

Basel III: Impact on Banks in Brazil*

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ABSTRACT

This article evaluates the potential impacts deriving from the change in required capital of banks in Brazil, with the implementation of Basel III. To do this, a sample of 58 banks was used, which accounts for 80% of the assets in the Brazilian National Financial System, according to the balance sheets of December 2012. The methodology adopted has simulated the need for regulatory capital that will be mandatory in the end of the transition period, in 2019, considering the continuity of risk-weighted assets (RWAs) contained in these balance sheets. Assuming that some banks will resort to the capital market to raise their capitalization level, the return on equity (ROE) for the previous three years was analyzed, compared to the cost of equity, estimated by the International Capital Asset Pricing Model (ICAPM). It was found that 23 institutions had some kind of noncompliance with the new regulatory capital, among them the 3 largest federal public banks. It was also observed that 39 banks have a ROE insufficient to attract new investors. The joint analysis of the adequacy of capital structure and the return level may identify occasional vulnerabilities. It is concluded that implementing Basel III in Brazil may increase the search for greater efficiency and profitability. In a future scenario, the Brazilian banking system may observe a wave of mergers and acquisitions and an increased number of initial public offerings (IPOs).

Keywords: regulatory capital, Basel III, banks, risk-weighted assets, bank regulation.

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1 INTRODUCTION

Over the past two decades, the Brazilian banking sector has undergone a major consolidation, which increased its concentration, the presence of large retail banks, and, within the last five years, the participation of federal public banks increased.

The 2008 international financial crisis has barely affected the capacity of this system. Brazilian banks, most of them, were complied with the regulatory capital and retained risk exposures within acceptable parameters, corroborating the views that regulatory capital (Laeven & Levine, 2009) and the supervision by regulators (Buch & DeLong, 2008) are intrinsically related to stability in the banking sector. However, the world economy has been affected by the crisis and measures were needed.

The Basel Committee on Banking Supervision (BCBS) has published a review of the Capital Accord entitled *A global regulatory framework for more resilient banks and banking systems*, which became known as Basel III (Basel Committee on Banking Supervision, 2011). The new Capital Accord will require more capital and better quality capital. In addition, the new rules have introduced the concept of *countercyclical capital*, which, in practice, will reduce the possibility of leverage by banks. By acting on a wide range with capital regulation and liquidity standards, the new agreement leaves room to decision-making by local standard setters on how to implement and adapt the model to their specificities.

These measures will lead the financial institutions to need better planning for their investment and lending actions, prioritizing the acquisition of assets that provide a better relation between return and risk. However, the actions are not limited to a review in the investment and credit policy. Banks may also adjust to the new rules by issuing stock, selling part of their asset portfolio, or even putting into practice a less aggressive dividend policy, with greater profit retention. Thus, the increase in regulatory capital required by the BCBS will imply capital injections by shareholders, who must be paid at the cost of equity (K_E). So, the return level provided by the

bank must meet the condition of being equal or above K_E .

This article analyzes the effects of this measure for the Brazilian banking sector, through two approaches. The first is a simulation of sufficiency of the regulatory capital of banks so that they keep their strategies and operations, considering the existing portfolios in December 2012, and within the rules introduced by Basel III. The second approach relates to the capacity of banks to attract capital in order to fit Basel III and, therefore, they should provide investors with consistent returns. Joint analysis of the adequacy of regulatory capital and the capacity to attract new capital will indicate the strategies that each bank should pursue.

The results obtained indicate that, out of the 58 banks analyzed, 23 are not complying with the rules of Basel III, because of any of the criteria discussed in section 2.2. Overall, the banking system will need to increase the regulatory capital in about R\$ 85 billion, in 2012. The difficulty to comply will increase, as 39 banks have lower returns at the cost of equity.

The main contribution of this study consists in discussing the potential effects of the new Capital Accord on the financial market, since the reduced capacity of banks to leverage can precipitate the rise in spreads. In addition, the new agreement can produce an increased concentration in the system, just as the keynote in the last two decades. Finally, it is also expected to raise the debate on issues of economic policy and banking regulation, given the interconnectedness of the subjects.

The article is divided into seven sections, including this introduction. The second section presents a literature review. The third section presents the methodology used. The fourth section consists in an analysis of the need for adjustment in the regulatory capital. The fifth section is intended to estimate the capital cost of banks and discusses their ability to attract new investors. The sixth section consists in a joint analysis of the regulatory capital and the return of banks. Finally, the seventh section presents our conclusions.

2 LITERATURE REVIEW

Banks are depositaries of the savings of families, companies, and institutional investors. They play the role of communicating vessels between all investors and borrowers; therefore, the bankruptcy of a bank is a systemic problem (Stiglitz & Weiss, 1981).

Banks may fail to comply when the volume of their con-

tracts is of such a magnitude that the effects propagated through a crisis, focusing on them, lead to losses not supported by the institution's equity. When problems go beyond borders, the action taken by central banks need to be coordinated by a multilateral institution, which can have reliability and representativeness to operate in this environment.

The BCBS is the international financial body responsible for recommending to the central banks prudential measures, aimed at ensuring international financial stability. To this end, the BCBS has issued, in 1988, its first Capital Accord, which limited bank leverage to a level that could bring stability to the economies (Basel Committee on Banking Supervision, 1988).

2.1 Background of Basel III

The primary principle of Basel Capital Accord consists in the compatibility of the institution's capital with the risks involved. In the 1988 Capital Accord, named *International convergence of capital measurement and capital standards*, there is, among others, the concept of risk-weighted assets (RWAs) that, multiplied by an 8% risk factor, defined the institution's regulatory capital, in addition to the concepts of Tier 1 and Tier 2 Capital. The relation between Total Capital and RWA is named Basel Index.

The concept of RWA consists in the weighted sum of institutions' assets, according to their risk level. In general, four weighting factors were established: 0% for government securities issued by central governments or assets of banks along with governments; 20% for amounts in compensation; 50% for interbank assets and credit guaranteed by mortgages; and 100% for the other credits.

Tier 1 represents the capital available to absorb losses on a "continuity" basis, which may be depleted without leading the bank to insolvency, special administration, or liquidation. Tier 1 consists in ordinary shares, disclosed reserves, and in preferred shares, provided that the latter are not redeemable and there are no cumulative dividends. At least 50% of Tier 1 should consist in stock.

Tier 2 is the capital that can absorb losses before depositors lose all the money and it is limited to 100% of Tier 1. It consists in revaluation reserves, undisclosed reserves, provisions for unidentified future losses, and instruments that, due to their characteristics, are classified as a "quasi-capital". They are hybrid instruments of capital and debt, such as preferred shares and perpetual bonds, in addition to subordinated debt instruments, limited to 50% of Tier 2, with a minimum term of five years, and providing for the reduction of their effectiveness as a capital instrument at the rate of 20% per annum (p.a.) within the 5 years before maturity.

The deductions from regulatory capital introduced by the 1988 Accord are related to Goodwill (deduction from Tier 1) and investment in unconsolidated financial subsidiaries in the institution's balance sheet (deduction from total regulatory capital).

In 2005, the BCBS published the *International convergence of capital measurement and capital standards: a revised framework*, known as Basel II (Basel Committee on Banking Supervision, 2005). Among other measures, Basel II has promoted qualitative changes regarding the concept of RWA, linking the rating to the weighting factor and enabling the institutions to develop internal mo-

dels, or *Internal Rating-Based Approach* (IRB).

In addition, other changes were introduced in the composition of regulatory capital: from Tier 1, intangible assets and increased capital coming from exposures in securitization transactions started being deducted and, simultaneously, from Tier 1 and Tier 2, equal investment portions started being deducted from investments in financial or unconsolidated banking subsidiaries and investments in other financial institutions.

2.2 Changes Introduced by Basel III

Basel III has brought significant changes, particularly with regard to definitions of capital. Among the changes, a new capital structure stands out, prioritizing better quality capital and establishing restrictions on lower-quality capital instruments; prudential adjustments to the institution's capital; the concept of *capital conservation buffer*, which is the additional capital to tackle potential losses; and the concept of *countercyclical buffer*, or countercyclical capital.

Unlike the previous agreements, which summarized the institution's capital structure within Tier 1 and Tier 2, the new Capital Accord is considerably tighter and it starts consisting in the sum of the following elements:

- a) Tier 1 Capital, whose requirement is 6% of RWA, consisting in:
 - i. *Common Equity*, or Main Capital, according to the terminology of Resolution of the Brazilian National Monetary Council (CMN) 4,192/2013, which should be greater than or equal to 4.5% of RWA; and
 - ii. *Additional Tier 1*, or Supplementary Capital, according to the same resolution.
- b) Tier 2 Capital. The sum of Tier 2 and Tier 1 should be, at least, 8% of RWA.

In addition to Tier 1 and Tier 2, Basel III provides that the institution's regulatory capital must include:

- c) *Capital conservation buffer* consists in an extra capital reserve for potential losses, providing an institution that "gets into" this threshold with the continuity of its operations. Under these conditions, the institution is required to stop paying dividends, until resuming the capital. *Capital conservation buffer* requires an additional of Common Equity equivalent to 2.5% of RWA.
- d) *Countercyclical buffer*, or countercyclical capital. It aims to ensure financial stability of the economy and its use provides freedom degrees to the central banks: when not undergoing times of crisis, a capital reserve is created to tackle losses during potential crises; and when undergoing times of crisis, the monetary authority may abolish it to avoid a recession. Countercyclical capital requires an additional of Common Equity equivalent to 2.5% of RWA.

The Common Equity Tier 1 Capital consists of ordinary shares, profit reserves, and other reserves. In turn, the Additional Tier 1 Capital consists in instruments with perpetuity characteristics, subordinates to all other

instruments, except for ordinary shares, redeemable only through lender's initiative and having the consent of central banks.

Tier 2 capital consists in debt instruments with a minimum term of 5 years, subject to all institution's liability, except those of Tier 1; there should not be early settlement triggers, except in case of the institution's bankruptcy; and they should be redeemed by issuer's initiative, observing the minimum term of 5 years, provided that they are replaced by better quality instruments, from the viewpoint of regulatory capital.

From the above, required capital in the form of ordinary shares, corresponds to the sum of the Common Equity Tier 1 Capital, conservation buffer, and countercyclical buffer, totaling 9.5% of RWA; adding the Additional Tier 1, it may achieve 11%; and also adding

the instruments that make up the Tier 2, we reach a 13% requirement.

Prudential adjustments consist in deductions from the Common Equity Tier 1 Capital. They are Goodwill and other intangible assets; tax credits derived from tax losses that depend on future outcomes to be realized; shares issued by the treasury itself; defined pension funds benefits; cross-shareholding in banks, financial and insurance firms; direct or indirect investment in the capital of banking, financial, insurance, and similar firms, which are outside the regulatory consolidation; gain on sale of assets in securitization transactions; lack of provisions for expected losses; reserves for hedges coverage, etc.

Table 1 shows the adjustment period to the new rules of the BCBS.

Table 1 Minimum capital requirements established by Basel III

Year of entry into force	2013	2014	2015	2016	2017	2018	2019
Common Equity Tier 1	3.500%	4.000%	4.500%	4.500%	4.500%	4.500%	4.500%
Tier 1	4.500%	5.500%	6.000%	6.000%	6.000%	6.000%	6.000%
Tier 1 + Tier 2	8.000%	8.000%	8.000%	8.000%	8.000%	8.000%	8.000%
Capital conservation buffer	-	-	-	0.625%	1.250%	1.875%	2.500%
Countercyclical buffer	-	-	-	0.625%	1.250%	1.875%	2.500%
Tier 1 + Tier 2 + buffers	8.000%	8.000%	8.000%	9.250%	10.500%	11.750%	13.000%
Prudential adjustments		20%	40%	60%	80%	100%	100%

Source: Prepared by the authors.

Insufficient capital to meet the Capital conservation buffer and Countercyclical buffer may stop, fully or partially, payment of dividends.

It is clear that, through the new agreement, more and better quality capital will be required from banks. If previously the regulatory capital was met by the sum of Tier 1 and Tier 2, the new agreement sets out requirements for the Common Equity Tier 1, for Tier 1, and for the sum of Tier 1 and Tier 2. Besides, capital conservation buffer, and countercyclical buffer represent an additional charge for banks.

2.3 Implementation of Basel III in Brazil

The Central Bank of Brazil (BACEN) published, on March 1, 2013, CMN Resolutions 4,192 and 4,193 (Banco Central do Brasil, 2013a, 2013b), which provide, respectively, for the reference property and the calculation of minimum capital requirements. In relation to Basel III, the standards differ with regard to the transition rules, because the BACEN already adopted a 11% risk factor that, by 2019, will adjust to the BCBS parameters. Concerning the instruments that make up capital, the BACEN has established rules similar to those of the BCBS.

Regarding prudential adjustments, it is worth mentioning that most of the tax credits generated by Brazilian banks stem from provisions for doubtful settlement credits, generated when it comes to issuing at the expense of credit operation. Out of the R\$ 110 billion in tax credits of the Financial System, R\$ 60 billion stem from credit operations (Reuters Brasil, 2013). If those tax credits were deducted from regulatory capital, Brazilian banks might have a disadvantage when compared to banks located in other countries. Provisional Measure 608/2013, already approved in the plenary of the Federal Senate, excluded them from those that may be deducted from regulatory capital (Brasil, 2013).

2.4 Empirical Studies on the Potential Effects Arising from the Implementation of Basel III

Several studies have been conducted in order to anticipate the effects of the new Capital Accord. Herrala (2014) has studied how banks in the Eurozone anticipate to banking regulation. According to the author, within the seven years prior to the implementation of Basel II, the real estate credit policy of banks was relieved. The effects of Basel III are also already felt in the Eurozone, where banks implemented a tighter credit policy.

Cohen (2013) has identified among European banks increased retained earnings, as a way to increase capitalization, and decreased asset portfolios for sale. However, in an aggregate way, there have been no significant cuts in the portfolio of assets. The author mentions that banks with high capitalization and profitability after the crisis have grown more than the others, something which emphasizes the importance of strong balance sheets.

The tightening of banks' credit policy, the rise in banking spread, and the economic downturn are conclusions made by some researchers. Slovik and Cournède (2011) have studied the effect of Basel III on the United States, the European Union, and Japan and they concluded that the measures will generate a contractionary effect between 0.05% and 0.15% per annum in the gross domestic product (GDP) of these economies. They estimate that the spread may rise by 50 basis points in 2019, when the transition period of the new Capital Accord is complete, and they suggest a reduction in the primary interest rates in order to reduce this contractionary effect. Similarly, according to Elliott, Salloy and Santos (2012) the lending rates in the United States, the European Union, and Japan may rise 28, 18, and 8 basis points, respectively.

Miles, Yang and Marcheggiano (2013) have studied which might be the optimal regulatory capital for banks and they weighed the cost of a financial crisis and the amount of public resources to tackle it was significant; therefore, the optimal level of capital stems from the trade-off between the reduction in GDP growth due to a crisis, with a given probability, versus the cost of GDP growth inherent to regulatory capital. The authors suggest that the optimal capital level is around 20% of RWA, a value which is substantially higher than the regulatory capital set in Basel III. Unlike the other researchers, these authors do not share the idea that there will be reduction of assets in the banking sector, because the increase in regulatory capital only means that a greater portion of assets will be financed by equity, i.e. they see capital from the banks' funding perspective.

Yan, Hall and Turner (2012) have studied the costs and benefits of Basel III in the United Kingdom, with the same goal, determining the optimal capital level. The principle is also that any contractionary effects of the new regulatory capital might be offset by a benefit, defined as a reduction in economic growth, if there was a

crisis. The authors have concluded that the optimal capital level, defined as the sum of the Common Equity Tier 1 plus the conservation buffer, is 10%, therefore, it is higher than the 7% of Basel III.

Klomp and Haan (2012) have investigated the effect of banking regulation and supervision on over 200 banks in 21 countries of the Organization for Economic Cooperation and Development (OECD) between 2002 and 2008 and they concluded that banking regulation and supervision are effective on banks that incur higher risk, but not on those more conservative in this regard. Based on this, the authors discuss whether regulation and supervision should not take into account the differences between institutions.

Finally, there is the issue of efficiency gains. The Basel Committee on Banking Supervision (2012) associates management gains with the stability of returns on capital. Tabak, Fazio and Cajueiro (2011), studying banks in Latin America, have concluded that they work at higher levels regarding *cost efficiency* than *profit efficiency*. Better cost management does not necessarily mean that they are getting the appropriate return. According to the authors, there is evidence that private banks and foreign banks are more effective regarding profit and costs than public banks. However, discussing which banks are more effective, whether private or public, national or foreign, is a controversial subject and it is far from being exhausted. Ruiz Tabak and Cajueiro (2008) have listed several papers with conclusions similar to those by Tabak et al. (2011), but also others with opposite conclusions. By way of example, the studies by Silva and Jorge Neto (2002) and Nakane and Weintraub (2005) point out the greater efficiency of private banks; in turn, according to Sensarma (2006) and Altunbas, Liub, Molyneux and Seth (2000), public banks are the most efficient. The issue of efficiency tackles discrepancies not only with regard to the conclusions, but also in terms of the methods used to measure efficiency and the fact that this may change over time depending on government attitudes, increased competition, and changes in administrations (Ruiz et al., 2008).

Arantes and Rocha (2012), by studying the effects of the 2008 global financial crisis, have concluded that, in times of crisis, banks seek to achieve greater rationalization of costs, by having control over these variables; on the other hand, revenues are mostly affected, by depending on factors exogenous to the institution.

3 METHODOLOGY

This study consists in an exploratory, analytical, and quantitative research that seeks, through a simulation technique, to check the potential effects of increased need for equity among a representative group of Brazilian financial institutions.

The first analysis concerns the banks' equity sufficiency. To do this, the following premises were considered:

- i. That the banks will keep their exposures in subsequent years, within the framework of the new rule calendar. This means admitting that banks will maintain the current size of their loan portfolios and the current exposures to market risk and operational risks, among others.
- ii. That the banks will keep their capital structure, including the preservation of characteristics of hybrid

capital and debt instruments existing today. In other words, they will keep the same kinds of instruments, with the same characteristics, such as maturity, and the same proportion between these instruments and the capital paid in by investors.

The growth trend of loan portfolios observed in the country over the past few years was not considered, fruit of the Federal Government policy to stimulate consumption through credit. Similarly, it was not considered that banks usually reinvest a part of their profits, because it is understood that each institution should review its dividend policy in order to fit the capital required by Basel III.

Observing these premises, the regulatory capital will be calculated having the parameters required by the BCBS in 2019 as a basis, exposed in item 2.2, and a conclusion may be drawn about its sufficiency.

An intentional sample of 58 Brazilian banks, whose data were obtained from the information system *Bankscope* was used. The institutions were selected having the following criteria as a basis: active banks, located in Brazil, classified as commercial banks or government credit institutions, and having the balance sheet available in 2012. This selection provided 78 banks, out of which 58 had sufficient information to carrying out the analysis. This intentional sample is representative, because the institutions included account for about 80% of the total assets of the Brazilian National Financial System. The data obtained from this system refer to the sum of RWA, Tier 1 Capital, Total Regulatory Capital, hybrid instruments of capital and debt, and subordinated debt. Based on the new rule's criteria, the Common Equity, Additional Tier 1, and Tier 2 Capital will be calculated.

As the *Bankscope* system does not indicate the values of subordinated debt and hybrid instruments that have perpetuity as a characteristic, these data were surveyed in the Quarterly Financial Reports of the BACEN, Report 7027, on the site of this government institution. The portion of these instruments having no maturity date was regarded as Additional Tier 1 Capital; the rest, with defined maturity, was regarded as Tier 2 Capital.

The numbers of *Bankscope* and the BACEN, regarding the subordinated debt and hybrid instruments, were reconciled. When there was a difference, the case of the BACEN, the total amount pointed out by *Bankscope* prevailed, but having a division between Additional Tier 1 and Tier 2 Capital, according to the proportion of perpetual instruments indicated by the BACEN.

When it was not possible to highlight the Additional Tier 1 Capital, the case of the Brazilian National Bank for Economic and Social Development (BNDES), all capital classified as Tier 1 was regarded as Common Equity.

Since the calculation of regulatory capital might require access to information not available in the published balance sheets, the procedure adopted leads to an indicative more optimistic than the actual value. Thus, a limitation of this analysis is the impossibility to investigate the prudential adjustments to regulatory capital,

as it would require knowing the nature of tax credits of each bank and analyzing its corporate structures to identify unconsolidated shareholding, minority shareholding, cross-shareholding, and others.

The second analysis concerns the comparison between the cost of equity and the return on equity of institutions. The average ROE recorded in 2010, 2011, and 2012 was considered.

The K_E value was obtained through a variant of the capital asset pricing model (CAPM), named international capital asset pricing model (ICAPM), by Adler and Solnik (1974). The reason to have passed over the CAPM results stems from the incipient risk premium calculated for the Brazilian market, as a result of poor performance of the Securities, Commodities, and Futures Exchange (BM&FBOVESPA) in recent years, something which would undervalue K_E in the sector.

Hope in the return of an asset, through ICAPM, is provided by Equation 1:

$$E(r_i^k) = r_f^{GL} + \beta_i^k \beta_k^{GL} (E(r_m^{GL}) - r_f^{GL}) + r_p \quad 1$$

Where:

$E(r_i^k)$ is the return on "i" stock traded in the stock exchange "k"; in this case, BM&BOVESPA.

$E(r_m^{GL})$ is the global market risk free rate, considering the Standard & Poor's 500 (S&P 500).

r_f^{GL} is the return on the asset free from global risk, considering the 10-year *U.S. Treasuries*.

β_i^k is the beta of the asset "i" with regard to the index "k"; in this case, the BOVESPA Index (IBOVESPA).

β_k^{GL} is the beta of the index "k" with regard to the global market.

r_p is the sovereign risk premium, measured by the EMBI+ Brazil.

The r_f^{GL} was obtained through the average of the 10-year *yield to maturity* dos *U.S. Treasury Bonds* set between 2003 and 2012; the β_i^k was based on the daily returns of the theoretical stock portfolio of the Brazilian banks from 2008 to 2012, having the IBOVESPA as regressor and the stock returns of banks as a dependent variable; the β_k^{GL} is the beta of the IBOVESPA regressed by the S&P 500 and calculated based on monthly returns from 1990 to 2012 as a basis; the $E(r_m^{GL})$ was based on the average of annual returns of the S&P 500 within the last 10 years (2003 to 2012); and as r_p we adopted the average EMBI+ Brazil. We preferred to limit to 5 years the series used by the EMBI+ Brazil, in order to avoid the period before the country risk was reclassified as *investment grade*.

To set the theoretical portfolio of banks, we referred to the Economática database. Except for the stocks of Itaú Unibanco, Bradesco, and Banco do Brasil, the price series of the other banks are faulty, possibly due to lower liquidity of these shares. These series provide very different betas, between 0 and 3.5, something which might distort the value of the sector beta. Thus, in order to use the most reliable beta, we defined a theoretical portfolio consisting of equal

parts of the shares of ITAÚ UBB ON, BRADESCO ON, and BANCO DO BRASIL ON, adjusted on a daily basis.

The resulting K_E , expressed in nominal dollars, was adjusted to the Brazilian inflation; to do this, it was deflated by the geometric average of the consumer price index (CPI), from the United States, in 2010, 2011, and 2012. Subsequently, we added the geometric average of the national broad consumer price index (IPCA), within the same period, producing a nominal K_E in reais, something which will enable a direct comparison with the average return of banks.

As limitations of this analysis, we considered that the capital cost is the same for all institutions, i.e. we disre-

garded the size effect, studied by Banz (1981), and later by Fama and French (1992). Also, we did not take into account the non-diversified risk of each institution, arising from its peculiarities.

It is also worth noticing that the adoption of different periodicities when calculating the parameters used is another limitation of this analysis. This fact was motivated by the effect of the economic cycles in Brazil and in the United States regarding the beta value, the market premiums, the rate free from risk, and the country risk. These periodicities also differ from the average ROE calculation period, which considered three years to reflect the recent history.

4 ANALYSIS OF THE NEED FOR ADJUSTMENT TO THE REGULATORY CAPITAL

Table 2 represents a first analysis, with the descriptive statistics of the consolidated regulatory capital of the banks analyzed in 2012.

Table 2 Descriptive statistics – regulatory capital in 2012 (%)

	Mean	Median	Standard deviation	Maximum	Minimum
Tier 1 Capital / RWA	16.54%	14.56%	9.79%	61.10%	6.62%
Total Capital / RWA	18.54%	15.80%	8.98%	61.10%	11.68%

Source: Prepared by the authors.

Table 3 displays data on the regulatory capital of the banks analyzed, based on the financial statements

of 2012, within the existing rules so far. All banks were complying, as they showed a Basel Index over 11%.

Table 3 Regulatory capital of the banks analyzed – base: December 2012 (in R\$ million)

Bank	Risk-weighted assets	Tier 1 Capital	Total Regulatory Capital	Hybrid instruments	Subordinated debt	Tier 1 Capital / RWA (%)	Total Capital / RWA (%)
Banco do Brasil	727,590	76,769	107,925	3,743	51,994	10.55	14.83
Itaú Unibanco	655,215	71,418	109,421	0	38,099	10.90	16.70
Bradesco	597,886	65,887	96,754	0	34,852	11.02	16.17
BNDES	582,214	48,633	89,599	0	155,325	8.35	15.39
CEF	433,691	28,690	56,329	0	40,644	6.62	12.99
Santander	337,500	65,200	70,300	0	11,900	10.32	20.80
HSBC	92,216	9,737	12,376	0	3,880	10.56	13.42
Votorantim	84,641	7,875	12,111	0	6,991	9.30	14.30
BTG Pactual	84,303	10,250	14,594	0	6,246	12.16	17.30
Safra	68,942	6,824	9,629	0	2,657	9.90	14.00
Citibank	51,767	7,812	7,812	0	0	15.09	15.09
Itaú BBA	37,624	6,283	6,283	0	0	16.70	16.70
Banrisul	32,387	4,877	6,046	0	1,158	15.05	18.67

(cont.)

Bank	Risk-weighted assets	Tier 1 Capital	Total Regulatory Capital	Hybrid instruments	Subordinated debt	Tier 1 Capital / RWA (%)	Total Capital / RWA (%)
BMG	32,234	2,508	3,693	0	1,226	8.05	11.85
Banco do Nordeste	30,601	2,611	5,184	0	2,535	8.53	16.94
Volkswagen	21,749	2,046	3,012	0	1,613	9.41	13.43
JP Morgan	20,919	3,494	3,494	0	0	16.70	16.70
Banco Industrial e Comercial (BICBanco)	18,685	1,959	2,915	0	947	10.60	15.80
Panamericano	16,608	1,270	1,904	0	1,195	7.79	11.68
Banco da Amazônia	13,132	1,946	2,011	0	0	14.82	15.31
Rabobank	12,967	1,052	1,990	0	939	8.11	15.35
Banco Daycoval	12,665	2,198	2,204	0	0	17.40	17.40
Deutsche Bank	11,563	1,499	1,499	0	0	12.96	12.96
Mercedes-Benz	10,929	1,172	1,395	0	223	10.73	12.77
Mercantil Brasil	10,163	839	1,258	0	622	8.26	12.38
GMAC	9,806	1,207	1,207	0	0	13.09	13.09
Fibra	9,411	873	1,246	0	373	9.28	13.20
Pine	9,218	1,220	1,478	0	317	13.37	16.19
BRDE	8,436	1,336	1,336	0	0	15.84	15.84
BNG	5,921	936	936	0	0	15.80	15.80
Société Générale	5,760	698	698	0	0	11.96	11.96
Paraná Banco	4,484	1,215	1,215	0	0	27.08	27.08
Intercap	4,467	687	684	0	0	15.37	15.31
CNH Capital	4,294	990	990	0	0	23.05	23.05
Bonsucesso	4,079	380	569	0	219	10.12	15.18
Indusval	3,912	586	582	0	0	14.81	14.91
Crédit Agricole	3,260	757	778	0	21	23.22	23.85
Fidis	3,143	480	483	0	0	15.28	15.38
Sofisa	3,142	781	780	0	0	24.86	24.83
BDMG	3,070	1,460	1,070	0	0	47.55	34.85
John Deere	2,713	450	450	0	115	16.60	16.60
Industrial Brasil	2,615	442	467	0	31	16.90	17.86
Rodobens	2,494	357	357	0	0	14.31	14.31
Sumitomo Mitsui	2,422	642	724	0	82	26.49	26.49
Estado de Sergipe	2,242	295	353	0	96	13.18	15.73
Estado do Pará	2,023	420	420	0		20.76	20.75
Tribanco	1,806	335	335	0	0	18.56	18.56
Tokyo Mitsubishi	1,795	1,097	1,097	0	0	61.10	61.10
Fator	1,742	429	429	0	0	24.62	24.62
Caixa Geral	1,633	474	474	0	0	29.06	29.06
Cacique	1,412	169	169	0	0	11.96	11.96
Intermedium	1,335	274	274	0	0	22.75	22.75
Ford	1,310	270	270	0	0	20.60	20.60
Rendimento	1,153	177	177	0	0	15.39	15.39
Pecúnia	810	97	97	0	0	11.96	11.96
BANDES	798	160	160	0	0	20.00	20.00
Negresco	209	25	25	0	0	12.37	12.37
BPN Brasil	123	52	69	0	16	42.37	55.73
Total	4,109,229	452,620	650,137	3,743	364,316	11.01	15.82

Source: Prepared by the authors.

Tables 4 and 5 display the maturities of the subordinated debts and hybrid instruments of the banks under study. BNDES was not included, due to unavailability of

its Quarterly Financial Statements on the BACEN website.

Table 4 Subordinated debt of the banks analyzed – base: December 2012 (in R\$ thousand)

Bank	No maturity	Up to 3 months	3 to 12 months	1 to 3 years	3 to 5 years	5 to 15 years	Over 15 years
Banco do Brasil	16,603	177	0	5,324	3,748	11,332	0
Itaú Unibanco	0	733	2,411	5,329	16,000	13,626	0
Bradesco	0	728	1,453	4,192	9,332	19,186	0
CEF	0	101	889	2,227	2,020	6,954	0
Santander	0	1,442	2,285	2,337	5,587	268	0
HSBC	0	0	0	1,596	950	1,331	0
Votorantim	0	216	0	1,946	2,108	2,720	0
BTG Pactual	0	0	0	0	1,392	4,854	0
Safrá	0	0	0	0	1,047	1,610	0
Banrisul	0	0	80	0	0	1,078	0
BMG	0	0	0	0	0	1,124	0
Banco do NE	0	0	0	0	0	0	1,332
Volkswagen	0	0	26	240	335	1,011	0
BICBanco	0	0	12	0	65	879	0
Panamericano	0	146	16	0	0	1,032	0
Rabobank	0	10	16	0	300	613	0
Mercedes Benz	0	0	0	78	145	0	0
Mercantil Brasil	0	26	0	56	0	540	0
Fibra	0	36	0.62	0	291	45	0
Pine	0	12	0	0	286	19	0
Bonsucesso	0	3	0	0	0	216	0
John Deere	0	0	0	0	0	0	115

Source: Prepared by the authors.

Table 5 Hybrid capital and debt instruments – base: December 2012 (in R\$ thousand)

Bank	No maturity	Up to 3 months	3 to 12 months	1 to 3 years	3 to 5 years	5 to 15 years	Over 15 years
Banco do Brasil	8,215	230	0	0	0	6,618	0
CEF	0	0	0	0	0	28,453	0
Banco do NE	0	0	74	0	0	0	1,128

Source: Prepared by the authors.

We examined the footnotes to the financial statements for December 2012 from BNDES, where it classified as hybrid instruments the contributions by the Brazilian National Treasury Secretariat and as subordinated debt the resources from the Worker's Support Fund (FAT) with no maturity date.

Except for the Banco do Brasil and BNDES, which have hybrid instruments and subordinated debt that can

be classified as Additional Tier I Capital, in the other banks these liabilities are eligible only at Tier 2 Capital, as it has a maturity date set.

Table 6 displays the situation of the regulatory capital of banks, hypothetically assuming that the requirement in the end of the transitional period (2019) should already be complied with in 2013.

Table 6 Adjustments to the capital base of the banks analyzed (in R\$ million)

Bank	Common Equity Tier 1	Additional Tier 1 Capital	Tier 1 Capital	Tier 2 Capital	Tiers 1 and 2 Capital	Common Equity / RWA (%)	Tier 1 Capital / RWA (%)	Total Capital / RWA (%)
Banco do Brasil	50,293	26,476	76,769	29,261	106,030	(*) 6.91	(*) 10.55	14.57
Itaú Unibanco	71,418	0	71,418	38,099	109,517	10.90	(*) 10.90	16.71
Bradesco	65,887	0	65,887	34,852	100,739	11.02	11.02	16.85
BNDES	48,633	0	48,633	155,325	203,958	(*) 8.35	(*) 8.35	35.03
CEF	28,690	0	28,690	40,644	69,334	(*) 6.62	(*) 6.62	15.99
Santander	65,200	0	65,200	11,900	77,100	19.32	19.32	22.84
HSBC	9,737	0	9,737	3,880	13,617	10.56	(*) 10.56	14.77
Votorantim	7,875	0	7,875	6,991	14,866	(*) 9.30	(*) 9.30	17.56
BTG Pactual	10,250	0	10,250	6,246	16,496	12.16	12.16	19.57
Safra	6,824	0	6,824	2,657	9,481	9.90	(*) 9.90	13.75
Citibank	7,812	0	7,812	0	7,812	15.09	15.09	15.09
Itaú BBA	6,283	0	6,283	0	6,283	16.70	16.70	16.70
Banrisul	4,877	0	4,877	1,158	6,035	15.06	15.06	18.63
BMG	2,508	0	2,508	1,226	3,734	(*) 7.78	(*) 7.78	(*) 11.58
Banco do NE	2,611	0	2,611	2,535	5,146	(*) 8.53	(*) 8.53	16.82
Volkswagen	2,046	0	2,046	1,613	3,659	(*) 9.41	(*) 9.41	16.82
JP Morgan	3,494	0	3,494	0	3,494	16.70	16.70	16.70
BICBanco	1,959	0	1,959	947	2,906	10.48	(*) 10.48	15.55
Panamericano	1,270	0	1,270	1,195	2,465	(*) 7.65	(*) 7.65	14.84
Banco da Amazônia	1,946	0	1,946	0	1,946	14.82	14.82	14.82
Rabobank	1,052	0	1,052	939	1,991	(*) 8.11	(*) 8.11	15.35
Daycoval	2,198	0	2,198	0	2,198	17.35	17.35	17.35
Deutsche Bank	1,499	0	1,499	0	1,499	12.96	12.96	(*) 12.96
Mercedes-Benz	1,172	0	1,172	223	1,395	10.72	(*) 10.72	(*) 12.76
Mercantil Brasil	839	0	839	622	1,461	(*) 8.26	(*) 8.26	14.38
GMAC	1,207	0	1,207	0	1,207	12.31	12.31	(*) 12.31
Fibra	873	0	873	373	1,246	(*) 9.28	(*) 9.28	13.24
Pine	1,220	0	1,220	317	1,537	13.23	13.23	16.67
BRDE	1,336	0	1,336	0	1,336	15.84	15.84	15.84
BNG	936	0	936	0	936	15.81	15.81	15.81
Société Générale	698	0	698	0	698	12.12	12.12	(*) 12.12
Paraná Banco	1,215	0	1,215	0	1,215	27.10	27.10	27.10
Intercap	687	0	687	0	687	15.38	15.38	15.38
CNH Capital	990	0	990	0	990	23.06	23.06	23.06
Bonsucesso	380	0	380	219	599	(*) 9.32	(*) 9.32	14.68
Indusval	586	0	586	0	586	14.98	14.98	14.98
Crédit Agricole	757	0	757	21	778	23.22	23.22	23.87
Fidis	480	0	480	0	480	15.27	15.27	15.27
Sofisa	781	0	781	0	781	24.86	24.86	24.86
BDMG	1,460	0	1,460	0	1,460	47.56	47.56	47.56
John Deere	450	0	450	115	565	16.59	16.59	20.83
Industrial Brasil	442	0	442	31	473	16.90	16.90	18.09
Rodobens	357	0	357	0	357	14.31	14.31	14.31
Sumitomo Mitsui	642	0	642	82	724	26.51	26.51	29.89
Estado de Sergipe	295	0	295	96	391	13.16	13.16	17.44
Estado do Pará	420	0	420	0	420	20.76	20.76	20.76
Tribanco	335	0	335	0	335	18.55	18.55	18.55
Tokyo Mitsubishi	1,097	0	1,097	0	1,097	61.11	61.11	61.11
Fator	429	0	429	0	429	24.63	24.63	24.63
Caixa Geral	474	0	474	0	474	29.03	29.03	29.03
Cacique	169	0	169	0	169	11.97	11.97	(*) 11.97
Intermedium	274	0	274	0	274	20.52	20.52	20.52
Ford	270	0	270	0	270	20.61	20.61	20.61
Rendimento	177	0	177	0	177	15.35	15.35	15.35
Pecúnia	97	0	97	0	97	11.98	11.98	(*) 11.98
BANDES	160	0	160	0	160	20.05	20.05	20.05
Negresco	25	0	25	0	25	11.96	11.96	(*) 11.96
BPN Brasil	52	0	52	16	68	42.28	42.28	55.28

(*) It shows noncompliance with the new regulatory capital, 9.50% of RWA for Common Equity, 11.0% for Tier 1 Capital, and 13% for Total Capital.

Source: Prepared by the authors.

The new regulatory capital might make that 23 out of the 58 banks analyzed became noncompliant in some way. In 12 situations there is deficiency in Common Equity; in 17 cases, Tier 1 Capital was not sufficient; and 8 times, Total Capital (Tier 1 + Tier 2) did not meet the standards.

Table 7 displays the institutions' capital deficiency. The Common Equity deficiency sum corresponds to R\$ 39 billion; Tier 1 Capital amounts to a total of R\$ 84 billion; and Total Capital, R\$ 85 billion. These deficiencies are cumulative. We notice that most of this value stems from public banks.

Table 7 Banks' capital deficiency (in R\$ million)

Bank	Common Equity Tier 1 Capital	Tier 1 Capital	Total Capital	Bank	Common Equity Tier 1 Capital	Tier 1 Capital	Total Capital
Banco do Brasil	18,828	22,093	22,093	BNG	0	0	0
Itaú Unibanco	0	656	656	Société Générale	0	0	51
Bradesco	0	0	0	Paraná Banco	0	0	0
BNDES	6,677	22,088	22,088	Intercep	0	0	0
CEF	12,511	31,527	31,527	CNH Capital	0	0	0
Santander	0	0	0	Bonsucesso	8	76	76
HSBC	0	407	407	Indusval	0	0	0
Votorantim	166	1,601	1,601	Crédit Agricole	0	0	0
BTG Pactual	0	0	0	Fidis	0	0	0
Safra	0	760	760	Sofisa	0	0	0
Citibank	0	0	0	BDMG	0	0	0
Itaú BBA	0	0	0	John Deere	0	0	0
Banrisul	0	0	0	Industrial Brasil	0	0	0
BMG	554	1,592	2,048	Rodobens	0	0	0
Banco do NE	296	1,051	1,051	Sumitomo Mitsui	0	0	0
Volkswagem	20	367	367	Estado de Sergipe	0	0	0
JP Morgan	0	0	0	Estado do Pará	0	0	0
BICBanco	0	96	96	Triângulo-Tribanco	0	0	0
Panamericano	308	865	865	Tokyo Mitsubishi	0	0	0
Banco da AM	0	0	0	Fator	0	0	0
Rabobank	180	554	554	Caixa Geral	0	0	0
Daycoval	0	0	0	Cacique	0	0	15
Deutsche Bank	0	0	4	Intermedium	0	0	0
Mercedes-Benz	0	30	56	Ford	0	0	0
Mercantil do Brasil	126	405	405	Rendimento	0	0	0
GMAC	0	0	68	Pecúnia	0	0	8
Fibra	21	183	183	BANDES	0	0	0
Pine	0	0	0	Negresco	0	0	2
BRDE	0	0	0	BPN Brasil	0	0	0
Overall total					39,695	84,351	84,981

Source: Prepared by the authors.

From the above, it is seen that the strategy adopted by many banks, complying with regulatory capital through non-perpetual subordinated debt, has lost much of its effectiveness with the new Capital Accord, due to better quality of required capital.

It is worth emphasizing that the scenario introduced has taken into account that the capital required in 2019 was immediately required. The transition time for the new rules will lead banks to better plan their actions of capitalization.

One should also mention that the findings of this study differ from those contained in the *Relatório de es-*

tabilidade financeira (Banco Central do Brasil, 2013c, p. 32), stating that “there would be no need for extra Common Equity Tier 1 Capital for the banking system as a whole until 2019, besides those values resulting from the current results retention practices”. This premise has not been considered in this article. In addition, the BACEN calculations regarded the “Common Equity as a rather fixed portion of the Additional Tier 1 Capital” (Banco Central do Brasil, 2013c, p. 32), seemingly without considering countercyclical buffer, something which also differs from this study.

5 CAPITAL COST AND BANKS' CAPACITY TO ATTRACT NEW INVESTORS

Capital deficiency in 23 banks raises, therefore, the question: are they able to attract new capital? Thus, the second analysis concerns the comparison between the capital cost and the return of the banks under study.

A bank whose return is lower than the cost of equity in the sector has a poor ability to attract new investments and this will represent vulnerability, if this bank has regu-

latory capital deficiency.

Initially, the cost of equity was obtained. Beta values calculated for the stocks of Itaú Unibanco, Bradesco, and Banco do Brasil were 0.7242, 0.8528, and 1.0293, respectively, resulting in a beta value for the portfolio equal to 0.8687. The resulting K_E was 15.56% p.a. Its calculation is displayed in Table 8.

Table 8 K_E calculation

K_E components	Notation	Value
Beta of the banks' portfolio vs. IBOVESPA	β_i^K	0.8687
Beta of IBOVESPA vs. S&P 500	β_R^{GL}	1.2371
Market risk (S&P 500)	$E(r_m^{GL})$	8.71%
Rate free from risk (UST 10y)	r_f^{GL}	3.46%
Risk premium	$E(r_m^{GL}) - r_f^{GL}$	5.25%
Country risk (EMBI+ Brazil, in base points)	τ_P	232
K_E (nominal, in US\$)	$E(r_i^K)$	11.43%
CPI (geometric mean 2010, 2011, and 2012)		2.29%
IPCA (geometric mean 2010, 2011, and 2012)		6.08%
K_E (nominal, in R\$)		15.56%

Note: For purposes of comparison, K_E value calculated through local data by means of the traditional CAPM by Sharpe (1964), using the risk premium of 6.50% by Fernandez, Aguirreamalloa and Linares (2013), sector beta of 0.8687 and free rate of 10.04% p.a. (average SELIC rate of 2010, 2011, and 2012), was 15.69%, a value compatible with the K_E obtained by means of the ICAPM.

Source: Prepared by the authors.

Determining K_E , it is possible to compare it to the average ROE of the banks analyzed (Table 9).

Out of the 58 banks analyzed, 39 had an average ROE lower than the cost of equity.

Table 9 Return on equity of the banks analyzed

Bank	ROE 2010	ROE 2011	ROE 2012	Average ROE	Bank	ROE 2010	ROE 2011	ROE 2012	Average ROE
Banco do Brasil	27.04	22.45	19.86	23.12	BNG	15.80	5.43	6.39	9.21 (*)
Itaú Unibanco	25.92	21.97	22.00	23.30	Société Générale	-0.41	-45.94	-66.76	-37.70 (*)
Bradesco	19.65	20.06	17.37	19.03	Paraná Banco	14.53	37.40	17.03	22.99
BNDES	21.20	14.26	14.46	16.64	Intercap	1.24	3.92	2.71	2.62 (*)
CEF	26.34	29.62	27.19	27.72	CNH Capital	6.67	17.07	16.19	13.31 (*)
Santander	10.37	10.30	6.89	9.19 (*)	Bonsucesso	25.11	9.90	6.70	13.90 (*)
HSBC	15.70	15.48	13.13	14.77 (*)	Indusval	6.78	-4.66	2.44	1.52 (*)
Votorantim	13.07	-2.45	-24.46	-4.61 (*)	Crédit Agricole	8.78	5.21	3.13	5.71 (*)
BTG Pactual	18.33	24.39	24.88	22.53	Fidis	12.86	16.90	10.88	13.55 (*)
Safra	19.92	21.57	19.32	20.27	Sofisa	9.91	3.53	3.26	5.57 (*)
Citibank	8.05	38.59	10.28	18.97	BDMG	8.30	7.50	5.45	7.08 (*)
Itaú BBA	30.42	29.82	18.13	26.12	John Deere	52.36	28.10	16.63	32.36
Banrisul	19.03	21.78	17.22	19.34	Industrial Brasil	10.12	7.03	10.30	9.15 (*)
BMG	27.03	19.60	-17.67	9.65 (*)	Rodobens	12.93	16.34	13.99	14.42 (*)
Banco do NE	14.76	13.97	20.28	16.34	Sumitomo Mitsui	11.58	14.20	20.80	15.53 (*)
Volkswagen	11.22	10.03	12.07	11.11 (*)	Estado de Sergipe	32.30	42.53	34.58	36.47
JP Morgan	8.12	5.72	8.29	7.38 (*)	Estado do Pará	30.00	39.20	32.54	33.91
BICBanco	18.74	9.40	5.64	11.26 (*)	Tribanco	18.00	10.43	7.36	11.93 (*)
Panamericano	-20.01	10.72	-26.68	-11.99 (*)	Tokyo Mitsubishi	3.28	11.80	2.70	5.93 (*)
Banco da AM	7.42	4.07	8.37	6.62 (*)	Fator	44.23	-3.23	4.64	15.21 (*)
Rabobank	17.00	18.02	20.94	18.65	Caixa Geral	4.15	3.39	3.15	3.56 (*)
Daycoval	15.83	16.35	17.20	16.46	Cacique	2.81	-99.63	-71.70	-56.17 (*)
Deutsche Bank	8.05	14.03	9.02	10.37 (*)	Intermedium	18.49	5.83	6.04	10.12 (*)
Mercedes-Benz	9.91	8.91	3.06	7.29 (*)	Ford	15.87	15.87	13.70	15.15 (*)
Mercantil Brasil	21.75	11.43	8.46	13.88 (*)	Rendimento	21.66	28.54	21.82	24.01
GMAC	12.15	18.94	3.68	11.59 (*)	Pecúnia	-50.85	-62.17	-145.63	-86.22 (*)
Fibra	1.12	-9.39	-13.58	-7.28 (*)	BANDES	8.55	7.38	2.72	6.22 (*)
Pine	13.98	17.17	19.96	17.04	Negresco	25.00	-106.25	45.71	-11.85 (*)
BRDE	7.93	7.62	6.44	7.33 (*)	BPN Brasil	-64.89	-76.44	-37.94	-59.76 (*)

(*) It has an average ROE below K_E .

Source: Prepared by the authors.

6 JOINT ANALYSIS OF RESULTS

The analysis of market structure through the variables chosen – regulatory capital sufficiency and sha-

reholder return – enables identifying four possible scenarios, as shown in Figure 1.

Figure 1 Summary of the market structure

Quadrant IV Regulatory capital insufficiency Returns higher than the cost of capital	Quadrant I Regulatory capital sufficiency Returns higher than the cost of capital
Quadrant III Regulatory capital insufficiency Returns lower than the cost of capital	Quadrant II Regulatory capital sufficiency Returns lower than the cost of capital

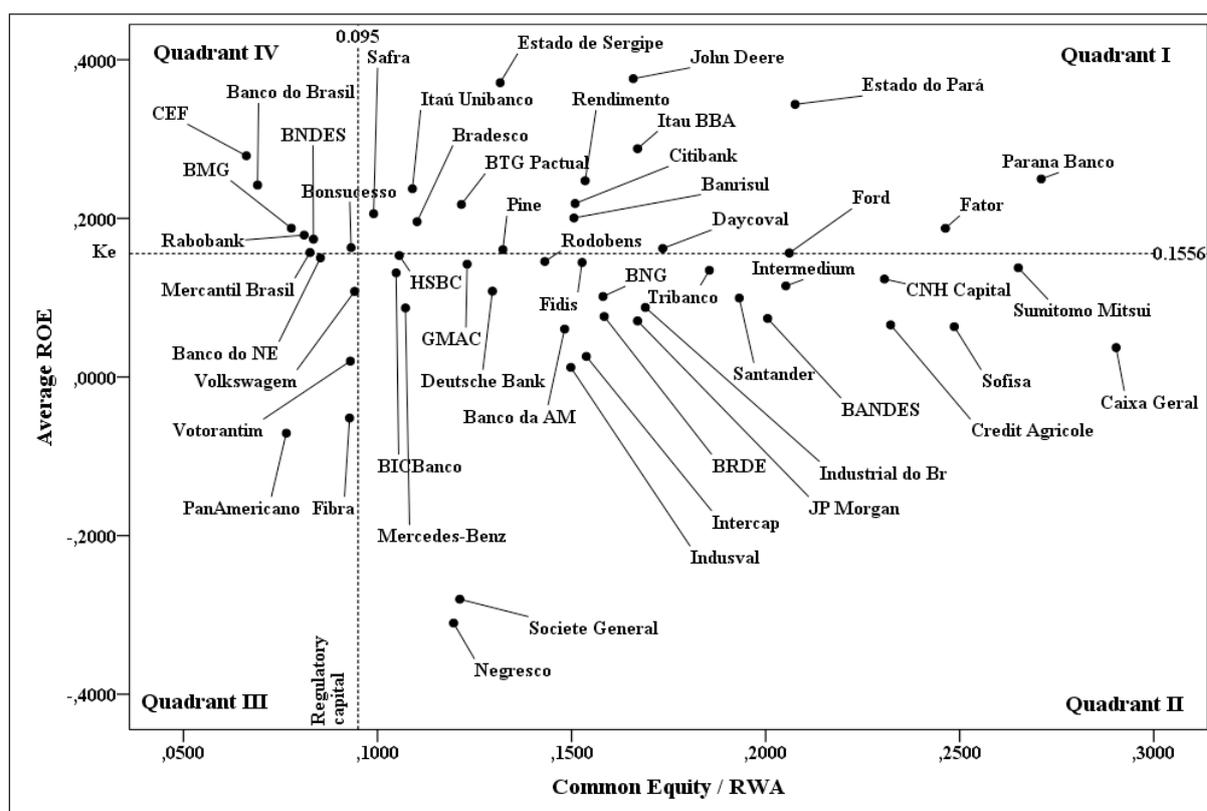
Source: Prepared by the authors.

In fact, by identifying in the quadrants the relative position of a bank, we may argue about its probable courses of action, anticipating measures or strategies, in order to keep it in Quadrant I, or reposition it there over time.

Figure 2 summarizes the banks' situation in relation to

the Common Equity Tier 1 Capital framework and its capacity to attract capital. Two dotted lines were drawn: one horizontal, representing the cost of equity of 15.56% p.a.; and another vertical one, indicating the Common Equity Capital requirement of 9.5%, which define the quadrants of Figure 1.

Figure 2 Common Equity requirement vs. ROE



Note: Banks with extreme numbers were excluded from the figure, in order to provide better visualization.

Source: Prepared by the authors.

Banks located in Quadrant I have sufficient regulatory capital to meet the new rules and they have shown an adequate return to its shareholders, therefore, it is enjoying a comforta-

ble situation. These banks are in this situation: Bradesco, Itau Unibanco, Itau BBA, BTG Pactual, Citibank, and Safra, among others, and in a borderline situation, regarding return, HSBC.

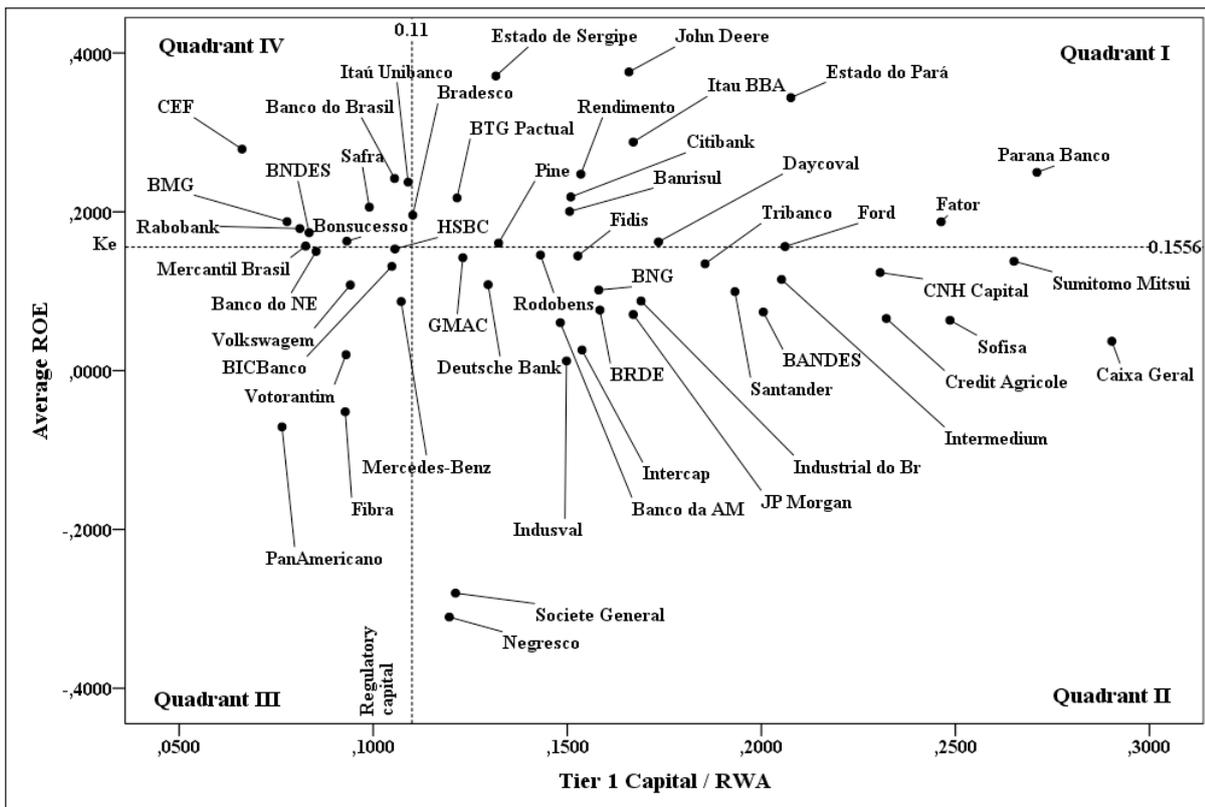
Banks located in Quadrant II have sufficient capital to meet the new Capital Accord; however, these institutions have shown a return on equity lower than the cost of equity. Among them there are Santander, Sofisa, Indusval; two public banks, BRDE and Banco da Amazônia; and some foreign banks, such as JP Morgan, Société Générale, and Deutsche Bank. These institutions should undertake adjustments, not in their capital structure, but concerning the efficiency of their operations. It is up to each institution to think through the causes of low profitability.

Banks located in Quadrant IV should make adjustments to their capital structure, in order to comply with the new rules. These institutions have shown superior returns in comparison to their cost of equity, something which provides them with credibility to go to the capital market and attract investments. The three largest Brazilian federal banks (Banco do Brasil, BNDES, and Caixa Econômica Federal) are in this quadrant and they should have no trouble to raise their capital. However, some institutions, such as Bonsucesso and Mercantil do Brasil, are in borderline position between quadrants III and IV and they may have some difficulty in attracting investors.

Banks located in Quadrant III are undergoing the most vulnerable situation, because they need to increase their regulatory capital and their returns are lower than the cost of equity, having no way to attract investors. These institutions must take immediate action, such as raising the retention of profits and reviewing operational and business processes, in order to increase their profitability and offer themselves, in the future, as investment alternatives. The transition period for the new rule provides some breath, albeit limited, for these adjustments to be adopted; otherwise, the alternative shall be decrease their asset portfolio. The banks located in this quadrant are Panamericano, Fibra, and Votorantim.

Figure 3 is similar to Figure 2, but it displays the compliance with the to Tier 1 Capital. In this analysis, the regulatory capital is 11% of RWA. The findings in these figures are similar. It is worth noticing that some institutions migrate from Quadrant I to Quadrant IV, such as the bank Safra. Others, such as Bradesco and Itaú Unibanco, come to stand in borderline position between these quarters. In general, all institutions see their regulatory capital deficiency increase.

Figure 3 Tier 1 Capital requirement vs. ROE



Note: Banks with extreme numbers were excluded from the figure, in order to provide better visualization.
Source: Prepared by the authors.

Concerning public banks, it is worth noticing that, based on the numbers in Table 3, Banco do Brasil maintained a ratio between Tier 1 Capital and Total Capital around 71%, against 51% of Caixa Econômica Federal and 54% of BNDES. In addition, almost 50% of Banco do Brasil's funding in hybrid

instruments and subordinated debt do not have a maturity date, making them eligible for Additional Tier 1 Capital. This leads Banco do Brasil to enjoy a more comfortable position than Caixa Econômica Federal and BNDES regarding Tier 1 Capital. The three banks are located in Quadrant III.

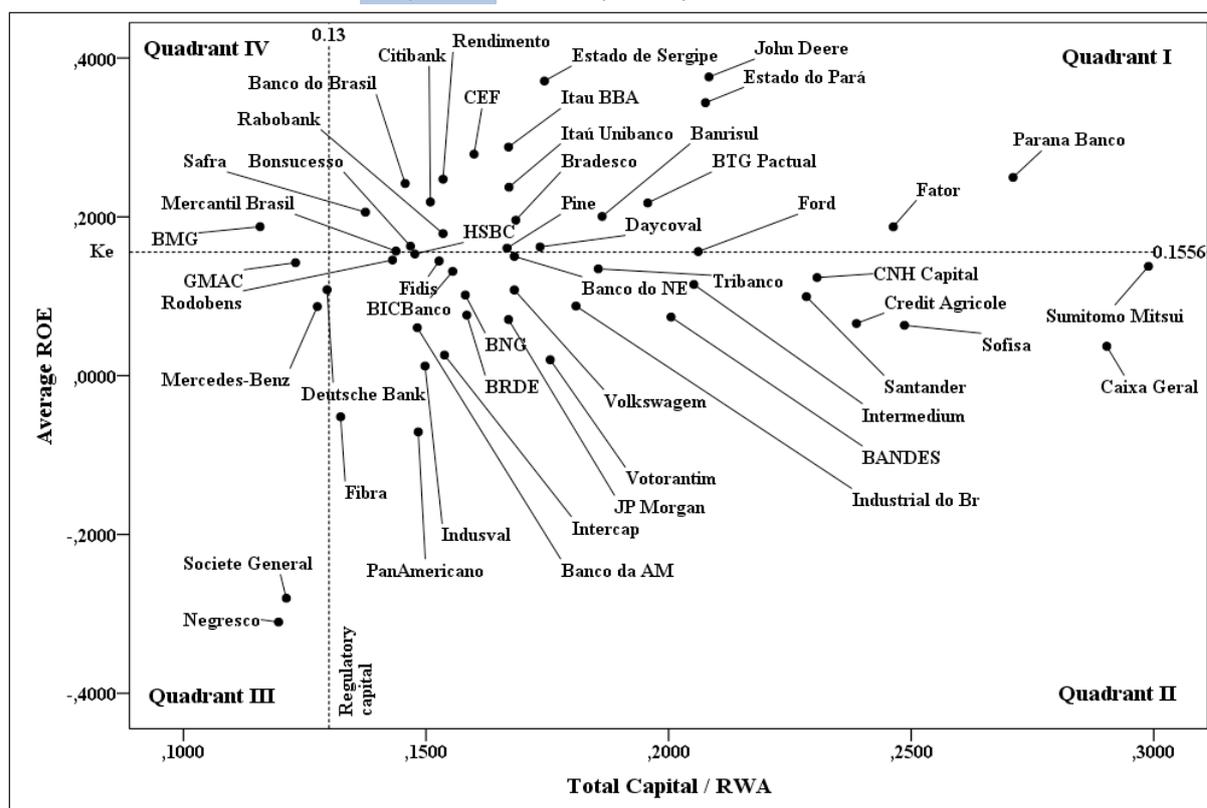
The role played by public banks to put into practice countercyclical policies, providing credit in times of economic downturn (De Paula, Oreiro, & Basílio, 2014) should be noticed. It is expected that this work is impaired until these banks became able to comply with the Basel III rules.

If the equity and debt instruments capable of adaptation as Additional Tier 1 Capital do not have liquidity in the market, there will remain to the institutions the choice of meeting the entire requirement of Tier 1 Capital by issuing ordinary shares. This is a very feasible consideration, as securities with perpetuity features are not traded in the local market, in addition to stocks. Figure 3 was

drawn through this assumption, by admitting that the institutions should issue shares to meet the entire Tier 1 Capital requirement.

Figure 4 displays the framework of Total Capital. The ROE information, in this case, loses relevance, because part of a potential deficiency in this regard may be supplied with hybrid instruments and subordinated debt, with a return different from that of equity. It may be noticed that the number of institutions in compliance is much larger (quadrants I and II), including major public banks. This seemingly comfortable situation stems from subordinate debt stocks in the banks' balance sheet.

Figure 4 Total Capital requirement vs. ROE



Note: Banks with extreme numbers were excluded from the figure, in order to provide better visualization.
 Source: Prepared by the authors.

7 CONCLUSIONS

The new Basel Accord has introduced significant changes regarding the quality of bank capital, in addition to the capital conservation buffer and countercyclical buffer, also providing flexible instruments to central banks in order to reduce the capital required in times of economic downturn. The new agreement will represent a challenge for many Brazilian banks, which should be capitalized to meet the new standards. Among them there are the biggest public banks.

The simulation model adopted has started from the premise that risk exposures might remain constant over time. However, one cannot disregard the fact that the indebtedness of the private sector has grown over the years, as a result of the policy adopted by the Federal Government to

stimulate consumption through credit. Thus, there might be pressure on financial institutions in order to increase their regulatory capital even further. This consideration opens up the opportunity for further studies, which shall contribute to the reconciliation between the policy to stimulate consumption and the capital adequacy standards.

In contrast, banks have a habit not to distribute their entire outcome to shareholders. The incorporation of a portion of the profits to equity will cause some banks do adapt without taking more drastic measures. This aspect may raise further studies on the effects of the dividend distribution policy on the banks' capital adequacy.

Given these considerations, there are several possible actions. The first consists in increasing capital by issuing

new stocks; this measure, however, may bump in the institution's inability to generate attractive return rates. It follows that, in addition to the capitalization action, some banks will seek greater profitability in their operations. These actions include, at the revenue side, hiring assets that have a more favorable ratio return vs. economic capital and the direction of focus for the market segments in which the institution enjoys better conditions for competitiveness. On the expenditure side, they shall seek greater efficiency in their operations.

The new Capital Accord may trigger a new round of acquisitions of smaller banks by big banks whose capitalization capacity is significantly higher than that of small and medium-sized institutions. The merger of smaller institutions may not be the solution, because two non-compliant institutions will hardly result in a compliant institution. However, a merger can provide economies in scale and produce returns that enable issuing new stocks.

A solution adopted by smaller institutions in liquidity constraint times has been securitization. However, it should be taken into account that BACEN has rules that reduce the effectiveness of this solution, especially when there is not a significant risk transfer. This subject

is addressed by Resolution CMN 3,533 (Banco Central do Brasil, 2008). So, securitization may be a short-range solution. Another suggestion for further research is developing models that equate the problem of partial transfer of risks through securitization, in order to suggest improvements to this standard.

Small and medium-sized banks will also seek new ways of operating. Thus, it is expected that smaller banks seek to develop relationships in order to syndicate their claims; others may sign operating agreements with big banks, which are dedicated to create operations with their sales channels by using the partner bank's credit standards, in order to transfer these assets to them. Thus, the smallest bank acquires features of a service provider from the bigger bank.

Regarding the macroeconomic effects, some authors think that the new Capital Accord will entail a reduction in loan portfolios, an increase in lending rates, and a reduction in the economic growth rate. Other authors minimize this effect. In this sense, it will be crucial that BACEN is careful to make the necessary course corrections, loosening monetary policy if the pessimistic scenario is consolidated.

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