



## The impact of market power at bank level in risk-taking: The Brazilian case



Benjamin M. Tabak<sup>a,\*</sup>, Guilherme M.R. Gomes<sup>b</sup>, Maurício da Silva Medeiros Jr.<sup>c,1</sup>

<sup>a</sup> Universidade Católica de Brasília, SGAN 916 Módulo B Avenida W5, Brasília, DF, Brazil

<sup>b</sup> Department of Statistics, Purdue University, 250 N. University Street, West Lafayette, IN, USA

<sup>c</sup> FGV/EPGE – Escola Brasileira de Economia e Finanças, Graduate School of Economics, Praia de Botafogo 190, Rio de Janeiro, RJ, Brazil

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### ABSTRACT

This paper seeks to examine the competitive behavior of the Brazilian banking industry by conducting an analysis at the level of individual banks to gain an understanding of how the risk-taking behaviors of banks are affected by their degree of market power. Our results suggest that the Brazilian banking industry is characterized by monopolistic competition. Our foremost finding is that the market power of Brazilian banks is negatively related to their risk-taking behavior, regardless of changes in banks' capital levels. Banks that experience a decline in market power, while simultaneously increasing their capital levels, tend to assume higher risk levels. After the Global Financial Crisis period, we find that Private and Foreign banks became risk averse. We also verify that State-Owned banks engaged in riskier activities to increase their market share after the crisis. These results have important implications for the design of appropriate financial regulations.

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### 1. Introduction

Competition critically affects many different industries, including the banking industry. The competitive behavior of banks relates directly to the financial stability and market consolidation of the banking industry, which are complex issues. The entire development of the financial sector intrinsically depends on both the efficiency with which banks produce financial services and the quality of the services they provide. These characteristics are directly influenced by competition in the market; therefore, as demonstrated in both the empirical and theoretical literature, the competitive behavior of banks affects the access that individuals and firms have to financial services. In effect, all economic activity is affected by the banking sector.

Market competition in the banking industry is interdependent with a variety of other economic variables; therefore, the competitive behavior of the market can be affected by economic fluctuations. However, the relationships among these variables are highly ambiguous; thus, current understanding of the effects of bank competition on economic

activity remains limited. In a study of the relationship between bank competition and risk-taking, [Boyd and Nicolò \(2005\)](#) emphasize that there is no consensus in the literature regarding interactions among these variables, as different studies have produced conflicting results.

While some studies have found a positive relationship between bank competition and risk-taking ([Keeley, 1990](#)), others have found a negative relationship between these variables ([Boyd & Nicolò, 2005](#)). The idea underlying the putative positive relationship between bank competition and risk-taking is that banks can effectively collect monopoly rents and tend to become relatively conservative as a result. However, research that has found a negative relationship between bank competition and risk-taking typically conjectures that banks with increased market power are subject to moral hazard; hence, they take riskier measures, such as increasing loan rates, which can lead to an increased risk of failure. [Boyd and Nicolò \(2005\)](#) conclude that the evidence regarding the theoretical relationship between risk-taking and competition of banks is best described as mixed.

[Boyd, Nicolò, and Jalal \(2009\)](#) develop an analysis of a sample of 2300 banks in 134 non-industrialized countries for the 1993–2004 period and a sample of 2500 U.S. banks in 2003, finding no evidence of a trade-off between bank competition and stability. [Hakenes and Schnabel \(2011\)](#) amplify this result, showing that the ambiguous relationship between bank competition and risk-taking presented by [Boyd and Nicolò \(2005\)](#) leads to ambiguity regarding the effect of

\* Corresponding author.

E-mail addresses: [benjaminm.tabak@gmail.com](mailto:benjaminm.tabak@gmail.com) (B.M. Tabak), [guilherme.gmaia@gmail.com](mailto:guilherme.gmaia@gmail.com) (G.M.R. Gomes), [mauriciojr.df@gmail.com](mailto:mauriciojr.df@gmail.com) (M. da Silva Medeiros).

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capital requirements on financial stability. Other studies, however, verify a trade-off between bank competition and risk-taking, corroborating the evidence of mixed findings on this subject.

Soedarmono, Machrouh, and Tarazi (2013) find, in a study of Asian countries, a trade-off between bank competition and risk-taking only in countries whose largest banks are relatively small. Using a general equilibrium approach, Nicolò and Lucchetta (2011) find evidence of such a trade-off, emphasizing the influence of banks' intermediation technology on banks' competitive behaviors. Thus, we observe that both theoretical and empirical studies continue to find ambiguity in the interpretation of the relationship between these variables, as shown by Boyd and Nicolò (2005).

It is important to note that studies usually focus on the influence of competitive conditions in banking on financial stability. For example, Tabak, Fazio, and Cajueiro (2012) analyze the relationship between bank competition and risk-taking in Latin American countries, applying measures of competitiveness to the banking industries observed. We therefore propose an innovative approach to studying this gap in the banking literature. Specifically, we analyze the Brazilian banking industry, using an approach that differs from previous studies in its technique for estimating market power and the effects of market power on banks' risk-taking behavior.

Our paper uses a measure of bank competitiveness to assess banks' market power at the individual level and the impact of market power on risk-taking. Brissimis and Delis (2011) use the same methodology to assess competitiveness at the bank level. However, they do not use this variable as an indicator of individual banks degree of market power and thus assess the effect of market power on risk-taking. We apply this approach to determine the market power of Brazilian banks and to study their behavior, contributing to an understanding of the relationship between bank market power and risk-taking.

In our examination of the Brazilian banking industry, we initially estimate competitiveness in the industry by analyzing the market power of each bank. In accordance with Brissimis and Delis (2011), we apply the Panzar and Rosse model created by Rosse and Panzar (1977) and Panzar and Rosse (1987) to predict market power at the bank level, using a local regression methodology (Cleveland, 1979; Cleveland & Devlin, 1988). The methodology we use is a distinctive feature of this study, as it allows us to examine the heterogeneity of the banks that compose the Brazilian banking industry, thereby providing us with a better understanding of the behavioral changes of these banks.

The results that we obtain using the methodology described above provide evidence of heterogeneity of banks in the Brazilian banking industry. Indeed, we document fluctuations in the competitive behavior of Brazilian banks, as certain periods show increased diversity of H-statistics (used to assess individual bank market power, as described below), indicating that the market power of individual banks is highly varied. These periods of high diversity are interspersed among periods of less H-statistic diversity, during which banks exhibit more homogeneous behavior and have high H-statistic values. By distinguishing banks according to their type, we find that State-Owned banks possessed more market power than Private and Foreign banks until January 2008 and that Private and Foreign banks have become less competitive than State-Owned banks since 2008. This change in the competitiveness can be explained by the response of Brazilian banks to the Global Financial Crisis.<sup>2</sup>

As an analysis of the relationship between market power at the bank level and bank risk-taking behavior is the main purpose of our paper, we apply a model of risk-taking to analyze the interaction between banks' market power and the risk that banks assume. In particular, we incorporate one variable that describes the H-statistic at the bank level in the risk-taking model, based on the approach in Delis and Kouretas (2011). The relationship between market power and risk-taking

behavior at the bank level provides insight into the competitive behavior of Brazilian banks. In particular, we find that banks with higher market power take less risk than banks with less market power. According to Boyd and Nicolò (2005), banks with monopoly rents become conservative in order to protect their valuable charter from large losses.

Capitalization is an important variable in understanding banks' risk-taking behavior; therefore, we also examine the relationship between capitalization and market power and the impact of capitalization on risk-taking. The broad conclusion is that an increase in capital does not alter the risk-taking behaviors of Brazilian banks. A bank with increasing market power is more conservative than a bank with reduced market power. When a bank's capital level increases, the negative relationship between its risk-taking behavior and its degree of market power tends to be unaffected. This result is highly relevant for policy-makers, as it allows for the development of new ways to control bank risk, a policy lever relevant to the Brazilian economy as a whole.

Combining our risk-taking results and our market power analysis regarding banks' type, we obtain valuable information about the Brazilian banking industry during the sampled period. Before the Global Financial Crisis, we find that State-Owned banks had more market power than Private and Foreign banks. As our results show that banks with higher market power take less risk, State-Owned banks reduced their risk before the crisis. After the crisis, we verify that State-Owned banks were assuming more risk to increase their market share because they started to possess less market power than Private and Foreign banks. Therefore, the risk-taking behavior of Brazilian banks that we identify in response to the crisis led to a change in the competitive conditions of the banking industry.

This paper is organized as follows. In Section 2, we present a literature review of recent contributions concerning the relationship between market power and risk-taking. In Section 3, we describe the methodology employed to examine market power at the bank level and the relationship between market power and risk-taking behavior; in particular, we describe the Panzar and Rosse approach and the local regression methodology in a more detailed manner. In Section 4, we describe the data (obtained from the Central Bank of Brazil) used in this study. In Section 5, we discuss how our results pertain to the influence of market power on risk-taking among banks. Finally, Section 6 concludes.

## 2. Literature review

Recent studies that analyze the competitive behavior of banks have employed non-structural approaches that have arisen within the New Empirical Industrial Organization (NEIO) framework. Initially derived from the pioneering contributions of Iwata (1974), non-structural approaches were reinforced by Rosse and Panzar (1977), Bresnahan (1982), Lau (1982), Bresnahan (1989), Panzar and Rosse (1987), Hall (1988) and Roeger (1995). These authors have developed three main models to assess competition in the banking industry by examining deviations from competitive pricing.

Some studies have sought to analyze competitive conditions in the context of particular banking industries. Some authors, such as Yildirim and Philippatos (2007), have examined the banking industries of certain Latin American countries, while others, such as Claessens and Laeven (2004), have studied the banking industries in various European countries. Scott and Dunkelberg (2010) examine the recent consolidation of the US banking industry and its effects on small banks. They conclude that increased competition is negatively correlated with deposit concentration in small banks and that there is a significant positive relationship between bank competition and bank output.

Molyneux, Lloyd-Williams, and Thornton (1994) observe that between 1986 and 1989, the banking industry in Italy operated as a

<sup>2</sup> We consider the Global Financial Crisis as the crisis that began with the collapse of the subprime market in the USA in December 2007.

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