# ABNORMAL RETURNS IN THE BRAZILIAN FINANCIAL SYSTEM: DOES CONTROL MATTER?

Renata Sol Costa[1]
José Américo Antunes[2]
Marcelo Alvaro Macedo[3]
Alfredo Sarlo Neto[4]

Abstract: The purpose of this paper is to investigate the influence of the control structure in abnormal returns in the Brazilian Financial System, contributing to the scarce literature available. The relevance of this study remains on the fact that the Brazilian Financial System differs significantly from developed or even other emerging economies' financial systems due to the relevance of the market share detained by state-owned banks. This feature influences the behavior of the financial system and makes Brazil an interesting case study. The analysis segments the Brazilian Financial System into three groups: all banks, state-owned banks and private banks, and evaluates the influence of relevant income and expense components such as credit spread, credit provisions and service income in the abnormal returns of each segment through aggregate data analysis. Our findings suggest that the behavior of the financial system depends on the control structure when considering the spread charged in credit operations as well as the credit provisions, presenting different realities when considering its segments. On the other hand, the control structure does not seem to be relevant for service income.

Keywords: Abnormal Returns, Control Structure, Brazilian Financial System, Credit Spread, Credit Provisions.

[1] renatasolcosta@hotmail.com - Universidade Federal do Rio de Janeiro
[2] jose.antunes@bcb.gov.br - Universidade Federal do Rio de Janeiro
[3] malvaro.facc.ufrj@gmail.com - Universidade Federal do Rio de Janeiro
[4] sarloneto@ccje.ufes.br - Universidade Federal do Espírito Santo

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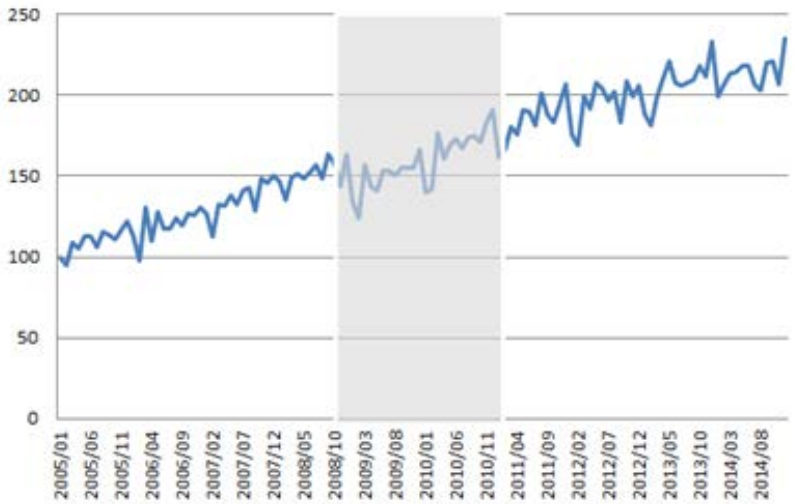
# 1. INTRODUCTION

Abnormal returns are the main purpose of many finance and accounting researches that have developed regression models to investigate its behavior (Jain, 1982). The main subject of this study is to investigate empirically the behavior of the Brazilian Financial System (BFS) by examining the relationship between abnormal returns and capital control structure. A number of papers have documented evidence of abnormal returns following earnings announcements on public companies (Watts, 1978; Chin and Hieu, 2015), but few analyzed it in the banking industry during, before and after the subprime crisis.

Most of the studies related to abnormal returns in the banking industry use event-study methods and daily stock exchange data (Farahani and Asgari, 2015; Abdioğlu and Aytekin, 2016). This study differs from the literature for it analyzes a longer time frame and uses aggregate accounting-based data, instead of firm-specific stock exchange data, since there are few public banks in Brazil. Aggregate data means that there is a single time series depicting all individual banks involved in the analysis, instead of a panel of banks.

Our analysis focuses on the Brazilian banking industry which has some features that make it an important case study. First of all, Brazil has a developed financial system that did not suffer noticeably effects from the subprime crisis. Following Antunes, Montes e Moraes (2016), there was no relevant problem with Brazilian banks in the aftermath of the crisis and the BFS was considered a successful case of safety and soundness. In order to illustrate this statement, Fig. 1 shows the monthly behavior of credit granting by the BFS along eight years centered in the subprime crisis. Except for a slight decrease in the first quarter of 2009, there was no observable effect in the long term trend, having the previous rhythm been recovered no later than the third quarter of 2009.

*Figure 1. Credit granting in the Brazilian Financial System, January 2005 – December 2014 (basis 100).*




Source: authors' elaboration based on data collected in Central Bank of Brazil's homepage.
Note: the grey bar stands for the eighteen month crisis period.

Another aspect to be taken into account is the relevant market share that state-owned banks hold in the BFS. Although more common in emerging economies, state-owned banks represent circa 10% of the financial system in developed economies (World Bank, 2013). According to data available in the Central

Bank of Brazil (CBB), on December 2014, state-owned banks accounted for 36% of the assets, 51% of the loans, 40% of the liabilities and 16% of the equity of the financial system. It is worth noting that the share held by state-owned banks increased after the subprime crisis as a government counter-cyclical response deployed to offset the rise in the risk aversion showed by private banks.

Therefore, the BFS renders an interesting and possibly unique case study to analyze the influence of the control structure in the abnormal returns of financial institutions. Hence, this study investigates empirically the following questions:

1. Does the control structure influence the abnormal returns in the Brazilian banking industry?

2. Does the influence of income and expense components in the abnormal returns change when the financial system is segmented in terms of the control structure?

To put forth these enquiries, two measures were taken: (i) the BFS was segmented according to control in two groups, state-owned banks and private banks; and (ii) credit spread, credit provisions and service income were chosen as drivers of income and expense based on their relevance in the income statement or in the balance sheet. To account for the relevance of the drivers chosen, on December 2014, loans equaled 43% of the total assets, hence reflecting the importance of credit spread. As for credit provisions, the amount reserved for the expected loss in loans far exceeded the net profit, mounting on 1.557% of its value in December 2014. Regarding service revenues, the amount registered in the same date almost equaled the net profit, reaching 97% of its value.

As for the quantitative analysis, estimates through different methods such as OLS, one-step GMM and two-step GMM were run for the BFS as a whole and for each segment to check whether the drivers' relation with the abnormal returns changed. The analysis was performed based on monthly aggregate time-series data from January 2005 to December 2014, totaling 120 observations.

The paper contributes to the scarce literature about Brazilian banking behavior regarding abnormal returns by examining and understanding how it reacts to the control structure and whether this reaction changes regarding different income and expense components. It can also be used by the regulator, the Central Bank of Brazil (CBB), as a subsidy to better understand the behavior of the BFS.

The findings suggest that the behavior of the financial system depends on the control structure in terms of credit spread and expected credit losses. As for services rendered revenues, the results are not conclusive, for they lack significance.

The remainder of this paper proceeds as follows: section 2 presents the literature review and the development of the testable hypotheses; section 3 presents the methodology and the description of the data; section 4 provides the estimation results as well as the robustness checks; and section 5 summarizes the main results and concludes.

## 2. LITERATURE REVIEW AND DEVELOPMENT OF THE HYPOTHESES

According to Martinez (2004), in addition to earnings management, companies can manage expectations, in order to meet the analysts' predictions or surprise them positively, creating previous expectations that the results will be worse than expected.

There are two different approaches regarding investment anomalies, as stated by Liu and Yeh (2014): (i) the risk compensation theory, derived from the efficient-market hypothesis; and (ii) the investor's stock

mispricing theory, derived from the behavioral finance approach, which argues that investor's behavior is not always rational or risk-adverse, and it, therefore, results in abnormal returns.

Fama (1970), based on the risk compensation theory, conducted a study to determine the efficiency of the capital markets through the classification of types of relevant information on pricing. According to this study, a market is considered efficient when the prices can fully incorporate and reflect the information available. There are, however, efficiency market levels depending on the nature of the information. A market is considered weakly efficient when it fully incorporates information about the historical asset prices, that is, it would not be possible to obtain abnormal returns based on historical data. In this case, prices reflect all available information and would not be possible to have abnormal returns based on public information. A market is considered semi-strong efficient when it incorporates publicly available data on assets, such as financial reports and market communications. Finally, a market would be highly effective when, in addition to public information, it incorporates inside information. In this case, even with the use of inside information there would be no way to get abnormal returns.

Therefore, to test the efficiency of a market is usually used a combination of two hypotheses: the first one is that the market is efficient, and the second one is that returns are generated by a specific equilibrium (Watts, 1978). According to Ball (1978) the abnormal returns are not an evidence of market inefficiency, but they exist because of the deficiencies in the capital asset-pricing model. Watts (1978), however, tested Ball's assumption and his results are inconsistent with the hypothesis that the abnormal returns are explained by the capital asset-pricing model's deficiencies.

In a study conducted in Turkey, Abdioğlu and Aytekin (2016) found evidences that the monetary policy decisions for 2008 (related to the subprime crisis) and 2012 (related to the Greek debt crisis) affected the stock returns in the banking industry and that this market is therefore, not considered semi-strong efficient.

One of the probable reasons for abnormal returns in the banking industry is the procyclical behavior of this segment. This characteristic of the financial system has been extensively studied (Bernanke, Gertler and Gilchrist, 1999) and information asymmetry between lenders and borrowers is a common explanation used for this behavior, since the economic circumstances affect the value of assets and restrict (or expand) the credit offer. Therefore, bad economic periods reduce the guarantees value and the credit offer even to borrowers with profitable projects due to the information asymmetries, while good economic periods raise both the guarantees value and the credit offer.

According to Borio, Furfine and Lowe (2001) one possible reason for the procyclical behavior of the banking industry is the difficulty in measuring the risk of this segment over time. Some researchers, as Minsky (1986) and Kindleberger (1996) suggest that these difficulties can lead to underestimated measurements during growing economic periods and to overestimated measurements during recession economic periods. During boom periods some of the consequences are the extremely high credit growth as well as the guarantees values, a spread reduction and reduced levels of capital and provisions, while during recession periods the reverse tends to occur. To deal with this procyclical behavior, emerging economies resort to official financial institutions, state-owned banks, to offset the effects of the increase in risk aversion in the private banks' segment (World Bank, 2013). The use of this strategy by emerging economies resulted in positive returns and strengthened the state activity in the financial intermediation services, according to Cunha, Lelis and Lopes (2015).

In less developed economies, private banks offer limited alternatives to credit finance, once the capital markets of these countries are not well-developed and these banks emphasize liquidity, opting for

short-term credit operations and low risk. Therefore, state-owned banks are used to correct this market failure and to supply the market with long-term and high risk credit (Stiglitz, 1993),

According to Kolari and Pynnonen (2010), "parametric tests based on scaled abnormal returns methods have been found to be superior in terms of power over those based on non-scaled returns". These tests were conducted in the bank industry and a positive relationship between abnormal returns and efficiency was stated by Farahani and Asgarib (2015).

As the BFS is a dual system, shared by private and state-owned banks, the investigation of these segments along with the BFS as a whole may offer a better understanding of the research problem. The first hypothesis, based on the previous literature, concerns the extent to which the spread of credit operations affects the abnormal returns of the banking industry. According to other previous studies (Chan, Ge and Lin, 2015; Vafaee and Darabi, 2015), the spread predicts positively the abnormal returns.

$H_1$: Spread of credit operations is positively related to abnormal returns in the BFS.

This first hypothesis is unfolded in two additional hypotheses related to the capital structure, which are also checked:

$H_{1A}$: Spread of credit operations is positively related to abnormal returns in the private segment.

$H_{1B}$: Spread of credit operations is positively related to abnormal returns in the state-owned segment.

The following hypothesis regards the extent to which services revenues affect the abnormal returns of the banking industry. In 1968, Ball and Brown have studied the usefulness of income numbers and suggested many issues for future investigation, as the relationship between abnormal results and the unexpected income, for example. As stated by Cheng and Ariff (2007), there is evidence in many studies that the earnings response coefficients are significant when analyzing the relation between abnormal returns and earnings. The obvious relevance of this variable to the income statement, though not reflected in the scarce literature available, forms the basis for the next hypothesis:

$H_2$: *Services rendered revenues are positively related to abnormal returns in the BFS.*

As well as in the previous hypothesis, the second hypothesis is also unfolded in two additional hypotheses related to the capital structure, which are also checked

$H_{2A}$: *Services rendered revenues are positively related to abnormal returns in the private segment.*

$H_{2B}$: *Services rendered revenues are positively related to abnormal returns in the state-owned segment.*

The remaining hypothesis concerns the extent to which expected credit losses affect the abnormal returns of the banking industry. According to Blose (2001), there is evidence that negative abnormal returns are significantly related to loan loss provisions in the bank industry. For the same reason we chose service revenues as the basis of testable hypotheses, we recurred to the relevance of this variable to formulate the third hypothesis, which is also unfolded in two additional hypotheses.

$H_3$: *Expected credit losses are negatively related to abnormal returns in the BFS.*

$H_{3A}$: *Expected credit losses are negatively related to abnormal returns in the private segment.*

$H_{3B}$: *Expected credit losses are negatively related to abnormal returns in the state-owned segment.*

## 3 METHODOLOGY AND VARIABLES

In order to obtain robust evidences on the effect of the control structure on the abnormal returns on equity we provide estimates through different methods: OLS, one-step GMM with Newey–West covariance matrix, and two-step generalized method of moments (2-STEP GMM) with Windmeijer covariance

matrix. GMM is used to deal with endogeneity and identification problems (Wooldridge 2001). Besides, GMM presents robust estimators even in the presence of serial autocorrelation and heteroscedasticity of unknown form, or non-linearity, which is typical in macroeconomic time-series models (Hansen 1982). We follow the methodology of Johnston (1984) to select the instruments on GMM estimation, that is, the instruments were dated to the period t–1 or earlier to assure the exogeneity. Cragg (1983) points out that overidentification has an important role in the selection of instrumental variables to improve the efficiency of the estimators. Hence, a standard J-test was performed with the objective of testing this property for the validity of the overidentifying restrictions, that is, the J-statistic indicates whether the orthogonality condition is satisfied. The two-step GMM estimations use Windmeijer (2005) correction to address small-sample downward biases on standard errors.

In general, abnormal return analysis is conducted through event-study methods which use daily stock exchange data. Considering the small number of public banks in Brazil, the use of daily stock exchange returns were replaced with accounting-based monthly operational return on equity. As the time frame changed from the daily basis to the monthly basis, traditional event-study methods fail and we decided to use the Hodrick-Prescott filter (HP filter) to determine the abnormal operational return on equity.

The HP filter was introduced into Economics by Hodrick and Prescott (1997) and became a standard technique in macroeconomics for separating the long run trend in a data series from short run fluctuations. Hence, when applying the HP filter to the operational return on equity (ROE) time series, it is possible do isolate the ROE trend, which is the long-term component of the series, from the ROE cycle, its short-term component. The latter can be proxied as the abnormal return on equity.

### 3.1 RESEARCH TYPE, POPULATION, SAMPLE AND DATA COLLECTION

The study is a descriptive research, using quantitative time-series data. The objective of the study is a macro analysis of the BFS, according to the control structure. From the perspective of a macro analysis, the bank´s individual behavior is not relevant, for the investigation is centered on the collective behavior of a group of banks. Thus, the analysis is performed by aggregating data from the banks which belong to the different types of control structure (private-owned and state-owned) as well as to the BFS as a whole[2].

According to the Law 4.595 of 1964, all financial institutions allowed to operate by the CBB must report their results, complying with the norms edited by the Brazilian Monetary Council and with an independent audit report, on two distinct periods: June 30 and December 31. Besides that, according to the same law and the Resolution nº 4.280 of 2013, these companies must also file their monthly information via CBB website, related to consolidated (if applicable) or individual numbers. The data used in the analysis was collected in the CBB´s website financial reports repository (IF.Data), in which researchers and market practitioners can find information regarding macroeconomic and financial variables. It covers the period from January 2005 to December 2014 (see Table A1 – appendix – for the descriptive statistics).

The analysis is performed in two stages: First, all banks were aggregated to form the BFS; and second, banks were segmented in terms of control, giving rise to two groups: stated-owned banks and private banks. The data was not corrected according to the inflation of the period, except for the output gap which was calculated from current GDP deflated prices, which are publicly disclosed on CBB website and uses international methodology.

2 BNDES (Banco Nacional de Desenvolvimento Econômico e Social) was removed from the analysis. Although a state-owned bank, BNDES is unique and performs such a specific role that it differs significantly even from other state-owned banks.

### 3.2 VARIABLES DESCRIPTION AND MEASUREMENT

Based on all presented before, the analysis is conducted through the following model:

$$ROE\_GAPt = \alpha + \beta 1SPREADt + \beta 2PROVt + \beta 3SERVt + \beta 4O\_GAPt + \beta 5IRt + \beta 6D\_CRISISt + \varepsilon t$$

In order to better compare the effects of the variables in the abnormal returns, we tested a similar model assuming the return on equity as the dependent variable.

$$ROEt = \alpha + \beta 7SPREADt + \beta 8PROVt + \beta 9SERVt + \beta 10O\_GAPt + \beta 11IRt + \beta 12D\_CRISISt + \varepsilon t$$

The variables involved are described below.

Return on equity (ROE): This variable expresses the operational return on equity. The option for the operational return, instead of the net profit, avoids the effect of non-recurring events on the returns, mainly non-operational revenues, which mask the performance of entities and are recurrent in financial institutions. Regarding the option for equity in the ratio, it is due to its relevance in prudential regulation. Equity is the basis of the Basel ratio, the main regulatory index adopted worldwide.

Abnormal return on equity (ROE_GAP): This indicator was built from the operational return on equity series. The return on equity gap is obtained by the difference between the ROE series and its long-term trend obtained through the Hodrick-Prescott filter. In Brazil, the large majority of the banks are not public companies and thus it is not trustful to calculate abnormal returns based on market quotes.

Spread (SPREAD): calculated as the difference between the average income accrued on loans through the last twelve months and the average expense accrued on liabilities through the last twelve months. The average income is computed as the ratio between the sum of the income accrued on the credit portfolio in the last twelve months and the average credit portfolio in the same period. The average expense is defined as the ratio between the sum of the expenses accrued on the liabilities in the last twelve months and the average amount of liabilities in the same period, as shown below.

$$Spread = \frac{\sum_{t}^{t-11} Credit\ Income}{\left(\frac{\sum_{t}^{t-11} Credit\ Portfolio}{12}\right)} - \frac{\sum_{t}^{t-11} Liabilities\ Expenses}{\left(\frac{\sum_{t}^{t-11} Liabilities}{12}\right)}$$

A positive relation is expected between SPREAD and ROE_GAP. Increases (and decreases) in SPREAD directly affects the most relevant financial asset (credit portfolio) and liabilities, communicating immediately to ROE_GAP.

Service Revenue (SERV): Reflects the amount of income accrued as a consequence of financial services provided by banks, scaled by equity. It encompasses a broad range of activities and is an important profit generator in the financial system. A positive relation is expected between this variable and ROE_GAP.

Provision (PROV): This variable represents the expected losses provisioned by banks in relation to loans. The calculation of this indicator is the ratio between the provisions for credit transactions and the loan portfolio and this measure can be viewed as a proxy for the perception of ex-ante risk. A negative relation is expected between PROV and ROE_GAP, once modifications in the amount of PROV inversely affects the profitability of a bank.

Output gap (O_GAP): This indicator was elaborated from the series of GDP accumulated in 12 months, provided by the CBB (series 4190). The output gap is obtained by the difference between the GDP series

and its long-term trend obtained through the Hodrick-Prescott filter. Variations in the economic cycle are expected to affect the process of lending and, consequently, the return on equity performed by banks.

Basic interest rate (IR): In Brazil, the basic interest rate (Selic) is the main monetary policy instrument. This variable should capture the impact of monetary policy on the financial system's activity, for variations in the basic interest rate may result in conflicting effects in the return on equity. For instance, an increase in the basic interest rate may produce an increase in SPREAD. On the other hand, it also tends to increase the risk perception in the financial system posed by PROV, leading banks to increase provisions on credit transactions. The prevalent influence on ROE_GAP may be contradictory. The series used is provided by the CBB (series 4189).

Dummy (D_CRISIS): In order to capture the effect of international financial shocks in the Brazilian economy from the subprime mortgage crisis and the crisis of government debt in Europe, we followed Antunes, Montes e Moraes (2016) and included a dummy variable, which assumes value 1 for the period from October 2008 to January 2011 and zero otherwise.

As a prerequisite to apply the estimations, the series were checked on the existence of unit roots, through the Augmented Dickey-Fuller (ADF), Phillips-Perron (PP) and Kwiatkowski-Phillips-Schmidt-Shin (KPSS) tests (see Table A2 – appendix).

## 4 ESTIMATION RESULTS

With the objective of observing the relation between the variables used in the models, the correlation matrix is presented in Table A3 (see appendix). Estimation results for both the BFS and its state-owned and private segments are presented in Tables 1 and 2. In a general way, the use of GMM methods do not change the signs and the statistical significance of the coefficients of the drivers of income and expense presented in the OLS models. Furthermore, all GMM regressions accept the null hypothesis in the J-test and thus the overidentifying restrictions are valid.

The results for the BFS suggest a positive and statistically significant relation between SPREAD and ROE_GAP. This result is consistent with the assertion of $H_1$ and implies that an increase in the credit spread results in abnormal returns in the BFS. However, looking into its segments, the results are intriguing. While there is no significant relation between SPREAD and ROE_GAP for the private segment, results suggest a negative and significant relation for the state-owned segment.

As for the private segment, a possible explanation is that fluctuations in the credit spread are linked to the bank´s risk perception and the way the banking industry forecasts the economy behavior. However, credit risk provisions (PROV) are also linked to a forward-looking behavior and react in accordance with the risk expectations for the credit market. Combining both arguments result in the following chain of events: (i) a worsen risk scenario results in higher spreads, which force ROE_GAP upwards; (ii) on the other hand, credit risk provisions are reinforced to protect the banks against future losses, forcing ROE_GAP downwards. These opposite effects do not cancel each other out and results indicate that the effects of PROV, which presents a negative and significant relation with ROE_GAP, are stronger. That can be explained by the fact that credit provisions absorb, at least partially, the credit spread, for it is applied on the full amount of the credit exposure and captures some of the variation caused by the credit spread. This results in the rejection of $H_{1A}$.

*Table 1: OLS and GMM estimates (dependent variable: Abnormal Return on Equity - ROE_GAP)*

| | Brazilian Financial System | | | Private Segment | | | State-Owned Segment | | |
|---|---|---|---|---|---|---|---|---|---|
| Explanatory Variables | ROE_GAP | ROE_GAP | ROE_GAP | ROE_GAP | ROE_GAP | ROE_GAP | ROE_GAP | ROE_GAP | ROE_GAP |
| | OLS | GMM | 2-STEP GMM | OLS | GMM | 2-STEP GMM | OLS | GMM | 2-STEP GMM |
| SPREAD | 0.279** | 0.426*** | 0.443*** | 0.300 | 0.270 | 0.145 | -0.436* | -0.437* | -0.406** |
| | (0.140) | (0.103) | (0.075) | (0.234) | (0.288) | (0.220) | (0.259) | (0.245) | (0.183) |
| SERV | -0.202 | -1.530* | -0.847 | -1.246 | -1.591 | -0.660 | 1.990 | 1.193 | -0.504 |
| | (1.191) | (0.907) | (0.746) | (1.499) | (2.025) | (1.701) | (1.711) | (2.136) | (1.669) |
| PROV | -0.630** | -0.387* | -0.524*** | -0.695* | -0.888* | -1.347*** | -0.515 | -0.378 | -0.094 |
| | (0.309) | (0.201) | (0.153) | (0.411) | (0.498) | (0.378) | (0.386) | (0.504) | (0.381) |
| O_GAP | 0.083 | 0.001 | 0.010 | 0.033 | 0.334* | 0.318 | 0.279 | 0.750** | 0.652** |
| | (0.137) | (0.092) | (0.072) | (0.153) | (0.190) | (0.236) | (0.289) | (0.339) | (0.307) |
| IR | 0.008 | 0.109** | 0.069 | -0.074 | -0.051 | -0.105* | 0.178 | 0.315** | 0.391*** |
| | (0.074) | (0.053) | (0.040) | (0.070) | (0.072) | (0.060) | (0.158) | (0.124) | (0.113) |
| D_CRISIS | 0.000 | -0.003 | 0.001 | -0.001 | 0.003 | 0.011 | 0.010 | 0.008 | 0.000 |
| | (0.005) | (0.005) | (0.004) | (0.006) | (0.008) | (0.006) | (0.010) | (0.008) | (0.007) |
| C | 0.021 | 0.002 | 0.006 | 0.042 | 0.056 | 0.093*** | -0.024 | -0.023 | 0.001 |
| | (0.016) | (0.010) | (0.007) | (0.035) | (0.040) | (0.030) | (0.030) | (0.044) | (0.034) |
| R2 | 0.19 | 0.19 | 0.19 | 0.23 | 0.15 | 0.06 | 0.15 | 0.08 | 0.02 |
| Adjusted R2 | 0.15 | | | 0.19 | | | 0.10 | | |
| J-statistic | | 13.88 | 15.83 | | 10.28 | 8.81 | | 8.36 | 7.74 |
| Prob (J-statistic) | | 0.87 | 0.95 | | 0.80 | 0.88 | | 0.75 | 0.80 |
| F-statistic | 4.53 | | | 5.76 | | | 3.39 | | |
| Prob (F-statistic) | 0.00 | | | 0.00 | | | 0.00 | | |
| Ramsey RESET | 0.52 | | | 0.27 | | | 0.64 | | |
| Prob (Ramsey RESET) | 0.60 | | | 0.78 | | | 0.51 | | |
| Heteroskedasticity ARCH | 12.59 | | | 17.83 | | | 128.06 | | |
| Prob (Heteroskedasticity) | 0.00 | | | 0.00 | | | 0.00 | | |
| Breusch-Godfrey-LM Test | 25.52 | | | 17.08 | | | 87.48 | | |
| Prob (Breusch-Godfrey-LM Test) | 0.00 | | | 0.00 | | | 0.00 | | |

Source: Authors' estimates.
Marginal significance levels: ***0.01, **0.05, *0.1.
Coefficients in bold, SEs in parentheses. Regarding OLS estimates, due to problems of autocorrelation and heteroscedasticity, the reported t-statistics in the OLS estimates are based on the estimator of Newey and West (1987).

*Table 2: OLS and GMM estimates (dependent variable: Return on Equity - ROE)*

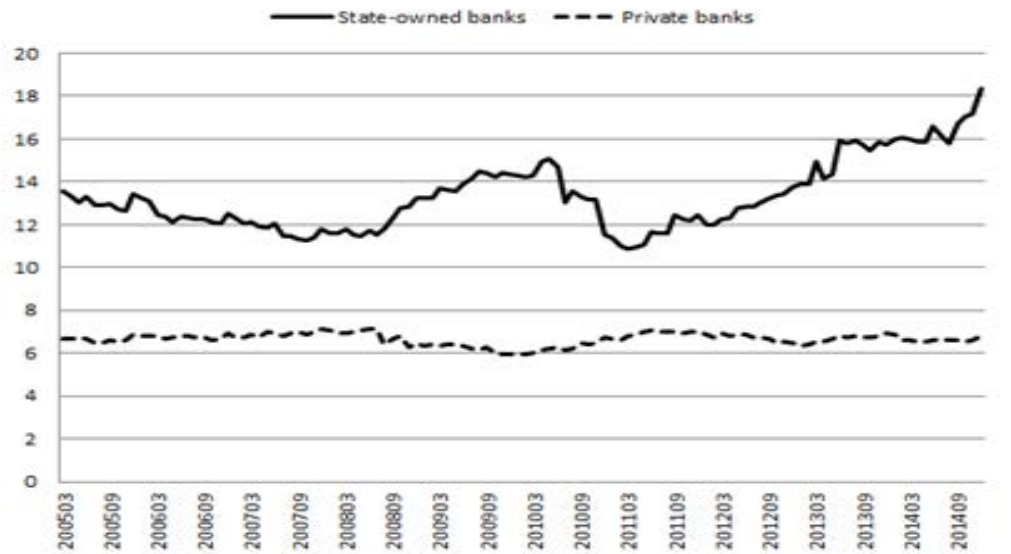
| | Brazilian Financial System | | | Private Segment | | | State-Owned Segment | | |
|---|---|---|---|---|---|---|---|---|---|
| Explanatory Variables | ROE_GAP | ROE_GAP | ROE_GAP | ROE_GAP | ROE_GAP | ROE_GAP | ROE_GAP | ROE_GAP | ROE_GAP |
| | OLS | GMM | 2-STEP GMM | OLS | GMM | 2-STEP GMM | OLS | GMM | 2-STEP GMM |
| SPREAD | 0.765*** | 0.847*** | 0.874*** | 0.869*** | 1.015*** | 0.980*** | 0.208 | 0.643** | 0.682** |
| | (0.165) | (0.111) | (0.120) | (0.241) | (0.332) | (0.334) | (0.338) | (0.318) | (0.334) |
| SERV | 4.185*** | 3.481*** | 3.110*** | 5.543*** | 4.677** | 4.848** | 1.459 | 1.572 | 0.816 |
| | (0.984) | (1.009) | (1.026) | (1.148) | (2.319) | (2.387) | (2.266) | (1.543) | (1.790) |
| PROV | 0.068 | 0.289 | 0.383 | -0.321 | -0.030 | -0.135 | 0.520 | 0.300 | 0.494 |
| | (0.314) | (0.248) | (0.249) | (.363) | (0.498) | (0.506) | (0.452) | (0.404) | (0.412) |
| O_GAP | -0.111 | -0.214** | -0.181 | -0.278** | -0.128 | -0.021 | 0.436 | 0.627** | 0.552* |
| | (0.123) | (0.106) | (0.113) | (0.111) | (0.297) | (0.269) | (0.359) | (0.308) | (0.303) |
| IR | 0.251*** | 0.323*** | 0.347*** | 0.243*** | 0.238*** | 0.224*** | 0.219 | 0.359* | 0.359** |
| | (0.071) | (0.052) | (0.053) | (0.058) | (0.069) | (0.059) | (0.216) | (0.197) | (0.146) |
| D_CRISIS | 0.002 | -0.004 | -0.005 | 0.003 | -0.004 | -0.003 | 0.028* | 0.026* | -0.000 |
| | (0.004) | (0.005) | (0.005) | (0.004) | (0.008) | (0.009) | (0.014) | (0.015) | (0.010) |
| C | -0.056*** | -0.073*** | -0.079*** | -0.047 | -0.067* | -0.058 | 0.007 | -0.024 | -0.012 |
| | (0.018) | (0.009) | (0.009) | (0.032) | (0.038) | (0.039) | (0.039) | (0.030) | (0.035) |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| R2 | 0.88 | 0.85 | 0.84 | 0.89 | 0.86 | 0.86 | 0.46 | 0.46 | 0.31 |
| Adjusted R2 | 0.88 | | | 0.88 | | | 0.43 | | |
| J-statistic | | 12.22 | 11.53 | | 7.38 | 6.91 | | 11.12 | 7.34 |
| Prob (J-statistic) | | 0.93 | 0.95 | | 0.59 | 0.64 | | 0.74 | 0.83 |
| F-statistic | 149.58 | | | 159.88 | | | 16.57 | | |
| Prob (F-statistic) | 0.00 | | | 0.00 | | | 0.00 | | |
| Ramsey RESET | 1.65 | | | 0.74 | | | 1.23 | | |
| Prob (Ramsey RESET) | 0.10 | | | 0.46 | | | 0.21 | | |
| Heteroskedasticity ARCH | 15.65 | | | 16.59 | | | 161.22 | | |
| Prob (Heteroskedasticity) | 0.00 | | | 0.00 | | | 0.00 | | |
| Breusch-Godfrey-LM Test | 17.02 | | | 7.15 | | | 139.48 | | |
| Prob (Breusch-Godfrey-LM Test) | 0.00 | | | 0.00 | | | 0.00 | | |

Source: Authors' estimates.
Marginal significance levels: ***0.01, **0.05, *0.1.
Coefficients in bold, SEs in parentheses. Regarding OLS estimates, due to problems of autocorrelation and heteroscedasticity, the reported t-statistics in the OLS estimates are based on the estimator of Newey and West (1987).

Concerning the negative and significant relation between SPREAD and ROE_GAP for the state-owned segment, it is explained by the countercyclical nature of the influence government exerts in state-owned banks. During crisis the expected reaction of the banking system is to restrain credit granting to preserve liquidity in a risk aversion scenario. The intensity of this reaction can drive the economy to a recession or even a depression. In the subprime crisis the consequences of this chain of events seemed to be catastrophic and caused a prompt and strong response from the government. The programs launched to stimulate the economy resorted to subsidized interest rates and lowered spreads and resulted in an subtle increase in the leverage of the state-owned segment that absorbed partially the market share once detained by private banks. Fig. 2 below compares the behavior of the leverage (ratio between assets and equity) of both segments during the period analyzed.

*Figure 2: Leverage – state-owned segment, January 2005 – December 2014.*




Source: authors' elaboration based on data collected in Central Bank of Brazil's homepage.

Hence, reducing spreads in the state-owned segment increased the leverage and produced a positive deflection in the ROE_GAP, supporting the results obtained and thus rejecting $H_{1B}$.

As for the relation between SPREAD and ROE, evidences point to a positive and significant relation for the BFS as well as for the private segment and the state-owned segment, though less intense for the latter. In the BFS, the use of post-fixed interest rates is pervasive, acting as the actual currency of the system. In practical terms, it means that assets as much as liabilities are rewarded in basis points of the basic interest rate and an additional fixed rate is applied on assets to compound most or all of the spread. When the basic interest rate increases (decreases), the profit or loss that arises from the positive or negative interest rate differentials increases (decreases). These results agree with the positive relation found between IR and ROE for all of the groups analyzed.

As for the less intense relation between SPREAD and ROE for the state-owned segment, though positive and significant, the explanation lies on the magnitude of government influence in the Brazilian banking system. Even though state-owned banks are allowed to operate in the same niches usually explored by private banks, their primary focus is to lend earmarked credit, which is subsidized and therefore not priced in accordance with the basic interest rate. Earmarked credit comprises loans granted to agriculture, exports, mortgages and investment and accounted for nearly 25% of the amount due in December 2014.

Being subsidized, earmarked credit is less subject to the influence of the basic interest rate, for it is priced in accordance with governmental programs. Therefore earmarked credit spread exhibits a stable behavior that contributes to steady the spread of the whole loan portfolio and helps to explain the less intense relation with ROE, when compared to the private segment.

Regarding the variable SERV, results suggest the absence of statistical significance with ROE GAP for all of the groups analyzed, thus rejecting $H_2$, $H_{2A}$ and $H_{2B}$. On the other hand, the positive relation between SERV and ROE for the BFS and private banks is a consequence of the steady contribution that SERV provides to income. Concerning the state-owned segment, the absence of relation with ROE reflects the influence of the government in the fare policy adopted by these banks. Acting as agents of the state, the banks on this segment are committed to financial inclusion, resorting to low, or even no fares as an incentive to attract new customers. As a consequence, SERV does not follow a pattern related to ROE, confirming the results.

Results point to a negative and significant relation between PROV and ROE_GAP, except for the state-owned segment, whereas no relation was found between PROV and ROE. As for the negative relation between PROV and ROE_GAP, the behavioral component embedded in credit provisions must be highlighted. Banks react to the risk perception increasing provisions when the credit conditions worsen, signaling a scenario of possible financial stress. The immediate outcome of these shocks is the negative deviation of ROE from its long-term trend, namely the ROE_GAP, corroborating the results found and thus confirming $H_3$ and $H_{3.1}$.

Regarding the state-owned segment, the absence of significance for the relation between PROV and ROE_GAP, though the sign of the coefficient is negative, can be explained by the governmental influence on the banking industry. Considering that the state-owned segment reflects the official scenario for the economy, it is understandable that the risk perceptions may differ, at least in emphasis, from that of the private segment. Hence, the reaction in terms of the credit provisions may be less intense and not sufficient to influence significantly the abnormal returns, rejecting $H_{3.2}$.

As for the absence of significance between PROV and ROE, it must be taken into account that the amount of credit provisions largely exceeds the net profit or loss. As it reflects the expected loss in the loan portfolio, provisioning is not a demand to be fulfilled immediately, rather a decision that is largely on the hands of the bank to decide the best moment to be taken. From this perspective, the results

observed seem to be reasonable, for an increase in PROV should not harm ROE, as much as a decrease in PROV should not raise ROE beyond a desirable threshold.

Concerning the O_GAP, the results found are consistent with the underpinnings of this study. The positive and significant relation between O_GAP and ROE_GAP, though irregular and limited to the private and the state-owned segments, reveals the way economic growth reflects on the ROE_GAP, increasing it.

Regarding the IR, the relation with ROE_GAP is irregular. Just for the state-owned segment, a more consistent positive and significant relation is found, and yet only for the GMM methods. As for the relation with ROE, this result is consistent with the effortless gains extracted from the positive differential between the post-fixed pricing of assets and liabilities.

Finally, the analysis for D_CRISIS only reported effects on the ROE and for the state-owned segment. The positive and significant relation between D_CRISIS and ROE is a consequence of the active role performed by this segment during the crisis, when the burden of stimulating the economy was assigned to state-owned banks. As for the absence of relation with the private segment, a possible explanation is that the eighteen month period of crisis chosen for the variable may have comprehended the period when the credit market recovered and the private segment resumed activity. That also explains the absence of relation found to the BFS, once it is the combination of both segments and their results may have cancelled each other out.

### 4.1 ROBUSTNESS CHECKS

In order to verify the consistency of the results, additional quantile regression estimations were performed to observe the effect the drivers of income, namely the credit spread, credit provisions and service income, has on different levels of abnormal returns for each of the segments analyzed. Introduced by Koenker and Bassett (1978), quantile regression divides the distribution in a way that a given proportion of observations is located below the quantile. In this sense, it is possible to observe the estimated coefficient to different parts of the abnormal returns distribution. The quantile regression was estimated with moving blocks bootstrap (MBB), which provides robust standard errors to heteroscedasticity and autocorrelation of unknown form (Fitzenberger, 1998). The quantile regression method allows one to observe the effects of the three drivers of income and expense for different levels of abnormal returns, that is, the method allows checking the hypothesis that the credit spread, the credit provisions as well as the service income are related to the abnormal returns.

Tables 3 to 5 present the estimates. In a general way, the findings agree with the baseline analysis and reveal that the effect of the drivers of income and expense on the abnormal returns, when significant, is concentrated in the higher levels of abnormal returns. It is worth noting that, in these cases, the estimated coeficients increase, in absolute values, alongside the quantiles (see Figs. 3 to 5). On the other hand, for low levels of abnormal returns, the effect of the drivers of income and expense is smaller and in most cases the estimated coeficients do not show statistical significance.

Regarding the BFS, the findings corroborate that the credit spread and the credit provisions affect the abnormal returns, but it depends on the level of SPREAD and PROV. Since small shocks in SPREAD and PROV are not supposed to affect ROE_GAP, the results suggest that the policy maker should pursue a low volatility environment in order to avoid instability in the financial system. The variable SERV presented the expected sign and significance.

As for the private segment, the findings support the results of the baseline analysis regarding PROV. The results for SPREAD, albeit present the same sign, are significant, differing from the baseline analysis.

Looking into the quantiles, results are misleading, for the pattern observed is irregular and does not show increasing values. The significance is irregular as well, as it is concentrated in the intermediate quantiles. The variable SERV presented the expected sign and significance.

Concerning the state-owned segment, the variable SPREAD presents a behavior similar to that observed for the private segment. Although the sign agrees with the baseline analysis, the coefficient is not significant. The behavior of the coefficients alongside the quantiles is also misleading and do not show a consistent pattern. As for PROV and SERV, the findings are consistent with those of the baseline analysis.

*Table 3: OLS and quantile regression estimates for the Brazilian financial system (dependent variable: Abnormal Return on Equity - ROE_GAP)*

| Brazilian Financial System | Quantiles | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | OLS | 0.1 | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 |
| SPREAD | 0.393*** | -0.148 | -0.221 | 0.215 | 0.393*** | 0.393*** | 0.381*** | 0.369*** | 0.494*** | 0.283** |
| | (0.107) | (0.175) | (0.264) | (0.229) | (0.148) | (0.115) | (0.091) | (0.105) | (0.137) | (0.135) |
| SERV | -0.329 | -0.301 | 0.807 | 0.631 | -0.745 | -0.329 | -0.624 | -0.666 | -1.380 | 0.097 |
| | (0.959) | (1.535) | (1.551) | (1.517) | (1.253) | (0.995) | (0.914) | (1.012) | (1.001) | (1.010) |
| PROV | -0.725*** | -0.038 | -0.276 | -0.434 | -0.556* | -0.725*** | -0.817*** | -0.724*** | -0.757*** | -1.159*** |
| | (0.210) | (0.322) | (0.411) | (0.348) | (0.286) | (0.206) | (0.186) | (0.225) | (0.253) | (0.364) |
| O_GAP | 0.012 | 0.077 | -0.076 | 0.025 | 0.027 | 0.012 | 0.011 | 0.016 | 0.011 | 0.088 |
| | (0.113) | (0.164) | (0.182) | (0.185) | (0.147) | (0.107) | (0.092) | (0.085) | (0.086) | (0.150) |
| IR | 0.022 | 0.111 | 0.076 | -0.064 | 0.025 | 0.022 | 0.052 | 0.078 | 0.151** | 0.191*** |
| | (0.049) | (0.141) | (0.114) | (0.087) | (0.061) | (0.049) | (0.054) | (0.057) | (0.062) | (0.067) |
| D_CRISIS | 0.004 | -0.007 | -0.008 | -0.002 | 0.001 | 0.004 | 0.003 | 0.004 | 0.007* | 0.014** |
| | (0.003) | (0.008) | (0.006) | (0.006) | (0.005) | (0.003) | (0.003) | (0.004) | (0.004) | (0.006) |
| C | 0.019* | -0.009 | 0.006 | 0.007 | 0.013 | 0.019** | 0.029*** | 0.023** | 0.019* | 0.041*** |
| | (0.010) | (0.012) | (0.020) | (0.016) | (0.013) | (0.009) | (0.008) | (0.009) | (0.010) | (0.014) |

Source: Authors' estimates.
Marginal significance levels: ***0.01, **0.05, *0.1.
Coefficients in bold, SEs in parentheses. Regarding OLS estimates, due to problems of autocorrelation and heteroscedasticity, the reported t-statistics in the OLS estimates are based on the estimator of Newey and West (1987). In the quantile regression, we follow Fitzenberger (1998) and we use moving blocks bootstrap (MBB) as an estimator for standard errors in quantile regression that is robust to heteroscedasticity and autocorrelation of unknown forms.

*Table 4: OLS and quantile regression estimates for the private-owned segment (dependent variable: Abnormal Return on Equity - ROE_GAP)*

| Private Segment | Quantiles | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | OLS | 0.1 | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 |
| SPREAD | 0.477*** | -0.226 | -0.065 | 0.294 | 0.344* | 0.477*** | 0.366** | 0.409*** | 0.519*** | 0.216 |
| | (0.172) | (0.222) | (0.403) | (0.272) | (0.204) | (0.173) | (0.161) | (0.142) | (0.195) | (0.231) |
| SERV | -2.199 | 1.402 | 1.870 | 0.074 | -0.601 | -2.199* | -1.981 | -2.478** | -3.435** | -2.077 |
| | (1.328) | (1.973) | (3.003) | (2.122) | (1.615) | (1.321) | (1.313) | (1.200) | (1.399) | (1.844) |
| PROV | -0.593** | -0.192 | -0.520 | -0.631 | -0.725* | -0.593* | -0.807*** | -0.837*** | -0.797*** | -1.320*** |
| | (0.308) | (0.513) | (0.689) | (0.417) | (0.373) | (0.317) | (0.289) | (0.215) | (0.239) | (0.294) |
| O_GAP | -0.071 | -0.070 | -0.040 | -0.044 | -0.016 | -0.071 | -0.030 | 0.023 | 0.042 | 0.071 |
| | (0.098) | (0.172) | (0.209) | (0.158) | (0.132) | (0.102) | (0.093) | (0.094) | (0.140) | (0.148) |
| IR | -0.082 | 0.043 | -0.096 | -0.138* | -0.137** | -0.082 | -0.040 | -0.026 | 0.020 | 0.058 |
| | (0.055) | (0.082) | (0.102) | (0.070) | (0.057) | (0.055) | (0.063) | (0.061) | (0.070) | (0.094) |
| D_CRISIS | -0.001 | -0.004 | -0.002 | -0.000 | 0.002 | -0.001 | 0.001 | 0.000 | 0.001 | 0.005 |
| | (0.003) | (0.007) | (0.009) | (0.006) | (0.004) | (0.003) | (0.004) | (0.003) | (0.003) | (0.004) |
| C | 0.032 | -0.001 | 0.025 | 0.030 | 0.040 | 0.032 | 0.050** | 0.054*** | 0.047** | 0.092*** |
| | (0.026) | (0.038) | (0.055) | (0.034) | (0.030) | (0.026) | (0.024) | (0.017) | (0.019) | (0.024) |

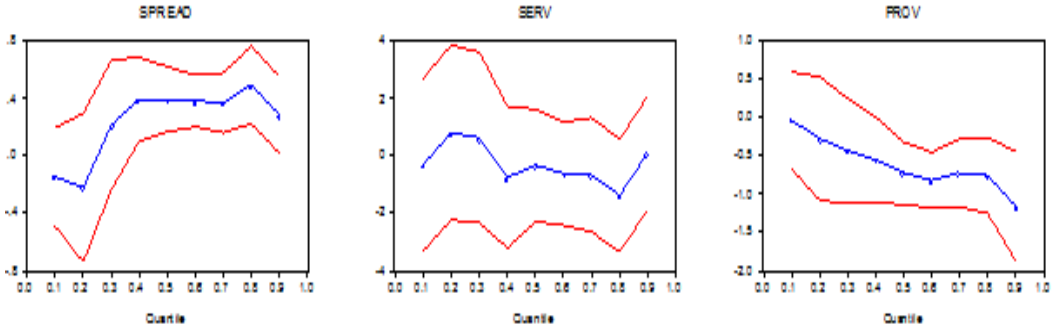
Source: Authors' estimates.
Marginal significance levels: ***0.01, **0.05, *0.1.
Coefficients in bold, SEs in parentheses. Regarding OLS estimates, due to problems of autocorrelation and heteroscedasticity, the reported t-statistics in the OLS estimates are based on the estimator of Newey and West (1987). In the quantile regression, we follow Fitzenberger (1998) and we use moving blocks bootstrap (MBB) as an estimator for standard errors in quantile regression that is robust to heteroscedasticity and autocorrelation of unknown forms.

*Table 5: OLS and quantile regression estimates for the state-owned segment (dependent variable: Abnormal Return on Equity - ROE_GAP)*

| State-Owned Segment | Quantiles | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | OLS | 0.1 | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 |
| SPREAD | -0.252 | -0.571*** | -0.325** | -0.291 | -0.121 | -0.252 | -0.252 | -0.048 | -0.091 | 0.164 |
| | (0.188) | (0.152) | (0.155) | (0.204) | (0.214) | (0.179) | (0.189) | (0.202) | (0.246) | (0.151) |
| SERV | 0.611 | -1.822 | -1.264 | -1.313 | 1.199 | 0.611 | 1.496 | 3.538** | 4.293** | 3.968*** |
| | (1.114) | (1.437) | (0.985) | (1.076) | (1.294) | (1.175) | (1.129) | (1.358) | (1.700) | (1.059) |
| PROV | -0.392 | -0.218 | -0.219 | -0.217 | -0.559* | -0.392 | -0.462* | -0.925** | -0.670 | -0.737*** |
| | (0.296) | (0.362) | (0.223) | (0.262) | (0.335) | (0.310) | (0.264) | (0.385) | (0.449) | (0.260) |
| O_GAP | 0.188 | 0.560** | 0.375* | 0.362** | 0.169 | 0.188 | 0.216 | 0.129 | 0.243 | 0.216 |
| | (0.184) | (0.280 | (0.219) | (0.177) | (0.170) | (0.190) | (0.186) | (0.250) | (0.242) | (0.155) |
| IR | 0.253** | 0.397*** | 0.237** | 0.320*** | 0.183 | 0.253*** | 0.260*** | 0.264** | 0.057 | 0.060 |
| | (0.097) | (0.129) | (0.095) | (0.116) | (0.112) | (0.094) | (0.089) | (0.107) | (0.122) | (0.067) |
| D_CRISIS | 0.004 | -0.007 | -0.005 | -0.003 | -0.001 | 0.004 | 0.005 | 0.008 | 0.020 | 0.044*** |
| | (0.004) | (0.009) | (0.005) | (0.005) | (0.005) | (0.004) | (0.004) | (0.008) | (0.012) | (0.005) |
| C | -0.008 | 0.040 | 0.031* | 0.025 | -0.019 | -0.008 | -0.028 | -0.072*** | -0.078** | -0.076*** |
| | (0.019) | (0.026) | (0.018) | (0.022) | (0.023) | (0.0198) | (0.022) | (0.026) | (0.032) | (0.020) |

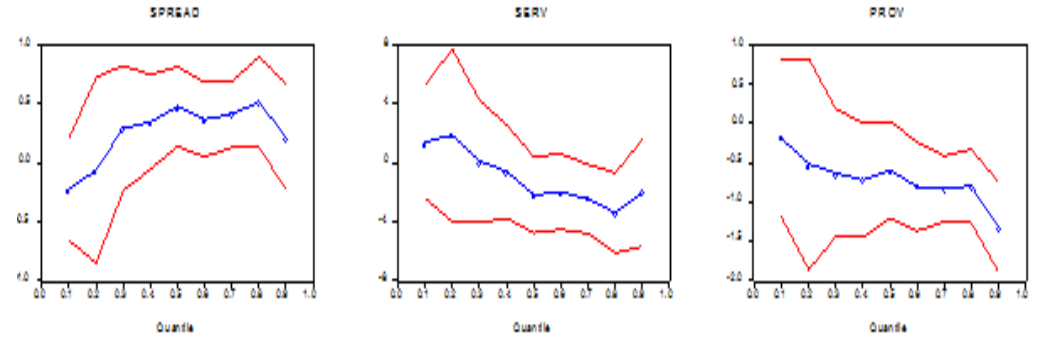
Source: Authors' estimates.
Marginal significance levels: ***0.01, **0.05, *0.1.
Coefficients in bold, SEs in parentheses. Regarding OLS estimates, due to problems of autocorrelation and heteroscedasticity, the reported t-statistics in the OLS estimates are based on the estimator of Newey and West (1987). In the quantile regression, we follow Fitzenberger (1998) and we use moving blocks bootstrap (MBB) as an estimator for standard errors in quantile regression that is robust to heteroscedasticity and autocorrelation of unknown forms.

*Figure 3: Coefficient per quantile for the Brazilian financial system (dependent variable: Abnormal Return on Equity (ROE_GAP).*



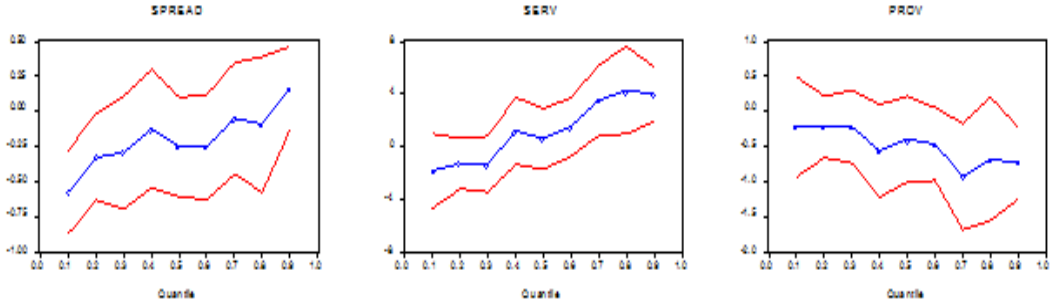

Source: Authors' elaboration.

*Figure 4: Coefficient per quantile for the private segment (dependent variable: Abnormal Return on Equity (ROE_GAP).*




Source: Authors' elaboration

*Figure 5: Coefficient per quantile for the state-owned segment (dependent variable: Abnormal Return on Equity (ROE_GAP).*




Source: Authors' elaboration.

## 5 CONCLUSIONS

The main purpose of this paper is to investigate the influence of the control structure in the abnormal returns of the banking industry. We analyzed aggregate data from the monthly reports filed in the CBB by the banks from January 2005 until December 2014. The Brazilian financial system was considered as a whole and segmented by control structure in state-owned banks and private banks. For each of the segments, we estimated the effects of three drivers of income and expense (spread of credit operations, service revenues and expected credit losses) on the abnormal returns.

We provide evidence that the spread of credit operations is positively related to abnormal returns when we consider the BFS as a whole. This is consistent with the pervasive use of post-fixed interest rates by the BFS that might have a positive or negative impact on pricing assets and liabilities For state-owned banks, the spread of credit operations is negatively related to abnormal returns, reflecting the countercyclical nature of the influence government exerts in state-owned banks to offset private banks behavior during economic downturn scenarios. Regarding private banks, the findings reveal no significance.

As for the services rendered revenues, results are not significant and consistent with the steady contribution of the variable to income. A stable behavior as such is not subject to shocks and explains the absence of effect on abnormal returns.

The negative and significant relation between expected credit losses and abnormal returns observed for the BFS and the private segment reveals the bank industry behavioral component embedded in credit provisions which increase (decrease) when credit conditions worsen (improve), signaling a scenario of possible financial stress (ease). As for the state-owned segment, the absence of significance, though the sign is consistent, can be explained by the governmental influence on the banking industry. The risk scenario may be different, or at least less intense, for the state-owned segment when compared to the private segment. Therefore, the credit provisions behavior is not sufficient to influence significantly the abnormal return.

We leave for future research the reproduction of this analysis under the perspective of banking strategy, instead of the macro analysis we performed. To account for this alternative approach, a panel data analysis would be the adequate methodology, for the individual behavior of the banks is central to this type of investigation.

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*Table A1: Descriptive Statistics*

| BFS | ROE | ROE-GAP | SPREAD | SERV | PROV | O_GAP | IR |
|---|---|---|---|---|---|---|---|
| Mean | 0,088 | 0.000 | 0,074 | 0,065 | 0,013 | 0,000 | 0,118 |
| Median | 0,079 | 0.000 | 0,074 | 0,063 | 0,011 | 0,001 | 0,112 |
| Maximum | 0,155 | 0,042 | 0,109 | 0,081 | 0,021 | 0,023 | 0,198 |
| Minimum | 0,029 | -0,052 | 0,046 | 0,051 | 0,008 | -0,030 | 0,071 |
| Std. Dev. | 0,034 | 0,012 | 0,017 | 0,008 | 0,003 | 0,010 | 0,033 |
| Observations | 120 | 120 | 120 | 120 | 120 | 120 | 120 |
| PRIVATE | ROE | ROE-GAP | SPREAD | SERV | PROV | O_GAP | IR |
| Mean | 0,079 | 0,000 | 0,079 | 0,066 | 0,009 | 0,000 | 0,118 |
| Median | 0,065 | 0,000 | 0,076 | 0,065 | 0,008 | 0,001 | 0,112 |
| Maximum | 0,152 | 0,052 | 0,108 | 0,086 | 0,015 | 0,023 | 0,198 |
| Minimum | 0,015 | -0,055 | 0,048 | 0,052 | 0,005 | -0,030 | 0,071 |
| Std. Dev. | 0,036 | 0,014 | 0,017 | 0,007 | 0,002 | 0,010 | 0,033 |
| Observations | 120 | 120 | 120 | 120 | 120 | 120 | 120 |
| STATE-OWNED | ROE | ROE-GAP | SPREAD | SERV | PROV | O_GAP | IR |
| Mean | 0,133 | 0,000 | 0,064 | 0,065 | 0,031 | 0,000 | 0,118 |
| Median | 0,133 | -0,002 | 0,065 | 0,065 | 0,031 | 0,001 | 0,112 |
| Maximum | 0,214 | 0,063 | 0,102 | 0,092 | 0,041 | 0,023 | 0,198 |
| Minimum | 0,072 | -0,056 | 0,039 | 0,042 | 0,025 | -0,030 | 0,071 |
| Std. Dev. | 0,035 | 0,022 | 0,014 | 0,015 | 0,004 | 0,010 | 0,033 |
| Observations | 120 | 120 | 120 | 120 | 120 | 120 | 120 |

Source: Author´s elaboration

*Table A2: Unit Roots Test*

| | ADF | | | | PP | | | | KPSS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Lags | Test | | Critical Value (10%) | Lags | Test | | Critical Value (10%) | Lags | Test | | Critical Value (10%) |
| BFS | | | | | | | | | | | | |
| ROE_GAP | 1 | -3.731 | a | -2.579 | 6 | -5.691 | a | -2.579 | 8 | 0.045 | a | 0.347 |
| ROE | 2* | -1.816 | c | -1.614 | 6 | -1.742 | c | -1.614 | | | | |
| SPREAD | 1 | -1.929 | c | -1.614 | 6 | -1.913 | c | -1.614 | 9 | 0.052 | b | 0.119 |
| PROV | 3 | -3.167 | b | -3.149 | | | | | 9 | 0.104 | b | 0.119 |
| SERV | 2 | -2.459 | c | -1.614 | 54 | -1.743 | c | -1.614 | | | | |
| STATE-OWNED | | | | | | | | | | | | |
| ROE_GAP | 6 | -3.682 | a | -2.580 | 5 | -4.097 | a | 0.0014 | 7 | 0.043 | a | 0.347 |
| ROE | 3* | -3.544 | b | -3.149 | 5 | -3.272 | b | -3.149 | 16* | 0.118 | b | 0.119 |
| SPREAD | 2 | -2.699 | a | -2.580 | 7 | -1.790 | c | -1.614 | 9 | 0.083 | b | 0.119 |
| PROV | 2 | -3.257 | b | -3.149 | 7 | -1.974 | c | 1.614 | 8 | 0.068 | b | 0.119 |
| SERV | 5 | -1.829 | c | -1.614 | 2 | -2.810 | a | -2.579 | | | | |
| PRIVATE | | | | | | | | | | | | |
| ROE_GAP | 5 | -4.282 | a | -2.580 | 6 | -6.269 | a | -2.579 | 8 | 0.045 | a | 0.347 |
| ROE | 1 | -1.720 | c | -1.614 | 5 | -1.834 | c | -1.614 | | | | |
| SPREAD | 0* | -1.855 | c | -1.614 | 4* | -1.627 | c | -1.614 | 9 | 0.078 | b | 0.119 |
| PROV | 3 | -3.197 | a | -2.580 | | | | | 9 | 0.173 | b | 0.347 |
| SERV | 2 | -2.228 | c | -1.614 | 56 | -1.632 | c | -1.614 | | | | |
| O_GAP | 12 | -2.584 | a | -2.581 | 7 | -6.525 | a | 2.579 | 2 | 0.039 | a | 0.347 |
| IR | 1 | -3.111 | a | -2.579 | 1* | -1.750 | c | -1.614 | | | | |

Source: author's elaboration. Note: ADF - the final choice of lag was made based on Schwarz criterion. PP and KPSS tests - lag is the lag truncation chosen for the Bartlett Kernel. * fixed by the authors. "a" denotes constant; "b" denotes constant and trend, and "c" denotes none.

*Table A3: Matrix Correlations*

| BFS | ROE | ROE_GAP | SPREAD | PROV | SERV | O_GDP | IR |
|---|---|---|---|---|---|---|---|
| ROE | 1 | | | | | | |
| ROE_GAP | 0,404 | 1 | | | | | |
| SPREAD | 0,872 | 0,207 | 1 | | | | |
| PROV | 0,423 | -0,277 | 0,372 | 1 | | | |
| SERV | 0,885 | 0,100 | 0,788 | 0,407 | 1 | | |
| O_GDP | 0,082 | 0,179 | 0,109 | -0,193 | 0,156 | 1 | |
| IR | 0,841 | 0,127 | 0,731 | 0,324 | 0,807 | 0,082 | 1 |
| PRIVATE | ROE | ROE_GAP | SPREAD | PROV | SERV | O_GDP | IR |
| ROE | 1 | | | | | | |
| ROE_GAP | 0,418 | 1 | | | | | |
| SPREAD | 0,899 | 0,268 | 1 | | | | |
| PROV | -0,488 | -0,445 | -0,549 | 1 | | | |
| SERV | 0,878 | 0,116 | 0,824 | -0,395 | 1 | | |
| O_GDP | 0,057 | 0,113 | 0,114 | -0,245 | 0,166 | 1 | |
| IR | 0,826 | 0,093 | 0,741 | -0,427 | 0,774 | 0,082 | 1 |
| STATE-OWNED | ROE | ROE_GAP | SPREAD | PROV | SERV | O_GDP | IR |
| ROE | 1 | | | | | | |
| ROE_GAP | 0,710 | 1 | | | | | |
| SPREAD | 0,411 | -0,151 | 1 | | | | |
| PROV | 0,577 | -0,025 | 0,569 | 1 | | | |
| SERV | 0,545 | 0,117 | 0,476 | 0,851 | 1 | | |
| O_GDP | 0,124 | 0,176 | 0,116 | -0,070 | 0,152 | 1 | |
| IR | 0,462 | 0,087 | 0,572 | 0,682 | 0,729 | 0,082 | 1 |

Source: Author´s elaboration