Title: The not so simple relationship between credit cooperatives and banks

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The not so simple relationship between credit cooperatives and banks

Abstract

This study evaluates competition between Brazilian Cooperative Financial Institutions (CFI) and commercial banks running a pooled OLS of bank interest rate as a function of CFI market share, competition and county characteristics. Results show no significant impact of CFI presence on bank interest rates. On the other hand, bank type and Human Development Index (HDI) are important determinants of bank rates. It is necessary to look at relationship between CFI and banks beyond traditional literature on banking competition. Moreover, regulators should not treat them the same way for empowering population should be a main goal of government.

1. Introduction

Cooperative Financial Institutions (CFI) are important players in financial and credit markets. They play two roles in society: acting as financial inclusion agents and, as well, serving as alternatives to traditional commercial banks. When performing the first role of financial inclusion, CFIs act complementary to banks, providing access to financial services to those excluded from traditional market. While performing the second role, they compete with and are substitutes to banks.

Brazilian regulatory framework tends to apply similar rules to CFI and banks, in a process of institutional isomorphism (DiMaggio & Powell, 1983). This makes sense if CFI act as bank substitutes. As the Brazilian cooperative environment is diverse, this study aims to answer the following question: What is the relationship between CFI presence and banks interest rates in regional markets?

The study focuses on direct competition between CFIs and banks in regional markets. While most studies on Brazilian cooperatives focus on financial inclusion, studies on bank competition tend to ignore cooperative credit institutions. Furthermore, even though the credit cooperative segment represents only 2% of assets held in the Brazilian financial system, there are large CFIs that are very important locally. By shedding light on the interaction between the cooperative and commercial banking segments in credit markets, this study aims to provide useful information for regulation and supervision.

After this introduction, section two provides a review of the literature on competition between CFIs and commercial banks. Section three describes the original data and methods used. Section four presents the main results of the empirical model and discuss several implications. Section five concludes with suggestions for future research.

2. Literature Review

Theoretical framework

The three most relevant types of institution in Brazilian credit market are private commercial banks, public banks and CFI. They differ as to ownership. Shareholders are banks' owners, government being public banks' controlling shareholder, while CFI members act as owners and clients at the same time (Ayadi, 2010). From the perspective raised in this study cooperative financial institutions exist as either as a response to financial exclusion or because of the market power of commercial or government owned banks. Figures 1 and 2 shows these two processes:

Figure 1 – CFI as a response to financial exclusion

Figure 2 – CFI as a response to bank market power

The first process refers to Stiglitz & Weiss (1981) credit rationing as a consequence of adverse selection and moral hazard. Grillo (2012) summarizes the theory of credit rationing as follows: "… when trying to govern market exchanges in order to prevent adverse selection and moral hazard, banks are forced to follow patterns of behavior inadequate to sort out the most deserving borrowers, dooming some of the latter to financial exclusion" (p. x). If this is the case, CFIs emerge as marginal players or complement bank role in credit markets. CFIs are able to serve the excluded for two reasons. First, *ex ante* information asymmetry is lower in CFIs because of common bond among members. Second, *ex post* moral hazard is lower due to long term relationship among these members (Banerjee, Besley & Guinnane, 1994). Peer monitoring also helps to reduce default risk (Stiglitz, 1990).

The second process explains the emergence of CFIs as bank substitutes. Bank market power causes a decrease in credit supply and higher interest rates to consumers. Exclusion of some applicants plus higher prices to those who receive credit generate a suboptimal result with extraordinary profits to banks (producer surplus) and welfare loss (deadweight loss). In this respect, CFIs have a different objective function from banks. While banks seek to maximize return to shareholders, CFIs aim to maximize net benefit to associates (Smith, Cargill & Meyer, 1981; Smith, 1984). As a consequence, CFIs may generate lower producer surplus by offering better credit conditions and distributes part of surplus to its members according to their operations during the period.

The relationship between CFI presence and bank interest rates has more than one possible result. The market power explanation relies on firm theory, whereby higher CFI presence reduces market concentration and bank market power, resulting in lower bank rates. Even when CFIs emerge as a response to financial exclusion, bank rates should still decrease, because CFI may potentially serve any customer, not only those excluded by banks. In both cases, CFIs are bank competitors and correlation between CFI presence and bank rates should be negative.

Informational theory predicts a different result. As Carlin (2009) argues, there are two groups of clients: the experts and the uninformed. Without product differentiation, experts choose firms who offer the best price, while the uninformed choose randomly. Because client decisions of getting information and becoming expert is given, and those clients have a poor knowledge of price structure, banks respond to new entrants increasing price complexity to maximize extraction of uninformed consumer surplus. In credit market contexts, as it is hard to rival CFI interest rates, banks should react to CFI presence by increasing price complexity. In this case, CFI presence may have no effect on bank rates and empirical tests may show no correlation or even positive correlation between CFI presence and bank interest rates.

CFIs may either play a marginal role in credit markets or act as bank complements. Périlleux (2014) says that this relationship is more common in developing countries, where the number of excluded from traditional markets is higher. This approach supposes that CFI s and commercial and government banks serve distinct groups of clients. Evidence of this distinction may be found in the prevalence of banks in consumer markets where competition is free, while CFIs may be found to be more active in directed credit markets such as microcredit and rural credit.

Empirical studies

Many studies focus on competition between for-profit and nonprofit institutions informed by theories of the firm. Most analyze markets where CFIs and banks offer credit and expect to find an effect of cooperative presence on banks

interest rates (Feinberg & Rahman, 2001, 2006; Feinberg, 2002; Schmid, 2005). However, some authors look at other cooperative institutions like savings & loans and savings banks (Tokle & Tokle, 2000; Hannan, 2003; Cohen & Mazzeo, 2007). As CFIs are usually local players, data is aggregated by region, state or county (Kondo, 2013). Another variation is to study bank deposit markets (Kondo, 2013; Hannan, 2003) or the effects on market share and market concentration (Emmons & Schmid, 2000). Except for Schmid (2005), studies have found evidence of competition between CFI and banks.

There are four main types of control variables in this literature: bank, operation, local and competition variables. Bank type variables often relate to size, directly measuring assets or using some variation like holding versus independent banks (Tokle & Tokle, 2000) or multi-market versus community banks (Cohen & Mazzeo, 2007). In highly concentrated markets like Brazil, it is easier to look at major players separately. Hirakawa & Bueno (2010) set dummies for the ten biggest Brazilian banks and found that public banks have lower rates in credit operations than private banks. Among private banks, bigger banks tend to have lower rates due to economies of scale (Lhacer, 2012). Operation characteristics like type of credit (Feinberg & Rahman, 2001, 2006) and risk (Da Silva, 2011) influence the effect of CFIs in credit markets.

Demographic variables also influence interest rates. According to Sen (1999), more developed communities have empowered citizens able to get better conditions in bank transactions. Local development indicators, population size and density (Périlleux, 2014), production (Coleman & Feler, 2012) and income distribution (Emmons & Schmid, 2000; Schmid, 2005; Cohen & Mazzeo, 2007) tend to support this hypothesis. Market dynamics in large cities may differ from smaller ones. With that in mind, Feinberg & Rahman (2001) dropped metropolitan areas from their sample. Region of the country also may be relevant. Due to cultural differences in Brazil, De Abreu (2014) analyzed the geographical south separately. On the other hand, it is unclear how rural population relates to interest rates. Although rural areas in Brazil remain less developed, directed credit from government is also important, especially for agricultural subsidies.

Bank concentration should raise interest rates. Most authors use some variation of Herfindahl-Hirschman Index (HHI) with significant results (Kondo, 2013). These studies rely on Structure-Conduct-Performance (SCP) approach and consider concentration an exogenous variable given by industry. However, results are divergent. Bikker & Haaf (2002) found negative correlation between concentration and competition, while Claessens & Laeven (2004) found opposite result. Looking at Brazilian market, Tonooka & Koyama (2003) and Hirakawa & Bueno (2009) results contradict the SCP approach. And the number of institutions is found important to the model presented by Cohen & Mazzeo (2007).

3. Data and method

The information for this study comes from two different sources: data on credit operations come from Central Bank of Brazil Credit Information System (BACEN, 2015) and demographic data from the Brazilian federal government Demographic Census 2010 (IBGE, 2015). The data covers three types of credit operations: consumer credit; microcredit, and rural credit. Table 1 shows distribution of bank operations by type of credit:

Table 1 – Bank operations by type of credit (%)

Type of credit	**Private Bank**	**Public bank**	**CFI**
Consumer	99,5%	87,7%	86,5%
Microcredit	0,4%	12,2%	9,7%
Rural	0,0%	0,2%	3,8%

Consumer credit is the most important type of credit of all segments. Banks and CFIs operate more heavily on free markets where rates are higher. This suggests banks and CFI act as substitutes. Table 2 shows financial institutions market share by type of credit:

Table 2 – Financial Institution market share by type of credit

Type of FI	**Consumer**	**Microcredit**	**Rural**
Private banks	55,6%	3,8%	5,2%
Public banks	41,2%	90,6%	33,3%
CFI	3,1%	5,6%	61,5%

Each segment dominates one type of credit market. While private and public banks are the most important players in consumer credit, public banks dominate microcredit and CFI are leaders in rural credit market. Tables 1 and 2 together suggest there is a substitution effect between banks and CFI, but cooperatives have a small, marginal participation in consumer market, being more relevant in rural credit. Table 3 shows correlation between CFI and bank branches by county:

Table 3 – Pearson's Correlation between CFI and bank presence

Branches	**Banks**	**Significance**
CFI	0.17	0.00

CFI and bank county presence correlates positively, given some additional evidence that there is a substitution effect between segments.

The sample covers new consumer credit operations concluded in each quarter of 2013 where interest rates are fixed and positive. Brazilian municipalities without the presence of branch offices of CFIs or banks were excluded from the sample. This restricts the sample to counties where banks and CFIs compete and transactions to where banks are free to decide interest rates. Observation unity is the operation aggregated by county, type of bank and quarter. Table 4 shows descriptive statistics for continuous variables:

Table 4 - Descriptive statistics of continuous variables

Variable	**Median**	**Mean**	**Std. Dev.**	**Min.**	**Max.**	**N**
Rate	62.2	70.6	36.6	5	152	55920
Presence						
All CFI operations	9.8	20.4	23.4	0	99.6	55920
Free admission CFI operations	14.6	24	24.5	0	99.6	37385
All CFI branches	0.79	1.24	1.39	0.02	16.9	35484
HDI	71	70.2	5.7	48.1	86.2	55920
Density	37.4	233.8	921.6	0.3	13024.6	55920
GDP	13628.2	16941.2	16064.5	2707.8	290834.1	55920
Gini	49	48.7	6.16	28	80	55920
Rural	20.3	25.3	20.4	0	95.8	55920
HHI	29.3	32.6	14	11.7	99.2	55920
Diversity	7	7.1	1.66	2	13	55920

The interest rate mode is 5%, with 1766 observations performed by Caixa Econômica Federal (CEF), a federal public bank, many involving government interference through subsidy or other incentives. On the other side, small banks are responsible for almost all operations above 97% percentile. As Brazilian prime rate ranged from 7.25% to 9.5% in 2013, extreme values were winsorized at 2.5% and 97.5% percentiles.

The empirical model is a Pooled Ordinary Least Squares (POLS) to analyze the relationship between CFI presence and bank interest rates in each quarter of 2013. For robustness, standard errors are clustered by county. Equation 1 identifies the model:

$$rate_{ijt} = \alpha + \beta_1 presence_{jt} + \delta\ bank_{ijt} + \beta_2 hdi_j + \beta_3 \text{density}_j + \beta_4 gdp_j + \beta_5 \text{gini}_j + \beta_6 \text{rural}_j + \phi\ \text{region}_j + \beta_7 capital_j + \beta_8 \text{HHI}_{jt} + \beta_9 \text{diversity}_{jt} + \varphi\ (\text{presence*bank})_{ijt} + \beta_{10} (\text{presence*capital})_{jt} + \gamma\ time_t + \theta\ (\text{presence*time})_{jt} + \varepsilon_{ijt} \quad (1)$$

i, j, t indicate observation, county and time; δ , ϕ , φ , γ , θ are vectors for type of bank, region, CFI presence and bank type interactions, time variables and presence and time interactions; ε Is the error term.

The dependent variable **rate** is the mean interest rate of operations by municipality and type of bank. **Presence** is the variable of interest, calculated in two alternative ways: the first measure is the volume of lending operations performed by CFIs over total lending operations, lagged by one period; the second is number of CFI agencies and branch offices per ten thousand inhabitants. As banks may only react to stronger CFI presence, I run an alternative regression considering only free admission CFIs. I expect to find negative coefficient sign for presence. **Bank** is a set of dummies for different bank types. Each one of the three biggest private banks is analyzed separately: *bank1*, *bank2* and *bank3*, while others are aggregated as *small* and are used as a control variable. Public banks followed the same rule: Banco do Brasil (BB) and Caixa Econômica Federal (CEF) each have a dummy variable, while others are aggregated as *public*. Small private banks should set higher rates for its operations, so all coefficients should be negative.

The Human Development Index (**HDI**), population **density**, Gross Domestic Product (**GDP**), **Gini** income concentration coefficient, and population ratio in **rural** areas are demographic variables set by municipality. Except for Gini, all other coefficients should be negative. **Region** is a set of dummies for North, Northeast, Middle-West, South and Southeast (control). **Capital** is a *dummy* equal to 1 if the county is a state capital. Southeast and capital cities have more developed financial markets and less government interference, meaning expected higher rates.

HHI is a one-period lagged variable adapted from Herfindahl-Hirschman Index, based on each type of bank market share, including CFIs. Higher concentration should bring higher rates. **Diversity** is the number of different types of financial institutions in a county lagged by one period. More diversity means more competition and lower rates.

I chose to leave risk out of the analysis. Because data has only new operations, the only risk measure available is customer risk. Due to classification errors, especially by small banks, including risk could be misleading. Preliminary data analysis show that in 88% of higher rates, banks classified customer risk as small. This may be due to weaker controls, classification errors, or existence of collateral. I also left population out because it is already included in density, GDP per capita and income per capita in HDI.

4. Results

Table 5 shows four variants of empirical model. Model 1 is exactly as identified in equation 1, considering all CFIs. Model 2 considers only CFIs with free admission of associates to calculate presence. Model 3 calculates presence as the number of CFIs or cooperative branch offices per ten thousand inhabitants. Model 4 calculates presence like model 3, but in logarithmic form.

Table 5 - Regression results

	Dependent variable: Rate			
Variable	(1)	(2)	(3)	(4)
CFI	0.030	0.074**	0.894***	0.592**
	(0.042)	(0.036)	(0.195)	(0.287)
Bank1	12.705***	13.491***	7.866***	7.852***
	(1.383)	(1.052)	(0.927)	(0.928)
Bank2	-55.965***	-54.936***	-57.723***	-57.729***
	(1.486)	(1.130)	(0.965)	(0.965)
Bank3	-7.003***	-6.136***	-11.662***	-11.659***
	(1.358)	(1.030)	(0.912)	(0.911)
BB	-44.229***	-43.203***	-47.918***	-47.919***
	(1.314)	(0.997)	(0.887)	(0.887)
CEF	-59.185***	-58.297***	-64.871***	-64.885***
	(1.306)	(0.989)	(0.870)	(0.870)
Public	-47.301***	-46.211***	-51.367***	-51.329***
	(1.445)	(1.089)	(0.934)	(0.932)
HDI	-0.472***	-0.465***	-0.619***	-0.612***
	(0.048)	(0.039)	(0.048)	(0.048)
Density	0.0002	0.0002*	0.0003**	0.0004***
	(0.0002)	(0.0001)	(0.0001)	(0.0001)
GDP	0.00003**	0.00003***	0.00001	0.00001
	(0.00001)	(0.00001)	(0.00001)	(0.00001)
Gini	-0.075**	-0.076***	-0.078**	-0.073**
	(0.031)	(0.026)	(0.031)	(0.031)
Rural	0.010	0.012	0.002	0.00005
	(0.012)	(0.010)	(0.013)	(0.013)

Middle-West	0.078	0.081	-1.352**	-1.372**
	(0.581)	(0.474)	(0.583)	(0.583)
Northeast	-1.212	-1.176*	-2.542***	-2.125***
	(0.806)	(0.662)	(0.708)	(0.730)
North	-2.056**	-2.003***	-3.489***	-3.298***
	(0.901)	(0.737)	(0.964)	(0.973)
South	0.418	0.496	-0.947**	-1.116***
	(0.443)	(0.358)	(0.400)	(0.413)
HHI	0.040***	0.041***	0.055***	0.052***
	(0.016)	(0.013)	(0.015)	(0.015)
Diversity	-0.419***	-0.385***	-0.375***	-0.339***
	(0.122)	(0.101)	(0.119)	(0.118)
Capital	3.427**	3.201***	4.201***	4.105***
	(1.716)	(1.159)	(1.003)	(1.009)
Q1	-3.100***	-3.265***	-2.820***	-2.816***
	(0.650)	(0.501)	(0.479)	(0.479)
Q2	-3.980***	-3.979***	-4.254***	-4.259***
	(0.467)	(0.359)	(0.325)	(0.325)
Q3	-2.214***	-2.142***	-1.851***	-1.852***
	(0.444)	(0.341)	(0.302)	(0.302)
CFI*Bank1	-0.029	-0.073**		
	(0.043)	(0.037)		
CFI*Bank2	0.111**	0.074*		
	(0.050)	(0.042)		
CFI*Bank3	-0.024	-0.074*		
	(0.047)	(0.040)		
CFI*BB	0.045	-0.001		
	(0.042)	(0.036)		
CFI*CEF	-0.069*	-0.124***		
	(0.042)	(0.036)		
CFI*Public	-0.011	-0.066*		
	(0.044)	(0.037)		
CFI*capital	-0.145	-0.179		
	(0.164)	(0.125)		
CFI*Q1	-0.067***	-0.068***	-1.457***	-1.452***
	(0.017)	(0.014)	(0.242)	(0.242)
CFI*Q2	0.001	0.001	-0.043	-0.040
	(0.014)	(0.012)	(0.213)	(0.212)
CFI*Q3	0.014	0.013	-0.173	-0.170

	(0.013)	(0.011)	(0.194)	(0.193)
Constant	137.654***	136.062***	152.480***	152.060***
	(4.106)	(3.341)	(3.964)	(3.957)
Observations	37,385	37,385	35,484	35,484
Adjusted R^2	0.625	0.626	0.624	0.624

Notes:

i. Significance level: ***1%; **5%; *10%.

ii. Standard errors in parenthesis are cluster-robust.

CFI presence does not influence the interest rates of banks. In model 1, the presence coefficient is not statistically significant even at 10% level. Moreover, a variation of one standard deviation in presence (23.57%) corresponds to a variation of only 0.71% in bank interest rates. The presence coefficient is higher and statistically significant at 5% level in model 2, which considers only free admission CFIs. One standard deviation increase in presence means a 1.82% raise in bank interest rates. Models 3 and 4 have similar results to model 1. Considering that the trimmed mean bank interest rate is around 70%, the effect of CFI presence is economically small in model 2 and insignificant in the other three models. The results for presence suggest that firm theory does not fully explain the relationship between CFIs and banks in local markets. Alternatively, informational theory may have a role in explaining positive and small coefficients. According to price complexity, where CFIs offer lower interest rates and get informed customers, banks keep rates high lending to uninformed ones.

Bank type coefficients are all significant at the 1% level. As a general result, public and big banks have lower rates than small private banks, but bank profile is also important. Bank 1 serves middle-low income clients and has branch offices throughout the country. As a result, bank 1 has interest rates even higher than small banks. In comparison, bank 2 has a conservative profile, selects clients and markets more cautiously, resulting in lower interest rates. Only the public savings bank CEF has lower rates than bank 2. Overall, bank type is the most important determinant of interest rates, suggesting that banks have different strategies and manage somehow to differentiate from one another.

The Human Development Index (HDI) is the only demographic variable statistically and economically significant. In model 1, a 5.7% raise in HDI (one standard deviation) means a 2.7% interest rate decrease. The higher economic significance is in model 3, where a 4.9% increase in HDI means a 3% decrease in bank interest rates. The Gini coefficient, population density, and GDP coefficients are economically insignificant, while the rural population coefficient is statistically and economically insignificant. State capital cities have higher interest rates than other cities. Interest rates vary across geographical regions, corroborating the argument of Hirakawa & Bueno (2010). Even though coefficients vary

among models, Southern regions do indeed have higher rates than northern ones. These results combined mean that more developed financial markets with less government interference tend to allow higher rates.

Competition variables results are statistically significant at the 1% level in all models, but coefficients do not have economic significance. Even though HHI showed the expected positive coefficient sign, the low economic effect corroborates previous studies of Brazilian markets (Tonooka & Koyama, 2003; Hirakawa & Bueno, 2009). So, less concentrated local markets don't necessarily mean lower rates. Diversity variable does not add much information and is highly correlated to HHI. These results suggest that relationship between concentration and competition is not fully explained by Structure-Conduct-Performance approach.

5. Conclusion

This study examined the relationship between cooperative institutions and banks with the lens of firm theory. Statistical results showed that CFI presence does not affect bank interest rates in Brazilian regional markets. On the other hand, bank type is the most important factor influencing interest rates. Human development is negatively related to interest rates, and more dynamic financial markets, like state capitals, have higher rates.

Results of the variable of interest show that relationship between CFI and banks is complex and not explainable by firm theory alone. The positive and economically small coefficients of presence suggests that the concept of price complexity from informational theory may play a role in explaining the effect of CFIs on bank interest rates. Population trust in these segments may influence consumer choice and need further study. Preferences may also have historical and sociological reasons beyond the scope of this study.

The results from analysis of bank level variables suggest that the most important banks have well defined strategies and relatively stable market positions. Maybe competition in credit markets is not as fierce as common sense would have it. Overall, government is a very important player in Brazilian financial and credit markets.

The empirical results reported herein suggest at least two implications for public policy. First, regulators should not treat cooperative institutions and banks the same way. Banks and cooperative financial institutions differ in nature, purpose, and relationship with customers. Moreover, even banks took different paths to their current positions and their interaction goes far beyond price competition. The second implication for public policy is that empowering the population, a main goal of government and financial institutions, may be optimized by coexistence between banks, public and private, and cooperatives.

Future research should focus on historical explanation for CFI dominance in some counties. A more qualitative approach may help to explain why bank rates do not decrease in these counties. This study deliberately chose data from a period of economic stability. So, another extension could be finding out whether relationship between CFI and banks changes during crisis periods.

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