 = 0.0002

Table 10. Hausman Test Results, Six Year Banks, ROAE Second Model

	Coefficients			
	(b) fixed4	(B) random4	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
ln_Size	0.0266521	0.0269386	-0.0002865	0.0003767
Capital_As t	0.0537468	0.0574033	-0.0036565	0.0025194
Loan_Deposit	-1.20E-05	-1.20E-05	1.74E-08	1.75E-08
Credit_Risk	-5.78E-04	-5.71E-04	-7.48E-06	3.45E-06
Ad_Cost	-9.90E-01	-9.80E-01	-1.02E-02	2.41E-03
IGAE	0.0100455	0.011545	-1.50E-03	1.74E-03
Inflation	0.2328101	0.2278496	0.0049604	0.0026698
IPC	0.0516514	0.0516066	0.0000448	0.0004117
Market_Share	0.1331524	0.0199873	0.1131652	0.0772648

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(7) = (b-B)'[(V_b-V_B)$\hat{}$(-1)](b-B)
= 28.80
Prob>chi2 = 0.0002

Table 11. Hausman Test Results, Ten Year Banks, ROAA First Model

	Coefficients			
	(b) fixed1	(B) random1	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
ln_Size	0.0025965	0.0036193	-0.0010228	0.0001526
Capital_As t	0.0225521	0.0288664	-0.0063143	0.0009617
Loan_Asset	8.54E-03	1.12E-02	-2.68E-03	7.12E-04
Deposit_As t	-5.59E-03	-4.99E-03	-6.08E-04	5.81E-04
Loan_Deposit	-4.05E-06	-4.13E-06	7.54E-08	8.58E-09
Credit_Risk	-0.0000351	-0.000038	2.86E-06	1.63E-06
Ad_Cost	-0.4896663	-0.4589226	-0.0307437	0.0021361
IGAE	0.0152055	0.0129937	0.0022118	0.0005892
Inflation	-0.0328418	-0.0361126	0.0032709	0.0008197
IPC	0.0070818	0.0083483	-0.0012665	0.0001679
Market_Share	-0.1450373	-0.1543005	0.0092631	0.0270681

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(9) = (b-B)'[(V_b-V_B)$\hat{}$(-1)](b-B)
= 285.98
Prob>chi2 = 0.0000

Table 12. Hausman Test Results, Ten Year Banks, ROAA Second Model

	Coefficients			
	(b) fixed2	(B) random2	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
ln_Size	0.0026384	0.0035924	-0.0009539	0.0001375
Capital_As t	0.0233991	0.028812	-0.005413	0.0008792
Loan_Deposit	-3.96E-06	-4.01E-06	5.40E-08	6.04E-09
Credit_Risk	-1.38E-05	-1.47E-05	8.91E-07	1.23E-06
Ad_Cost	-4.86E-01	-4.59E-01	-2.67E-02	1.94E-03
IGAE	0.0155973	0.0140285	1.57E-03	5.41E-04
Inflation	-0.0336266	-0.03594	0.0023134	0.0007074
IPC	0.0068101	0.007695	-0.0008849	0.0001464
Market_Share	-0.1498934	-0.1602302	0.0103369	0.0249317

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(7) = (b-B)'[(V_b-V_B)$\hat{}$(-1)](b-B)
= 234.50
Prob>chi2 = 0.0000

Table 13. Hausman Test Results, Ten Year Banks, ROAE First Model

	Coefficients			
	(b) fixed3	(B) random3	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
ln_Size	0.0251472	0.0277052	-0.002558	0.0006926
Capital_As t	0.0612326	0.0709091	-0.0096766	0.0043344
Loan_Asset	-2.62E-04	7.32E-03	-7.58E-03	3.23E-03
Deposit_As t	-2.52E-02	-2.55E-02	2.44E-04	2.64E-03
Loan_Deposit	-1.19E-05	-1.21E-05	2.03E-07	3.92E-08
Credit_Risk	-0.0006061	-0.0006079	1.77E-06	7.46E-06
Ad_Cost	-1.083843	-1.001331	-0.0825116	0.0097208
IGAE	0.0974894	0.0898365	0.007653	0.0026818
Inflation	0.2211844	0.2095942	0.0115903	0.0037321
IPC	0.0514905	0.0544073	-0.0029169	0.0007588
Market_Share	0.0357447	-0.1793736	0.2151183	0.1188336

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(9) = (b-B)'[(V_b-V_B)$\hat{}$(-1)](b-B)
= 109.40
Prob>chi2 = 0.0000

Table 14. Hausman Test Results, Ten Year Banks, ROAE Second Model

	Coefficients			
	(b) fixed4	(B) random4	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
ln_Size	0.0240232	0.0266954	-0.0026721	0.0006661
Capital_As t	0.0661815	0.0750212	-0.0088396	0.004243
Loan_Deposit	-1.17E-05	-1.19E-05	1.49E-07	2.97E-08
Credit_Risk	-5.49E-04	-5.43E-04	-6.34E-06	6.03E-06
Ad_Cost	-1.09E+00	-1.01E+00	-8.13E-02	9.47E-03
IGAE	0.095529	0.0887387	6.79E-03	2.64E-03
Inflation	0.2134986	0.2033371	0.0101615	0.0034489
IPC	0.0527705	0.0550916	-0.002321	0.0007091
Market_Share	0.0952271	-0.1423522	0.2375793	0.1149006

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(7) = (b-B)'[(V_b-V_B)$\hat{}$(-1)](b-B)
= 96.90
Prob>chi2 = 0.0000

Table 15. Hausman Test Results, Complete Year Banks, ROAA First Model

	Coefficients			
	(b) fixed1	(B) random1	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
ln_Size	0.0038428	0.0047901	-0.0009473	0.0001317
Capital_As t	0.0381137	0.0433357	-0.005222	0.0010495
Loan_Asset	1.71E-02	2.47E-02	-7.59E-03	8.42E-04
Deposit_As t	-1.87E-02	-2.23E-02	3.56E-03	8.14E-04
Loan_Deposit	-2.75E-06	-2.85E-06	1.06E-07	3.17E-08
Credit_Risk	-0.000135	-0.0001409	5.83E-06	2.52E-06
Ad_Cost	-0.1042305	-0.0323061	-0.0719244	0.0060169
IGAE	-0.0101078	-0.0141277	0.0040199	0.0007816
Inflation	0.0178217	0.0262308	-0.0084092	0.0019464
IPC	0.0098613	0.0119673	-0.0021059	0.0002605
Market_Share	-0.0726122	-0.0622461	-0.0103661	0.0160444

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(9) = (b-B)'[(V_b-V_B)$\hat{}$(-1)](b-B)
= 289.18
Prob>chi2 = 0.0000

Table 16. Hausman Test Results, Complete Year Banks, ROAA Second Model

	Coefficients			
	(b) fixed2	(B) random2	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
ln_Size	0.0038766	0.0042126	-0.000336	0.0000726
Capital_As t	0.0457219	0.0480892	-0.0023673	0.0005532
Loan_Deposit	-2.56E-06	-2.59E-06	2.62E-08	1.46E-08
Credit_Risk	-7.51E-05	-7.32E-05	-1.96E-06	1.28E-06
Ad_Cost	-1.06E-01	-8.20E-02	-2.44E-02	3.70E-03
IGAE	-0.0082525	-0.009464	1.21E-03	4.19E-04
Inflation	0.0202798	0.0239517	-0.0036719	0.0011501
IPC	0.0099041	0.0105212	-0.0006171	0.0001268
Market_Share	-0.0728326	-0.0668465	-0.0059861	0.0123561

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(7) = (b-B)'[(V_b-V_B)$\hat{}$(-1)](b-B)
= 61.83
Prob>chi2 = 0.0000

Table 17. Hausman Test Results, Complete Year Banks, ROAE First Model

	Coefficients			
	(b) fixed3	(B) random3	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
ln_Size	0.0337967	0.0382052	-0.0044085	0.000957
Capital_As t	-0.1006669	-0.0879496	-0.0127173	0.0075163
Loan_Asset	1.10E-01	1.41E-01	-3.06E-02	6.03E-03
Deposit_As t	-1.67E-01	-1.67E-01	-3.24E-04	5.92E-03
Loan_Deposit	-1.08E-05	-1.06E-05	-2.23E-07	2.23E-07
Credit_Risk	-0.0017686	-0.0017868	1.83E-05	1.77E-05
Ad_Cost	-0.7677386	-0.4540312	-0.3137074	0.0465463
IGAE	0.0648451	0.0424483	0.0223968	0.0057446
Inflation	0.6012978	0.6497436	-0.0484458	0.0143874
IPC	0.1206369	0.1316202	-0.0109833	0.0019346
Market_Share	-0.956077	-0.5693609	-0.3867161	0.1425512

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(9) = (b-B)'[(V_b-V_B)$\hat{}$(-1)](b-B)
= 88.28
Prob>chi2 = 0.0000

Table 18. Hausman Test Results, Complete Year Banks, ROAE Second Model

	Coefficients			
	(b) fixed4	(B) random4	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
ln_Size	0.0340816	0.0368435	-0.0027619	0.0007564
Capital_As t	-0.0384788	-0.0264679	-0.0120109	0.0057671
Loan_Deposit	-8.69E-06	-8.73E-06	3.96E-08	1.53E-07
Credit_Risk	-1.28E-03	-1.27E-03	-1.56E-05	1.34E-05
Ad_Cost	-8.00E-01	-6.09E-01	-1.91E-01	3.84E-02
IGAE	0.0752477	0.0632645	1.20E-02	4.35E-03
Inflation	0.6148322	0.6509946	-0.0361624	0.011931
IPC	0.1247806	0.1299688	-0.0051881	0.0013204
Market_Share	-0.9131129	-0.6682897	-0.2448232	0.1259541

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(7) = (b-B)'[(V_b-V_B)$\hat{}$(-1)](b-B)
= 32.48
Prob>chi2 = 0.0000

Table 19. Wooldridge Test For Autocorrelation, Six Year Banks, ROAA First Model

Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
F(1, 42) = 110.269
Prob > F = 0.0000

Table 20. Wooldridge Test For Autocorrelation, Six Year Banks, ROAA Second Model

Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
F(1, 42) = 110.272
Prob > F = 0.0000

Table 21. Wooldridge Test For Autocorrelation, Six Year Banks, ROAE First Model

Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
F(1, 42) = 237.784
Prob > F = 0.0000

Table 22. Wooldridge Test For Autocorrelation, Six Year Banks, ROAE Second Model

Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
F(1, 42) = 235.452
Prob > F = 0.0000

Table 23. Wooldridge Test For Autocorrelation, Ten Year Banks, ROAA First Model

Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
F(1, 35) = 72.930
Prob > F = 0.0000

Table 24. Wooldridge Test For Autocorrelation, Ten Year Banks, ROAA Second Model

Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
F(1, 35) = 72.687
Prob > F = 0.0000

Table 25. Wooldridge Test For Autocorrelation, Ten Year Banks, ROAE First Model

Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
F(1, 35) = 199.119
Prob > F = 0.0000

Table 26. Wooldridge Test For Autocorrelation, Ten Year Banks, ROAE Second Model

Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
F(1, 35) = 197.769
Prob > F = 0.0000

Table 27. Wooldridge Test For Autocorrelation, Complete Year Banks, ROAA First Model

Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
F(1, 23) = 233.385
Prob > F = 0.0000

Table 28. Wooldridge Test For Autocorrelation, Complete Year Banks, ROAA Second Model

Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
F(1, 23) = 248.387
Prob > F = 0.0000

Table 29. Wooldridge Test For Autocorrelation, Complete Year Banks, ROAE First Model

Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
F(1, 23) = 40.802
Prob > F = 0.0000

Table 30. Wooldridge Test For Autocorrelation, Complete Year Banks, ROAE Second Model

Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
F(1, 23) = 42.314
Prob > F = 0.0000

Table 31. Wald Test For Heteroskedasticity, Six Year Banks, ROAA First Model

Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model
H0: sigma(i)$\hat{2}$ = sigma$\hat{2}$ for all i
chi2 (43) = 2.8e+06
Prob>chi2 = 0.0000

Table 32. Wald Test For Heteroskedasticity, Six Year Banks, ROAA Second Model

Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model
H0: sigma(i)$\hat{2}$ = sigma$\hat{2}$ for all i
chi2 (43) = 2.6e+06
Prob>chi2 = 0.0000

Table 33. Wald Test For Heteroskedasticity, Six Year Banks, ROAE First Model

Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model
H0: sigma(i)$\hat{2}$ = sigma$\hat{2}$ for all i
chi2 (43) = 61329.28
Prob>chi2 = 0.0000

Table 34. Wald Test For Heteroskedasticity, Six Year Banks, ROAE Second Model

Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model
H0: sigma(i)$\hat{2}$ = sigma$\hat{2}$ for all i
chi2 (43) = 94121.56
Prob>chi2 = 0.0000

Table 35. Wald Test For Heteroskedasticity, Ten Year Banks, ROAA First Model

Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model
H0: sigma(i)$\hat{2}$ = sigma$\hat{2}$ for all i
chi2 (36) = 1.5e+06
Prob>chi2 = 0.0000

Table 36. Wald Test For Heteroskedasticity, Ten Year Banks, ROAA Second Model

Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model
H0: sigma(i)$\hat{2}$ = sigma$\hat{2}$ for all i
chi2 (36) = 1.3e+06
Prob>chi2 = 0.0000

Table 37. Wald Test For Heteroskedasticity, Ten Year Banks, ROAE First Model

Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model
H0: sigma(i)$\hat{2}$ = sigma$\hat{2}$ for all i
chi2 (36) = 50218.30
Prob>chi2 = 0.0000

Table 38. Wald Test For Heteroskedasticity, Ten Year Banks, ROAE Second Model

Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model
H0: sigma(i)$\hat{2}$ = sigma$\hat{2}$ for all i
chi2 (36) = 52504.97
Prob>chi2 = 0.0000

Table 39. Wald Test For Heteroskedasticity, Complete Year Banks, ROAA First Model

Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model
H0: sigma(i)$\hat{2}$ = sigma$\hat{2}$ for all i
chi2 (24) = 1.8e+05
Prob>chi2 = 0.0000

Table 40. Wald Test For Heteroskedasticity, Complete Year Banks, ROAA Second Model

Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model
H0: sigma(i)$\hat{2}$ = sigma$\hat{2}$ for all i
chi2 (24) = 2.0e+05
Prob>chi2 = 0.0000

Table 41. Wald Test For Heteroskedasticity, Complete Year Banks, ROAE First Model

Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model
H0: sigma(i)$\hat{2}$ = sigma$\hat{2}$ for all i
chi2 (24) = 66308.83
Prob>chi2 = 0.0000

Table 42. Wald Test For Heteroskedasticity, Complete Year Banks, ROAE Second Model

Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model
H0: sigma(i)$\hat{2}$ = sigma$\hat{2}$ for all i
chi2 (24) = 81210.90
Prob>chi2 = 0.0000

Table 43. Fixed Effects Regression, Period: 2001-2006, Before Financial Crisis, Complete Year Banks

	(1)	(2)	(3)	(4)
	ROAA	ROAA	ROAE	ROAE
ln_Size	0.00134	0.00277	0.0870***	0.111***
	(0.00179)	(0.00175)	(0.0233)	(0.0228)
Capital_Asset	0.0868***	0.0955***	0.970***	1.118***
	(0.00823)	(0.00786)	(0.107)	(0.102)
Loan_Asset	0.00948**		0.151***	
	(0.00444)		(0.0576)	
Deposit_Asset	-0.0195***		-0.325***	
	(0.00426)		(0.0552)	
Loan_Deposit	0.000000854**	0.00000123***	0.0000172***	0.0000233***
	(0.000000384)	(0.000000377)	(0.00000498)	(0.00000492)
Credit_Risk	0.108***	0.109***	1.023***	1.039***
	(0.00699)	(0.00695)	(0.0907)	(0.0905)
Ad_Cost	-0.532***	-0.534***	-3.594***	-3.626***
	(0.0266)	(0.0265)	(0.345)	(0.345)
IGAE	0.00669	0.00461	0.437	0.399
	(0.0240)	(0.0241)	(0.311)	(0.315)
Inflation	0.134**	0.153**	2.611***	2.929***
	(0.0672)	(0.0676)	(0.872)	(0.881)
IPC	0.0108***	0.0104***	0.128***	0.121***
	(0.00233)	(0.00234)	(0.0302)	(0.0306)
Market_Share	-0.114***	-0.120***	-2.430***	-2.540***
	(0.0343)	(0.0345)	(0.444)	(0.449)
_cons	0.0181	-0.00190	-0.633**	-0.974***
	(0.0205)	(0.0194)	(0.266)	(0.253)
N	1286	1286	1286	1286
R^2	0.549	0.541	0.412	0.396
adj. R^2	0.537	0.530	0.397	0.381
F	138.4	164.3	79.89	91.41
p	0	0	1.03e-280	1.11e-295

Standard errors in parentheses

* p<0.10, ** p<0.05, *** p<0.010

Table 44. Fixed Effects Regression, Period: 2007-2009, During Financial Crisis, Complete Year Banks

	(1)	(2)	(3)	(4)
	ROAA	ROAA	ROAE	ROAE
ln_Size	-0.00175	-0.00229*	0.0222	0.0129
	(0.00145)	(0.00135)	(0.0139)	(0.0130)
Capital_Asset	0.0162*	0.0167**	-0.0999	-0.111
	(0.00853)	(0.00838)	(0.0819)	(0.0805)
Loan_Asset	-0.00371		0.0218	
	(0.00591)		(0.0567)	
Deposit_Asset	0.00828		0.0451	
	(0.00593)		(0.0570)	
Loan_Deposit	-0.00136	-0.00303**	-0.00982	-0.0147
	(0.00193)	(0.00129)	(0.0186)	(0.0124)
Credit_Risk	-0.00599	0.00187	-0.537***	-0.433***
	(0.0137)	(0.0126)	(0.132)	(0.121)
Ad_Cost	0.283***	0.286***	4.329***	4.353***
	(0.0246)	(0.0245)	(0.236)	(0.236)
IGAE	0.0319***	0.0300***	0.550***	0.528***
	(0.00678)	(0.00668)	(0.0651)	(0.0642)
Inflation	-0.137***	-0.133***	-0.546	-0.539
	(0.0477)	(0.0476)	(0.458)	(0.458)
IPC	0.00138	0.00117	0.0430***	0.0385***
	(0.00136)	(0.00133)	(0.0131)	(0.0128)
Market_Share	0.0837***	0.0798***	0.707**	0.659**
	(0.0305)	(0.0304)	(0.293)	(0.292)
_cons	0.0199	0.0295*	-0.330**	-0.190
	(0.0175)	(0.0158)	(0.168)	(0.152)
N	792	792	792	792
R^2	0.250	0.247	0.516	0.513
adj. R^2	0.218	0.217	0.495	0.494
F	22.94	27.72	73.45	89.15
p	3.73e-90	2.20e-101	2.91e-208	5.08e-226

Standard errors in parentheses

* p<0.10, ** p<0.05, *** p<0.010

Table 45. Fixed Effects Regression, Period: 2010-2019, After Financial Crisis, Complete Year Banks

	(1) ROAA	(2) ROAA	(3) ROAE	(4) ROAE
ln_Size	0.00589***	0.00661***	0.0221***	0.0217***
	(0.000642)	(0.000639)	(0.00443)	(0.00441)
Capital_Asset	0.0761***	0.0840***	0.150***	0.179***
	(0.00569)	(0.00571)	(0.0393)	(0.0394)
Loan_Asset	0.0101***		-0.0485***	
	(0.00271)		(0.0187)	
Deposit_Asset	-0.0223***		-0.112***	
	(0.00236)		(0.0163)	
Loan_Deposit	0.0000133	0.0000262	-0.000151	-0.000120
	(0.0000217)	(0.0000219)	(0.000150)	(0.000151)
Credit_Risk	-0.000112***	-0.0000680***	-0.000997***	-0.000906***
	(0.0000259)	(0.0000257)	(0.000179)	(0.000177)
Ad_Cost	-0.0534***	-0.0342***	-0.0251	-0.0466
	(0.00977)	(0.00922)	(0.0675)	(0.0636)
IGAE	0.0576***	0.0733***	0.362***	0.554***
	(0.0154)	(0.0153)	(0.106)	(0.105)
Inflation	-0.00782	-0.0228	0.385***	0.245**
	(0.0165)	(0.0166)	(0.114)	(0.115)
IPC	0.00419***	0.00559***	0.00550	0.0166
	(0.00147)	(0.00148)	(0.0102)	(0.0102)
Market_Share	-0.0812***	-0.0639***	-0.263	-0.00197
	(0.0237)	(0.0236)	(0.164)	(0.163)
_cons	-0.0557***	-0.0720***	-0.115**	-0.192***
	(0.00770)	(0.00763)	(0.0532)	(0.0526)
N	2746	2746	2746	2746
R^2	0.124	0.095	0.060	0.031
adj. R^2	0.113	0.084	0.049	0.020
F	34.76	31.50	15.83	9.638
p	3.57e-185	2.04e-160	6.06e-83	4.50e-44

Standard errors in parentheses

* p<0.10, ** p<0.05, *** p<0.010

Table 46. Time Fixed Effects Regression, Period: 2001-2006, Before Financial Crisis, Complete Year Banks

	(1)	(2)	(3)	(4)
	ROAA	ROAA	ROAE	ROAE
ln_Size	0.00230	0.00450**	0.118***	0.153***
	(0.00217)	(0.00206)	(0.0280)	(0.0267)
Capital_Asset	0.0910***	0.102***	1.110***	1.289***
	(0.00947)	(0.00880)	(0.122)	(0.114)
Loan_Asset	0.00814*		0.125**	
	(0.00462)		(0.0596)	
Deposit_Asset	-0.0174***		-0.278***	
	(0.00453)		(0.0584)	
Loan_Deposit	0.000000917**	0.00000126***	0.0000177***	0.0000231***
	(0.000000399)	(0.000000391)	(0.00000515)	(0.00000506)
Credit_Risk	0.108***	0.109***	1.005***	1.016***
	(0.00726)	(0.00719)	(0.0937)	(0.0931)
Ad_Cost	-0.527***	-0.523***	-3.458***	-3.390***
	(0.0280)	(0.0277)	(0.361)	(0.359)
IGAE	0	0	0	0
	(.)	(.)	(.)	(.)
Inflation	0	0	0	0
	(.)	(.)	(.)	(.)
IPC	0.0121*	0.0132**	0.152*	0.170**
	(0.00625)	(0.00628)	(0.0807)	(0.0813)
Market_Share	-0.122***	-0.134***	-2.701***	-2.888***
	(0.0355)	(0.0355)	(0.458)	(0.460)
_cons	0.0133	-0.0143	-0.852***	-1.299***
	(0.0234)	(0.0215)	(0.302)	(0.278)
N	1286	1286	1286	1286
R^2	0.556	0.551	0.428	0.417
adj. R^2	0.523	0.518	0.384	0.374
F	22.02	22.22	13.12	12.96
p	5.32e-195	4.80e-194	5.62e-124	1.02e-120

Standard errors in parentheses

* p<0.10, ** p<0.05, *** p<0.010

Table 47. Time Fixed Effects Regression, Period: 2007-2009, During Financial Crisis, Complete Year Banks

	(1)	(2)	(3)	(4)
	ROAA	ROAA	ROAE	ROAE
ln_Size	0.00242	0.000106	0.0810***	0.0519***
	(0.00158)	(0.00144)	(0.0148)	(0.0136)
Capital_Asset	0.0347***	0.0302***	0.161*	0.0880
	(0.00894)	(0.00873)	(0.0838)	(0.0822)
Loan_Asset	0.00263		0.106*	
	(0.00598)		(0.0561)	
Deposit_Asset	0.0115*		0.0603	
	(0.00600)		(0.0562)	
Loan_Deposit	-0.00306	-0.00430***	-0.0368**	-0.0323***
	(0.00195)	(0.00132)	(0.0183)	(0.0125)
Credit_Risk	-0.0321**	-0.00802	-0.866***	-0.594***
	(0.0141)	(0.0127)	(0.133)	(0.120)
Ad_Cost	0.301***	0.302***	4.582***	4.590***
	(0.0245)	(0.0247)	(0.230)	(0.232)
IGAE	0	0	0	0
	(.)	(.)	(.)	(.)
Inflation	0	0	0	0
	(.)	(.)	(.)	(.)
IPC	0.0101***	0.00835***	0.133***	0.112***
	(0.00213)	(0.00210)	(0.0200)	(0.0197)
Market_Share	0.0789***	0.0692**	0.541*	0.444
	(0.0303)	(0.0304)	(0.284)	(0.287)
_cons	-0.0381**	-0.00401	-1.053***	-0.650***
	(0.0187)	(0.0163)	(0.175)	(0.154)
N	792	792	792	792
R^2	0.302	0.288	0.570	0.557
adj. R^2	0.240	0.227	0.532	0.520
F	7.300	7.190	22.42	22.40
p	1.30e-45	7.42e-44	3.06e-132	4.80e-130

Standard errors in parentheses

* p<0.10, ** p<0.05, *** p<0.010

Table 48. Time Fixed Effects Regression, Period: 2010-2019, After Financial Crisis, Complete Year Banks

	(1) ROAA	(2) ROAA	(3) ROAE	(4) ROAE
ln_Size	0.0126***	0.0136***	0.0560***	0.0673***
	(0.000947)	(0.000925)	(0.00652)	(0.00634)
Capital_Asset	0.0953***	0.103***	0.255***	0.307***
	(0.00609)	(0.00605)	(0.0419)	(0.0415)
Loan_Asset	0.0171***		-0.00984	
	(0.00282)		(0.0195)	
Deposit_Asset	-0.0180***		-0.102***	
	(0.00245)		(0.0169)	
Loan_Deposit	0.0000594***	0.0000739***	0.0000660	0.000178
	(0.0000222)	(0.0000224)	(0.000153)	(0.000153)
Credit_Risk	-0.000122***	-0.0000709***	-0.00114***	-0.00100***
	(0.0000264)	(0.0000260)	(0.000182)	(0.000178)
Ad_Cost	-0.0556***	-0.0295***	-0.0485	-0.0238
	(0.00982)	(0.00924)	(0.0677)	(0.0633)
IGAE	0	0	0	0
	(.)	(.)	(.)	(.)
Inflation	0	0	0	0
	(.)	(.)	(.)	(.)
IPC	0.0150***	0.0160***	0.0614**	0.0898***
	(0.00369)	(0.00367)	(0.0254)	(0.0251)
Market_Share	-0.124***	-0.127***	-0.484***	-0.400**
	(0.0241)	(0.0243)	(0.166)	(0.167)
_cons	-0.138***	-0.153***	-0.505***	-0.700***
	(0.0117)	(0.0110)	(0.0808)	(0.0755)
N	2746	2746	2746	2746
R^2	0.166	0.144	0.111	0.096
adj. R^2	0.118	0.096	0.060	0.044
F	4.075	3.509	2.556	2.206
p	2.70e-49	1.10e-37	2.72e-20	3.08e-14

Standard errors in parentheses

* p<0.10, ** p<0.05, *** p<0.010

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