Banking concentration, profitability and systemic risk: An indirect contagion approach

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Abstract

We investigate the impact of the Brazilian banking system's concentration on the perception of financial institution interdependencies, as measured by the correlations of their return on assets. This correlation is observed by the market and can provide an indicator of systemic risk potential, which we argue represents an indirect contagion channel. By changing this correlation, the degree of concentration can alter the systemic risk exposure of the banking sector. Our findings suggest the existence of an indirect contagion channel in Brazil, and that a more concentrated financial system is associated with an increase in the potential of systemic risk among banks with similar characteristics. Our findings call attention to the implications of financial system consolidation on the contagion of idiosyncratic shocks. Banking consolidation may bring benefits by improving the diversification of the banks' portfolios, reducing their idiosyncratic risks, but it can also increase the systemic risk, by increasing the probability of an idiosyncratic shock being interpreted as an aggregate shock.

Keywords: Systemic risk, contagion, banking concentration
JEL classification: G21

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1. Introduction

One of the key issues raised by the global financial turmoil of 2008 is the effect of the ongoing observed financial sector consolidation, bringing out concerns about financial stability in the future. Nevertheless, there are conflicting conclusions about the relationship between bank concentration and financial stability. Some studies suggest that a more concentrated banking sector is less prone to financial crises (e.g., Allen and Gale, 2004, or Beck et al., 2006). First, large banks have economies of scale, which provide them alternative sources of investment and financing. In addition, bigger banks have more diversified portfolios and in general better control of risks. Besides this, it is also easier to monitor a few banks in a concentrated system than lots of banks, and so supervision may be more effective in the latter case, reducing the risk of direct contagion. There is also the argument that a more concentrated system can increase banks' profits and thus provides capital buffers that protect banks against adverse shocks (Boyd et al., 2004).

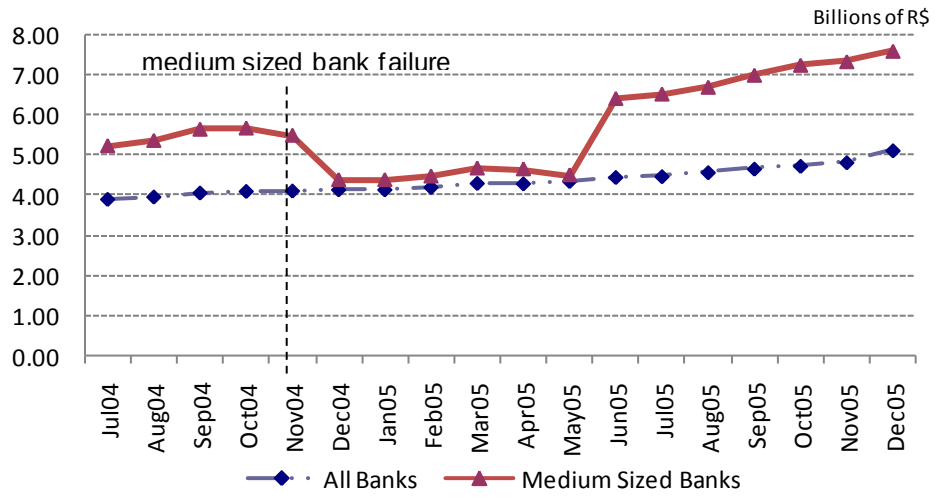
On the other side, there is the concentration fragility view (e.g., Uhde and Heimeshoff, 2009). Among the reasons advocated by holders of this view is that bigger banks are usually associated with the *too big to fail* problem, where the possibility of receiving public subsidies in the case of financial problems motivates them to incur riskier investments. Besides this, oligopolistic banks charge higher interest rates to firms, inducing them to assume greater risks, causing higher loan defaults and probability of bank failures (Boyd and De Nicolo, 2006).

In the context of the present paper, it is important to observe that an increase in concentration is usually associated with a decrease in the specialization of the market participants, for example sharing more frequently similar products or clients. This increases the correlation of profits and the operational performance of these firms. So, the recent consolidation observed around the world may be associated with a decrease in the number of banks specialized in specific segments or products, and a greater profit dependence on similar shocks. In this way, this higher concentration can increase systemic risk by the indirect transmission channel, i.e. the mechanism of expectations: An idiosyncratic shock is more easily interpreted as a shock affecting more institutions in a more concentrated system. So we advocate the concentration fragility view.

By assuming that the correlation of banks' profitability is perfectly observed by the market, we argue that this represents an important indirect shock transmission channel. Economic agents may infer the solvency condition of a segment of the banking sector conditional on the occurrence of an idiosyncratic shock in a bank in that segment. In other words, since there is asymmetric information in the market, the failure of a specific bank may be interpreted as a generalized problem in all banks with similar characteristics. This triggers the possibility of bank runs, creating liquidity problems for solvent banks.

An example of such situation occurred in Brazil in 2004. In November that year, a medium sized bank – Banco Santos – went into bankruptcy unexpectedly. As a consequence, as can be seen in Figure 1, there was a considerable withdrawal of deposits from other medium sized banks, even though they were healthy. The market's reaction was typical of a bank run.

Figure 1 - Mean of Total Deposits in Brazil



The above example presents a case where the contagion of an idiosyncratic shock was caused by the expectation that financial institutions of similar size were subject to the same shocks. However, a bank's size should not say that much about the shock exposure of groups of banks. The knowledge of the common specific segments or products, such as the same collateralized debt obligations or derivatives, should be a better source of information about the probability of a bank's being exposed to the same adverse shocks as an insolvent bank. Since this information is imperfect, the correlation of the profitability among banks can be an inference instrument of the similarity of the

shocks to which some banks are exposed. Banks with high correlation in their returns can be viewed by the market as exposed to the same or similar shocks.

The proposal to identify which banks have high correlation in their returns, and in this way to identify the groups of banks that are subject to a bank run, is novel. Moreover, it provides the supervisor authority with an ex ante indication of the financial institutions that may suffer liquidity problems after the failure of a specific bank.

The focus of this article, however, is not to identify which groups of banks have high return correlation. The focus is to examine the impact of the changes in banking concentration on the systemic risk of the financial sector by investigating its effects on the interrelation of these returns. This study brings to the literature a novel perspective on the effects of banking consolidation on financial stability.

Systemic risk can be defined as the propagation of an isolated shock affecting a particular agent or group of economic agents to other market participants, without the initial shock necessarily generating direct real effects on the other stakeholders. De Bandt and Hartmann (2000) define a systemic event as one in which "bad news" about a financial institution, or its failure, generate a sequence of adverse effects on other financial institutions. The essence of this definition is the interdependence among banks, which allows a contagion effect from one to another.

The literature analyzes the transmission of an idiosyncratic shock through the financial system by two basic approaches: the direct and indirect mechanism. The first would result from the direct financial relationship among banks, for example, credit exposures among them. There is an extensive literature on this direct mechanism that examines the role of the interbank market as a source of contagion (e.g., Upper and Worms, 2004, and Degryse and Nguye, 2007). The idea is that the failure of any bank can result in losses for others by the suspension of debt payments between them. The second mechanism would result in market expectations about the solvency of a bank, or group of banks, given the occurrence of a shock affecting one or more financial institutions. In this case, the mechanism of propagation is related to the market's perception (expectation) that these institutions were also affected by the initial shock, because they have, or the agents believe they have, similar assets and/or liabilities to the insolvent bank(s).

Few empirical studies have examined the existence of indirect contagion. We can cite De Nicolo and Kwast (2002) among them. These authors argue that the

interdependence of financial institutions can be an indicator of potential systemic risk and measure such interdependence by the correlation of banks' stock returns. According to them, since stock prices reflect the market's assessment of future returns, including the impact of interactions with other institutions, the correlation of these returns is a good measure of interdependence.[2]

As in De Nicolo and Kwast (2002), we explore the approach of the indirect contagion mechanism. But unlike that study, here we use the correlation of banks' profitability as an indicator of the inter-relationship of banks. For this, we will empirically assess how the profitability of a number of banks, grouped by some specific characteristics, is correlated with the return of another bank with those same characteristics.

Our paper deals with the Brazilian banking sector, which is the biggest and most important in Latin America. The Brazilian sector has been consolidating in the last two decades, and has also experienced a few bank runs, as that of November 2004. The results presented show that higher concentration is associated with higher interrelation in the profitability of banks with specific characteristics. We conclude that the risk of idiosyncratic shocks spreading through the system is substantially higher in concentrated financial systems than in decentralized ones. These results reinforce the need for the regulator to pay attention to the impacts of banking consolidation on the contagion of idiosyncratic shocks through the system.

This article is organized into four sections including this introduction. The second section presents the empirical strategy adopted, the database and econometric specification. The third section presents the estimates results and the fourth section concludes.

2. Empirical strategy

To assess the impact of bank concentration on systemic risk by the indirect transmission mechanism, we group the banks according to some specific characteristics observed by the market. The idea is to verify if there is an increase in the profitability correlation (within each group of banks) as banking concentration increases. As we

[2] There is a different approach that employs stock prices from financial institutions to infer the probability of their failure. See Clare (1995) and Tabak and Staub (2007).

previously explained, this would happen because a less specialized – on specific segments or products – banking system (i.e., a more concentrated banking industry) would be more prone to suffer correlated shocks, increasing the market perception that they can be suffering from the same adverse shocks. In this way, the conditional expectation that a bank with specific characteristics will fail following the failure of another bank with the same characteristics increases in a more concentrated financial system.

We assume that the profitability of all banks is perfectly observed by the market and that the correlation of returns among banks in a particular group is a good measure of interdependence. In this sense, the correlation of returns would be a good proxy for the probability of an idiosyncratic shock observed represent in fact a shock of aggregate proportions. That is, given the occurrence of a shock that affects a given bank, what is the likelihood that similar banks are also suffering the same shock? Thus, the correlation of bank returns would indicate the exposure to systemic risk of a given economy.

Using the panel regression technique, we estimate the impact of the interaction variable between bank concentration and average profitability of banks with characteristics similar to the bank analyzed, controlling for all variations in time (fixed effect in time) and between banks (individual fixed effect). For this, we classify banks into groups by certain characteristics, such as sharing of credit in total assets, size, leverage level, liquidity, control type and type of banking (with or without commercial portfolio).

We expect that greater bank concentration will raise the market perception of the interdependence between banks – the correlation of returns – particularly among those with similar profiles, increasing systemic risk in case of any idiosyncratic shock.

The two following subsections present the database used and the econometric specification.

2.1 Database

Our analysis focuses on the Brazilian banking sector, which has well-developed institutions and regulation concerning stability. For example, Brazil has a deposit insurance system financed by premiums paid ex ante by banks. Depositors receive the full value of their deposits up to a certain value. In the final period of our sample, 99%

of the depositors were fully covered and 40% of total financial institution credits were guaranteed. Besides this, the Basel capital ratio must be higher than 11% in Brazil, a ratio above the usual levels in other countries. As a last example, since 2002 the Brazilian Payment System has been a real-time gross settlement system (RTGS), where all transfers made between banks are cleared and settled straightway and irrevocably. As Holthausen and Rønde (2002) stressed, RTGS limits the exposure to settlement and systemic risks. On the other hand, 39 banks went into bankruptcy during our sample period.

The database consists of biannual information from the balance sheets of all financial institutions consolidated by cluster (if any), from the second half of 1995 to the second half of 2007. The primary source of data is the Central Bank of Brazil. No bank was excluded from the sample. All mergers or purchases of banks during the period were considered case by case, as well as any possible duplication of data in the sample. If one bank ceased to exist, or function, in a given period, it remained in the sample up to that period.

The periodicity chosen is justified by the fact that financial institutions are obliged to disclose their balance sheets every six months, although many make their data available every quarter. Therefore, we work with data observable by all agents of the economy, which can serve as a source of information for an indirect mechanism to transmit idiosyncratic shocks.

In addition to data on assets, net income, credit, cash, bonds and net equity, the database provides information about the type of control, and whether or not a banking conglomerate has a commercial portfolio. Thus, it was possible to calculate the average profitability, weighted by assets of groups of financial conglomerates by the following characteristics: with or without a commercial portfolio[3], public or private control, asset size, level of leverage, level of liquidity (cash, repo-resell and securities over total assets), the share of credit in total assets, and the combination of all these groups.

Bank profitability (ROA) was calculated as the ratio of semiannual net profit to the total assets less the brokerage, in which brokerage is part of the assets owned by third parties. The concentration of financial assets is measured by the Herfindahl-Hirschman Index (HHI). One advantage of this index is that it provides information on the

[3] Banks with a commercial portfolio: financial institutions that accept demand deposits and that make at least two types of loans (including commercial, consumer, real-estate loans…)

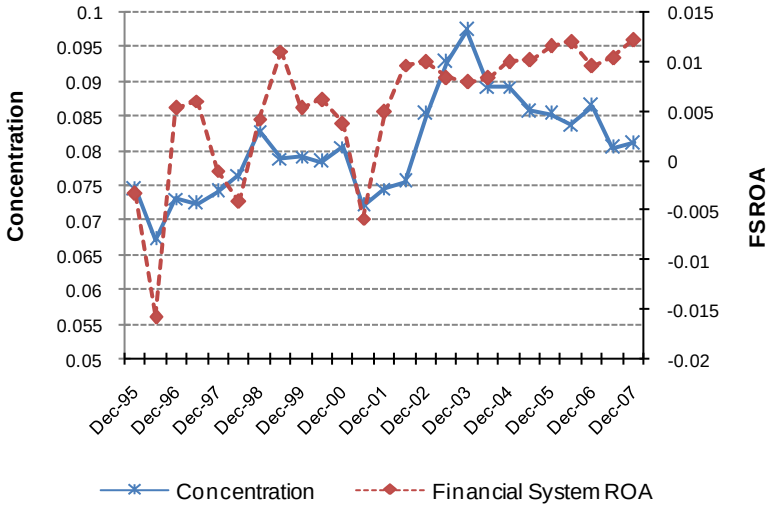
dispersion of market shares in the national financial system Leverage is the ratio of total assets, less brokerage, to net equity and the participation of credit is the ratio of total credit to total assets less brokerage.

Figure 2 shows the evolution of profitability and the concentration ratio of the banking system as a whole. In earlier periods the financial system had negative profitability, mainly because of the loss of earnings from the float after the adoption of the Real Plan in 1994, which ended over two decades of high inflation, with bouts of hyperinflation. In the first years after this economic plan, several banks went bankrupt or suffered some type of restructuring, including mergers, acquisitions, change of ownership etc. This at least partly explains the growth of bank concentration in those early years. After this shakeout period, the returns on assets became positive, with some occasional moments of losses. One of those moments, for example, was the first half of 2001 and was caused by the bad result recorded by foreign and state-owned banks in terms of asset adjustments related to participation in the privatization of public institutions and the cash reinforcement of federally controlled institutions.[4]

It can be seen that between 2000 and 2003 there was a marked increase in bank concentration. This period was characterized by important acquisitions and reduction in the number of institutions, in which banks sought new sources of revenue and demanded scale, to face the prospect of reduced earnings resulting from the downward trend in interest rates at that time. More recently, despite several acquisitions and financial system consolidations, the change in concentration can be attributed mainly to changes in the dispersion of market shares in the financial system and the entry of new competitors.

[4] It should be clarified that the ROA values presented here may be different from those shown in other texts, since we are working semiannual instead of annual net profits.

Figure 2– Evolution of profitability and concentration of Brazilian banks



2.2 Econometric specifications

To examine the impact of bank concentration on the correlation between the profitability of banks with similar characteristics, we estimate the following dynamic model:[5]

$$ROA_{i,t} = \alpha ROA_{i,t-1} + \beta ROA^{M^i}_{i,t\ t} + \delta \left(HH_t * ROA^{M^i}_{i,t} \right) + \sum_{\tau=1}^{T} \theta_\tau dummy_t^\tau + \varepsilon_{i,t} \qquad (1)$$

where t∈[1,T] is the time period; i∈[1,I] is the financial institution in question; $dummy_t^\tau$ is a variable that assumes the value of one if τ = t and zero in other periods, a fixed time effect; $\varepsilon_{it} = \mu_i + \upsilon_{it}$, where μ_i is the individual fixed effect and υ_{it} is a random error, $E(\mu_i) = E(\upsilon_{it}) = E(\mu_i \upsilon_{it}) = 0$; and:

$$ROA_{i,t} = \left(\frac{Net\ profits}{Total\ assets - brokerage} \right)_{i,t} \qquad (2)$$

[5] Vander Vannet (2002) suggests using the proportion of demand deposits and savings deposits over total deposits and the ratio of administrative costs and profits to explain bank profitability. We did not use these variables in our model because they were not significant when included in the estimates that follow. Also, we did not include some variables (such as the benchmark interest rate, GDP growth, exchange rate) because the time dummies already take in all the aggregate effects.

$$ROA_{i,t}^{M^i} = \frac{\sum_{j=1}^{I} Net\ profits_{j,t} - Net\ profits_{i,t}}{\sum_{j=1}^{I} (total\ assets - brokerage)_{j,t} - (total\ assets - brokerage)_{i,t}} \quad (3)$$

$$IHH_t = \sum_{i=1}^{I} \left(\frac{Total\ assets_{i,t}}{\sum_{j=1}^{I} Total\ assets_{j,t}} \right)^2 \quad (4)$$

In equation 1, β indicates the impact of profitability (ROA) of a set of banks, with a given characteristic, on the profitability of a bank with that same characteristic. This coefficient is our measure of interdependence (correlation of returns) in each group of banks. The coefficient of greatest interest is the interaction between the average profitability of banks belonging to the same group of the examined bank and banking concentration, δ, which measures the impact of bank concentration on the return correlation between banks with similar characteristics. Also in equation 1, the lag in ROA was only included as a control for a possible inertia in the profitability of banks.

The next section presents the results of estimating the above model for different groups of financial conglomerates.

3. Results

The estimations were carried out by System GMM estimator (Arellano and Bover, 1995, and Blundell and Bond, 1998), which allows us to estimate dynamic models and deal with fixed effects and endogeneity problems. The coefficient of the interaction between market profitability and concentration indicates the impact of concentration on the correlation of bank returns. Moreover, the (isolated) total impact of market profitability on the profitability of each bank will be calculated.[6]

We now try to identify which groups of banks have more correlated returns, while pointing out which niches would increase or decrease the inter-relationship in light of changes in the concentration of the financial system. This effect is captured by the variable of interaction between the profitability of other banks within the group (average ROA, weighted by assets) and bank concentration (IHH).

[6] To do this, we used the IHH average over the estimation period.

In the following tables, we first present estimations in which we classified banks by certain characteristics and compared the effect of the average ROA (the profitability measure adopted) of banks within the same group on the ROA of each bank of that group. Then estimations using an ungrouped sample and a more restricted grouped sample are presented in Table 2. Banks are classified into the following groups: i) private and public control; ii) with or without a commercial portfolio; iii) size; iv) credit to total assets ratio; v) liquidity; and vi) leverage.

In terms of size, the banks are divided into three groups: large, those among the 5% largest in terms of assets; medium, between 5% and 25%; and the remaining ones as small banks. In terms of credit, liquidity and leverage, the 25% largest were classified as "high", those between 25% and 75% as "medium", and those lower than 25%, as "low".

In each estimation, time dummies are included (fixed time effect), which assume the value of one in a given semester and zero in the others, in order to capture the aggregate effects of each period. This makes the effect captured in the market ROA on the ROA of a given bank independent of the macroeconomic effects. To save space, the coefficients of time dummies are not presented in the tables that follow.

Table 1

Dependent Variable:	Net Profits over Assets (ROA)		
	Control	Commercial Portfolio	Size
Independent Variables			
ROA(-1)	0.6183811***	0.550012***	0.505835***
	[0.000]	[0.000]	[0.000]
ROA^M	0.837779	-0.7498496	2.596039
	[0.846]	[0.749]	[0.357]
$H*ROA^M$	9.580977	7.182066	-26.85688
	[0.879]	[0.830]	[0.446]
Total ROA^M impact	1.600866**	-0.1778268	0.4569958*
	[0.043]	[0.639]	[0.055]
AR(1) Test	z = (4.42)	z = (4.59)	z = (4.75)
AR(2) Test	z = 0.71	z = 0.69	z = 0.57
Hansen J test	0.195	0.197	0.188
# of obs	3838	3838	3838

Note: *,** and *** indicate significant coefficients at 10, 5 and 1 percent, respectively.

The time dummies and their first differences were duly included as instruments.

Instruments for the equation in a first difference: L3.ROA, L2.ROAM, L2.H and L2.(H*ROAM)

Instruments for the equation at level: D.L2.ROA, D.L.ROAM, D.L.H and D.L.(H*ROAM)

Cont..Table 1

Dependent Variable:	Net Profits over Assets (ROA)		
	Credit	Liquidity	Leverage
Independent Variables			
ROA(-1)	0.5401513***	0.5484537***	0.5122668***
	[0.000]	[0.000]	[0.000]
ROA^M	(9.050035)**	3.974605	(1.511097)*
	[0.028]	[0.637]	[0.093]
$H*ROA^M$	120.2888**	-34.22214	22.16*
	[0.021]	[0.745]	[0.067]
Total ROA^M impact	0.5304903*	1.248949***	0.2538589**
	[0.054]	[0.002]	[0.015]
AR(1) Test	z = (4.76)	z=(4.65)	z=(4.87)
AR(2) Test	z = 0.62	z=0.62	z=0.64
Hansen J test	0.354	0.249	0.37
# of obs	3838	3838	3838

Note: *,** and *** indicate significant coefficients at 10, 5 and 1 percent, respectively.

The time dummies and their first differences were duly included as instruments.

Instruments for the equation in a first difference: L3.ROA, L2.ROAM, L2.H and L2.(H*ROAM)

Instruments for the equation at level: D.L2.ROA, D.L.ROAM, D.L.H and D.L.(H*ROAM)

Table 1 presents the estimation results when grouping banks by their characteristics. When banks are divided by type of control (private or state-owned banks), the autoregressive term is significant and positive (0.62). The ROA of other banks within the group has a positive (more than 1) and significant effect on the ROA for each bank of that group (1.60). In general, these results point to the existence of an indirect mechanism of transmission of idiosyncratic shocks. In other words, since there is a positive correlation among bank returns when they are classified by their type of control, economic agents may infer that the occurrence of an idiosyncratic shock represents a more aggregated one. The results without grouping the banks, in Table 2, suggest the existence of a negative correlation between private and state owned banks, as this effect is negative when these banks are not grouped by type of control.

In the estimates for the banking consolidation (with or without commercial portfolio), still in Table 1, the return of each bank shows no correlation with the return of other banks in the group. This result might be due to the negative correlation between the returns of private and state-owned banks.

In the estimates for size, the ROA of the other banks positively affects the ROA of the bank in question (0.46). In the estimates for credit, the ROA of the other banks in the same group positively and significantly affects the ROA of a given bank (0.53). Furthermore, the interaction term is positive and significant (120.3). This indicates that

the higher the bank concentration, the higher the correlation of the returns of banks with similar credit participations in their assets. That is, bank concentration affects the indirect mechanism of transmission of idiosyncratic shocks, when we examine banks grouped by level of credit.

These results indicate that the banking industry concentration level affects the return correlation of banks with the same asset structure, i.e., banks with similar shares of credit volume in total assets. This effect can be interpreted as showing that an increase in the level of banking concentration makes the credit portfolio more diversified as the lending volume increases, because banks increase their participation of loans to credit modalities and economic sectors not previously exploited. In this way, these banks start to share similar markets, increasing the return correlation of their portfolios. On the other hand, banks less dedicated to the credit market start to use more exotic and sophisticated financial instruments, also augmenting the correlation of their returns.

As observed for banks with the same share of credit in assets, in the estimations for leverage the interaction was positive and significant (22.16), meaning a positive effect of the group's ROA on the bank of the same group. That is, the higher the concentration, the higher the correlation between the return of a bank and return the other banks in the group, indicating once again that bank concentration can affect the indirect transmission of idiosyncratic shocks.

Banks must satisfy minimum capital requirements, so the optimal capital structure depends not only on the cost of outside funds but also on the opportunities for putting these funds to work. In this way, the leverage of a bank depends on its capacity to obtain resources (volume and cost), so leverage is positively related to the size of the institution and the return opportunities of its credit and treasury operations. Therefore, a bank's leverage should be positively related to the share of credit in total assets (as there are higher expected returns from credit operations) and negatively related to the risk of its investment portfolio (as riskier portfolios demand larger portions of internal capital)

Since an increase of concentration diminishes the level of specialization in the banking industry and increases the inter-relation and financial interdependence of the smaller number of banks, this should increase the return correlation of the banks with the same capital structure, because these banks' assets and liabilities have similar risks and returns. Hence they are subject to correlated shocks.

As for the estimates for liquidity, the interaction was not significant, but there was a positive and significant effect of the average ROA for the group on the ROA of each bank of the same group (1.25). This result may reflect the fact that banks with more liquid assets suffer less in recessions than do less liquid banks. In this way, banks with the same liquidity structure should have more correlated returns. However, the level of concentration of the financial system does not seem to affect the correlation among banks with similar liquidity levels.

Table 2

Dependent Variable:	Net Profits over Assets (ROA)		
	Total	Control and Comm. Port.	Control, Comm.Port. and Leverage
Independent Variables			
ROA(-1)	0.5752792***	0.5954293***	0.41318***
	[0.000]	[0.000]	[0.000]
ROA^M	8.830482	(6.822809)*	(1.872363)*
	[0.744]	[0.055]	[0.062]
$H*ROA^M$	-256.7699	103.5288**	29.72238**
	[0.533]	[0.049]	[0.037]
Total ROA^M impact	(11.62021)*	1.422849**	0.4949054***
	[0.067]	[0.031]	[0.004]
AR(1) Test	z=(4.44)	z=(4.56)	z=(4.16)
AR(2) Test	z=0.47	z=0.64	z=0.11
Hansen J test	0.257	0.226	0.247
# of obs	3838	3838	3794

Note: *,** and *** indicate significant coefficients at 10, 5 and 1 percent, respectively.

The time dummies and their first differences were duly included as instruments.

Instruments for the equation in a first difference: L3.ROA, L2.ROAM, L2.H and L2.(H*ROAM)

Instruments for the equation at level: D.L2.ROA, D.L.ROAM, D.L.H and D.L.(H*ROAM)

Table 2 presents the results without grouping the banks by any features, and with grouping in more specialized niches. In the results without grouping, there is inertia in the profitability of banks, measured by the coefficient α, so that the return in the previous period influences the current return of each bank by 0.58. Surprisingly, there is a decrease in ROA of the bank examined when the ROA of the other banks increases (-11.62). A possible explanation may be the existence of cutthroat competition among banks during the period.

If we restrict further the groups, for example, by bank control and banking type (with or without commercial portfolio), or by control, banking type and leverage (still in Table 2), the interaction becomes positive and significant (103.5 and 29.7, respectively), indicating that more concentration of the financial system increases the correlation between the profitability of financial institutions of these groups, which could increase

the systemic risk if one of these banks becomes insolvent. In other words, periods of greater bank concentration can be seen by the market as periods of increased interdependence between the profitability of banks with the same type of control, banking type and leverage. For example, if a highly leveraged bank under private control, without a commercial portfolio, becomes insolvent, the higher the bank concentration is, the greater the market perception will be that other heavily leveraged private banks without commercial portfolios (i.e., with very similar characteristics) are also insolvent, or will become so soon. Furthermore, the results for both groups point to the fact that the higher the return of banks in the same group, the greater the return of each bank in the group (1.42 and 0.49, respectively).

To summarize, the results indicate a positive correlation between the return of each bank and the average return of banks with similar characteristics, and this similarity mainly occurs in the banks grouped by leverage, credit to total assets ratio, size, liquidity and control type. In addition, the results indicated that increases in bank concentration, while reducing the idiosyncratic risks by increasing diversification, may increase the market perception that there is a higher interdependence in the profitability of banks with the same characteristics, increasing the systemic risk if a bank within these groups suffers an adverse shock.

4. Conclusions

Banking crises are usually followed by mergers and acquisitions, which can produce a more concentrated financial system. As a consequence, the system becomes better sheltered against idiosyncratic shocks since banks with bigger shares of the market are in general more diversified. In other works, they are less vulnerable to isolated shocks. However, the panic that the insolvency of a specific financial institution may cause can be higher as banking concentration increases. Therefore, an idiosyncratic shock can be interpreted as a shock affecting many banks, which would affect the expected returns of other institutions.

This study sought to address two issues. The first is the existence of interdependence between the profitability of banks in Brazil and, as a consequence, the possibility of systemic risk from the perspective of indirect contagion. The second is

whether the degree of that interdependence could be associated with the concentration of the system.

On the first question, the results indicate that banks with similar characteristics of control, size, credit, liquidity and leverage have a positive and significant degree of interdependence even after controlling for aggregate effects over time. These results suggest the existence of an indirect transmission channel of contagion in Brazil.

Regarding the second question, we obtained evidence – when we grouped the banks by (i) credit to total assets ratio, leverage, control and banking type; and (ii) control, banking type and leverage – that the higher the concentration of the financial system, the greater the interrelation of profitability in each of these groups. This result reinforces the importance of being attentive to the implications of bank consolidation on the risk of transmission of idiosyncratic shocks in the system. Consolidation can bring benefits in terms of portfolio diversification and therefore can reduce idiosyncratic risk, but it can also increase systemic risk, in that it can increase the probability that an idiosyncratic shock will be interpreted by the market as a shock of aggregated order.

However, one has to take into account that there are other factors that determine the interdependence among banks which were not considered in this work. Interdependence directly via the interbank lending market and by exposure to derivatives is an example. These are questions for future research.

5. References

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