Brazilian Credit Union Member Groups: Borrower-dominated, Saver-dominated or Neutral Behavior?

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Abstract

Theoretical models concerning Credit Unions (CUs) suggest that the type of CU domination determines the way it allocates the monetary value it generates. A borrower- (saver-) dominated CU benefits borrower (saver) members at the expenses of saver (borrower) members, and a neutral CU equally benefits its member groups. This paper applies direct measure of monetary benefits to each member group (Patin & McNiel, 1991a) to test for the existence of dominated behavior in Brazilian CUs, and is the first to apply panel data regressions to identify the determinants of CUs behavior. We use a unique panel data with 40,664 observations taken from 533 CUs affiliated with the largest Brazilian cooperative network. Results indicate Brazilian CUs are dominated by borrowers, but behave close to neutrality. Panel regression estimates show that common or multiple bond type, size and overdue loans of a CU have no effect on its behavior, the greater the total amount of loans over social capital and adjusted equity over total assets are the more likely a CU is borrower dominated, and the greater the age and current operational expenses over total asset of a CU are the more likely a CU is saver dominated.

Key words: credit union; member group domination; monetary benefits; panel data.

Introduction

The owners (members) of a financial cooperative, or simply credit union (hereafter CU), are borrowers who consume loans and savers who supply savings deposits. The gap between the dividend rate paid to savers and the interest/loan rate paid by borrowers gives the main source of income to a CU (Spencer, 1996).

A CU acts as a financial intermediary between its net saver members, who want high dividend rates on savings (*i.e.*, shares in CUs), and its net borrower members, who prefer low interest rates on loans. These two opposite objectives of member groups create the inherent borrower-saver conflict in CUs (Smith, 1986). Thus, a borrower- (saver-) oriented/dominated CU is expected to benefit net borrower (saver) members at the expenses of net saver (borrower) members, and a neutral CU is expected to equally benefit its member groups. This paper aims to investigate and explain the member group orientation/domination of CUs in Brazil.

We have divided the literature on CUs member group orientation/domination into theoretical and empirical groups of studies. As follows, we first review the most important theoretical studies, and then the most important empirical studies on CUs member group orientation/domination.

Taylor (1971) was one of the first authors to explicitly recognize the existence of conflict among member groups within a CU. On the basis of a simple graphical analytical model of CU, he shows the conflict among member groups is not likely to restrict membership, and therefore credit availability, on purely economic grounds. The first reason for this is that members do not belong exclusively to one group (*i.e.*, borrowers or savers) or other. The second reason is that the relationships between current savers and new borrowers, and current borrowers and new savers, are complementary.

Disagreeing with Taylor (1971), Flannery (1974) used a simple graphical analytical model to show that non price rationing (*i.e.*, restrictions on membership) is crucial for saver and borrower dominated CUs to operate. Exactly because of this, Flannery (1974) argued that dominated CUs would produce more distortion in terms of credit availability than simple profit maximizing monopolistic competitors. A neutral credit union, which is considered by Flannery to act exactly like a simple sales maximizing firm, would supply more credit to consumers than capital markets operating under monopolistic competition.

Following this line of inquiry, Smith, Cargill and Meyer (1981) develop a theoretical model in which a CU chooses the loan rate and dividend rate so as to maximize the weighted sum of the net gains on savings and loans, with the weights labeled behavioral preference parameters. They show that the loan rate for a borrower- (saver-) oriented CU would be less (more) than for a neutral CU, and the dividend rate on savings would be less (more) than for a neutral CU; and that a borrower- (saver-) oriented CU would issue more (less) debt or invest extra funds less (more) than if equal treatment or neutral behavior was the case. Despite their results, they argue that a CU would likely seek to maximize its total net gain or, in other words, behave neutrally for three reasons. First, neutral behavior is coherent to the **fairness** and **equity** considerations that lie behind the cooperative philosophy. Second, borrowers or savers might hesitate to participate in a CU that intentionally penalizes their interests. Third, individual members might always switch in their roles as net borrowers or net savers.

The model developed by Smith *et al.* (1981) was extended by Smith (1984) in order to consider that savings and loan transactions have maturities which extend beyond current period. Thus, Smith (1984) incorporated into his model a more realistic and detailed balance sheet constraint, and imposes that the operating statement for the CU's current accounting period must net out to zero. He showed that the optimal loan and dividend depend critically on the preferences of the CU, such that a borrower- (saver-) oriented CU will treat savers (borrowers) so as to maximize profit and use the profit to set the lowest (highest) possible loan rate (dividend rate). He also showed that in a borrower- (saver-) oriented CU the loan (dividend) rate would tend to absorb exogenous disturbances while the

dividend (loan) rate would tend to remain unchanged. Interestingly, Smith (1988) extended Smith's (1984) stylized model of CU to incorporate uncertainty, but only considered risk neutral CUs to develop his entire model, thus ignoring the CU orientation/domination issue.

Other works such as Black and Dugger (1981) and Walker and Chandler (1977) have not developed formal analytical models of CUs, but still recognize that a CU orientation is likely to affect the manner it operates or behaves. Thus, it should be noticed that, except for Spencer (1996), all theoretical studies after Taylor (1971) have recognized the conflict among member groups translated into the CU domination/orientation is likely to affect the way CUs are operated and behave.

In terms of empirical evidences on the significance of dominated behavior among CUs, Flannery (1974) seems to have been the first study attempting to classify CUs as saver-dominated, borrower-dominated or neutral. However, it failed to distinguish between variations caused by dominated behavior and random errors so that its results should be taken with caution (Smith, 1986).

Smith (1986) tested the variant objective functions of CUs (*i.e.*, saver- or borrower- oriented or neutral) by relying on comparative static results obtained by Smith (1984). In so doing, he employed a two-step approach where in the first step the CUs are classified into the borrower (saver) oriented group if their predicted values for loan (dividend) rates, obtained from two linear regression equations, are greater than (less than) the observed values for loan (dividend rates)[1]. In the second step, Smith (1986) tested the variant objective function of CUs by carrying out regressions to test if the classified CUs would respond to changes in the explanatory variables as predicted by the comparative static results obtained by Smith (1984). Because his results did not show any evidence to support the variant objective function hypothesis, he concluded that the 951 federally insured American credit unions in his sample had behaved neutrally from 1975 to 1979.

Based on the theoretical works of Walker and Chandler (1977), Smith *et al.* (1981) and Smith (1984), Patin and McNiel (1991a) developed a direct measure of the net monetary benefits to saver and borrower members, and applied it to calculate the differences between the net monetary benefits allocated to savers (*NMBS*) and borrowers (*NMBB*) in the years 1984 and 1985 for each of 10,565 (10,142) federally chartered and 4,657 (4,932) state chartered/federally insured CUs in the United Sates. They tested if the CU industry in USA balanced the interest of borrowers and savers by observing if the mean of the differences between *NMBS* and *NMBB* for all CUs in their sample would differ from zero when using the *t* test. They found that the CU industry as a whole allocated more benefits to member-savers than to member-borrowers but argued that this result does not imply each CU in the sample exhibited this type of behavior. Thus, they proposed a way to adjust for the possibility of size bias in order to create an index of domination for each CU. Using this index distribution, they found that 80% of CUs they had previously classified showed evidence of neutral behavior. Patin and McNiel (1991b) employed this same approach to analyze CUs in USA and found, like Patin and McNiel (1991a), that most CUs exhibited neutral behavior.

The National Credit Union Administration (NCUA) of USA changed its membership policy in 1982 so that members from groups without any affinity with the core group of a CU could participate. In other words, NCUA started to allow multiple group credit unions to operate. Since the National Association of Federal Credit Unions (NAFCU) claims that non-core members are more likely to be borrowers in a CU than the core members, Leggett and Stewart (1999) used a more restrictive version of the approach proposed by Patin and McNiel (1991a) to identify the orientation of 2,025 federally chartered CUs in 1997 from the twenty-five largest Metropolitan Statistical Areas in USA. They found that on average CUs were saver-oriented regardless of the type of their membership but common bond CUs had a stronger saver orientation than multiple bond CUs.

Goddard and Wilson (2005) conducted an empirical study on the effect of size, age and growth of American CUs on their orientation and got results consistent with the work of Kohers and Mullis (1990). In other words, Goddard and Wilson (2005) found that younger CUs are likely borrower oriented while older CUS are likely saver oriented. According to them, the reason for this is that

younger CUs would set lower loan rates than the market as a means to make their assets and membership grow and, as a side effect, would attract borrowers.

Although most theoretical studies have agreed that a CU orientation is likely to affect the way it behaves, there are few recent empirical studies on this issue for CUs located in developed countries, and almost none for CUs in developing countries. In fact, except for the work by Desrocher and Fischer (1999 as cited in Fischer, 2000), which detected both saver and borrower oriented CUs in Colombia, we could not find any other work on CU orientation/domination for developing countries.

Of special interest to this paper, we could not find any previous work on the orientation of CUs in Brazil, which is of concern because it has been broadly recognized that CUs can improve financial access for the poor and, therefore, contribute to development and poverty reduction (Nair & Kloeppinger-Todd, 2007). Furthermore, new regulatory rules introduced by the Central Bank of Brazil in its resolution 3.106 of 25th July 2003 allow for the creation of multiple bond or open-admission CUs, which increases the importance of investigating the behavior of CUs in Brazil; where it is reasonable to suspect that "non-core members are more likely to be borrowers than core members" (Leggett & Stewart, 1999, pp. 235-236)[2].

The objectives of the present paper are twofold: to investigate and explain the member group orientation/domination of CUs in Brazil; and to investigate if Brazilian CUs have been more attractive to their members than other financial institutions, thus complying with CUs' primary objectives: to promote thrift and provide credit at reasonable rates. This way, our work adds to the literature as the first to empirically study the orientation of Brazilian CUs, using a unique panel data obtained from the Brazilian Credit Cooperative System (hereafter Sicoob-Brasil). Note that the Cooperative Unions system in Brazil is composed of four CU networks: Sicredi, Unicredi, Ancosol, and Sicoob-Brasil, which is by far the largest one in Brazil[3].

This paper[4] is organized so that in the following section presents the basis to measure benefits and how they are divided across the members of a CU. Next follows the literature review on models of domination in credit unions and their estimation, and the specification of the baseline panel data regression model. Then the empirical results on Brazilian CU member domination and the factors determining it are presented. Finally, the paper closes with a summary, main conclusions and directions for future research.

Measuring Benefits for CU Members and How CUs Allocate Benefits among Member Groups

Most theoretical articles suggest that a CU orientation/domination determines the way it allocates the monetary value it generates among its saver and borrower members. Walker and Chandler (1977) pointed out that the benefits a CU allocates to its members can be divided into monetary and non-monetary benefits. For instance, non-monetary benefits are the provision of financial advice, and the convenience of directly deducting savings applications and loan payments out of a member's payroll. However, Walker and Chandler (1977), Smith *et al.* (1981), Smith (1984), Patin and McNiel (1991a), and Leggett and Stewart (1999) agree that non-monetary benefits are uniformly distributed across members of CUs and, therefore, will have no effect on the potential asymmetry by which benefits are distributed among their members group. Based on this, we ignore non-monetary benefits and focus only on how monetary benefits are distributed across CUs members.

Monetary benefits allocated to savers

As suggested by Patin and McNiel (1991a), we calculate the net monetary benefits received by saver members of the *i*th CU at time *t* using Equation (1).

$$NMBS_{it} = (WADR_{it} - WAMDR_{it})*TS_{it} \tag{1}$$

where at time t, $NMBS_{it}$ is the net monetary benefits received by the ith CU saver-member, $WADR_{it}^{(5)}$ is the weighted average of the dividend rates paid by the ith CU on all savings instruments it offers, $WAMDR_{it}^{(6)}$ is the weighted average of the best alternative market dividend (savings) rates available on similar types of savings instruments outside the ith CU, and TS_{it} is the total monetary volume of member savings balances in reais (R\$) for the ith CU.

Patin and McNiel (1991a) argue that Equation (1) measures the monetary benefits accruing to the ith CU saver members at time t net of the opportunity costs associated with their decisions, and is based on the theoretical works of Walker and Chandler (1977), Smith *et al.* (1981), and Smith (1984).

Monetary benefits allocated to borrowers

Patin and McNiel (1991a) suggest that the net monetary benefits received by the ith CU borrower members at time t should be calculated by Equation (2).

$$NMBB_{it} = (WAMLR_{it} - WALR_{it}*(1 - RRT_{it}))*TL_{it} \tag{2}$$

where at time t, $NMBB_{it}$ is the net monetary benefits received by the CU borrower members, $WAMLR_{it}^{(7)}$ is the weighted average of market loan rates charged by other institutions on similar types of debts instruments to those offered by the ith CU, $WALR_{it}^{(8)}$ is the weighted average of loan rates charged by the ith CU for all types of loans to members, RRT_{it} is the proportion of interest income on loans refunded to CU borrower members, and TL_{it} is the total monetary volume of loans to the members of the ith CU. About RRT_{it}, we use as proxy the total income refunded to a CU's members in R\$ over the total R\$ income obtained by a CU from all charges on loans calculated as presented in the Appendix.

Note that Equation (2) measures the monetary benefits accruing to the ith CU borrower members net of the opportunity costs associated with borrowers' decisions, and is based on the theoretical works of Walker and Chandler (1977), Smith *et al.* (1981), and Smith (1984).

In order to empirically compare the treatment of borrowers and savers, we follow Patin and McNiel (1991a), and calculate by Equation (3) the difference (dif_{it}) between the net benefits allocated by the ith CU at time t to each member group.

$$dif_{it} = NMBS_{it} - NMBB_{it} \tag{3}$$

The ith CU allocates more monetary benefits to savers (borrowers) at time t if dif_{it} is greater (lower) than zero, otherwise the ith CU equally allocates benefits to both member groups. Furthermore, $\sum_{i=1}^{n} dif_{it}$ can be used to investigate how a CU industry allocates aggregate benefits across member groups at time t such that if $\sum_{i=1}^{n} dif_{it} > 0$ ($\sum_{i=1}^{n} dif_{it} < 0$) then the CU industry allocates a greater level of aggregate net monetary benefits to member-savers (member-borrowers); otherwise, the CU industry equally allocates net monetary benefits among member groups (Patin & McNiel, 1991a).

Patin and McNiel (1991a) suggested adjusting for size bias by calculating the degree to which the ith CU allocates benefits among member groups at time t as the index of domination (ID_{it}) calculated by Equation (4).

$$ID_{it} = \frac{ds_{it}}{std_t} \tag{4}$$

where

$$ds_{it} = \frac{NMBS_{it}}{TS_{it}} - \frac{NMBB_{it}}{TL_{it}} \qquad (5)$$

$$std_t = \sqrt{\frac{\sum_{i=1}^{n} ds_{it}^{2}}{n-1}} \qquad (6)$$

for the ith CU, ds_{it} gives the difference between $NMBS_{it}$ per real of savings and $NMBB_{it}$ per real loaned, and std_t is the standard deviation of ds_{it} about zero at time t. Thus, the absolute value of ID_{it} gives the extent by which the ith CU deviates from perfect neutral behavior ($ID_{it}=0$) at time t, and its signal shows if the ith CU is saver dominated ($ID_{it}>0$) or borrower dominated ($ID_{it}<0$).

Data

The data used in this paper is an unbalanced panel with 40,664 observations of monthly accounting information for 533 Brazilian CUs affiliated with Sicoob-Brasil from January 2000 to June 2008, which represents 58.51% of the CUs affiliated with Sicoob-Brasil during this time period. Note that Sicoob-Brasil comprises 46.32% of all Brazilian single CUs, which makes Sicoob-Brasil by far the largest cooperative network in Brazil (Soares & Melo, 2007). The sources of our data are the Central Bank of Brazil, Sicoob-Brasil and Sicoob's Deposit insurance Administration.

Models of Domination in Credit Unions and their Estimation

We rely on the literature as summarized in Table 1 as the basis to specify the variables and the functional forms of our models.

Table 1

Common Variables Used to Explain the Domination in CUs

Explanatory Variable	For Saver-Dominated CUs	For Borrower-Dominated CUs	For Neutral CUs	Authors
Fees on loans and dividend rates	High fees on loans and high dividend rates on savings	Low fees on loans and low dividend rates on savings	Intermediate fees on loans and interest rates on savings	Taylor (1971), Flannery (1974), Smith *et al.* (1981), Smith (1984, 1986), Patin and McNiel (1991a), Leggett and Stewart (1999)
Size as a CU's total asset	Intermediate	Low	High	Patin and McNiel (1991a), Smith (1986)[8]
Average monetary volume of loans and savings per member	Intermediate	Low	High	Patin and McNiel (1991a)
Net income distribution	Most of the net income is distributed as dividends	Most of the net income is distributed as low loan rates	Equally distributed	Patin and McNiel (1991a)

Continues

Table 1 (continued)

Explanatory Variable	For Saver-Dominated CUs	For Borrower-Dominated CUs	For Neutral CUs	Authors
Loans over social capital	*	*	*	Patin and McNiel (1991a)
Age as time of existence	High	Low	*	Kohers and Mullis (1990), Smith (1986)
Common or multiple bond type of CU	Most likely a common bond type	Most likely a multiple bond type	*	Leggett and Stewart (1999)
Adjusted equity over total assets, as a measure of a CU stability	*	*	*	Leggett and Stewart (1999)
Operational expenses over total asset, as a measure of a CU efficiency	*	*	*	Leggett and Stewart (1999)
Overdue loans over total amount of loans, as a measure of quality of assets	*	*	*	Leggett and Stewart (1999)
Geographical location	*	*	*	Smith (1986)
Reserve of capital, as the total of reserves plus indivisible surpluses divided by total asset	Positive signal	Negative signal	*	Smith (1986)
Average cost of operations	Negative signal	Positive signal	*	Smith (1986)
Total reserves over gross total revenue	Negative signal	Positive signal	*	Smith (1986)

Note. * denotes that although the authors thought of the variable as important and included it in their analysis, they could not find a clear pattern for the effect of the variable on the behavior of CUs.

From Table 1, we observe the variables **fees on loans** and **dividend rates, average monetary volume of loans and savings per member, net income distribution**, and **average cost of operations** are all by their own definitions closely related to ID_{it}. Based on this and the lack of data available on those variables, we chose not to include those variables in our models

We also did not include in our models the variable **reserves over gross total revenue** because of its high correlation with accounting records used to compute the variable **reserve of capital**. Also, we didn't use the variable **reserve of capital** in our models because it is highly correlated with the variable **adjusted equity over total assets**. Finally, we did not include a CU **geographical location** in our models because it is a CU characteristic that does not change over time and, therefore, is already captured by the fixed effects models.

The remaining variables in Table 1, **size as CU's total asset, loans over social capital, age[9], common or multiple bond type of CU, adjusted equity over total assets, operational expenses over total asset** and **overdue loans over total amount of loans** were all included in our models.

Baseline panel data regression model

The general procedure we use to search for the best model is composed of five steps. First, we estimate the pooled and fixed effects models and test if pooled is preferred to the fixed effects model by the Chow test. Second, we estimate the random effects model and test if pooled is preferred to random effects model by the Breusch-Pagan test. Third, we test if the random effects model is preferred to fixed effects model by the Hausman test. Provided that fixed effects is preferred to pooled and random effects models, we test for first-order autocorrelation by the F-test as proposed by Wooldridge (2002), and for within group homoscedasticity by the Wald test. Finally, provided that absence of first-order autocorrelation and group homoscedasticity are rejected, we re-estimate the fixed effects model by Feasible Generalized Least Squares (FGLS) estimators as proposed by Judge, Griffiths, Hill, and Lütkepohl (1985), and Davidson and MacKinnon (1993). Note that Baltagi and Wu (1999) and Hansen (2007) also use FGLS estimators for fixed effects linear panel data models presenting autocorrelation.

The causal relationship of interest is captured by the benchmark regression model formalized as Equation (7).

$$ID_{it} = \beta_0 + \beta_1 size_{it} + \beta_2 lsc_{it} + \beta_3 age_{it} + \beta_4 dt_{it} + \beta_5 aeta_{it} + \beta_6 oeta_{it} + \beta_7 ol_{it} + v_i + \varepsilon_{it} \qquad (7)$$

where $i = 1,..., 533$ indexes CUs, $t = 1, ..., 102$ indexes the observation's month such that: $t = 1$ denotes January of 2000 and $t = 102$ denotes June of 2008; ID_{it} is the index of domination as in Equation (4); β_0 is the intercept; the β's are coefficients; $size_{it}$ stands for the size of the ith CU measured as its total asset in R\$ at time t; lsc_{it} denotes the total amount of loans over social capital; age_{it} denotes the time of existence of the ith CU in years at time t; dt_{it} is a dummy variable with value zero for common bond type of CUs and value one for multiple bond type of CUs; $aeta_{it}$ denotes the adjusted equity over total assets; $oeta_{it}$ denotes the current operational expenses over total asset; ol_{it} denotes overdue loans over total amount of loans; v_i is the ith CU fixed effects which are non-observables and do not vary over time; and ε_{it} is an i.i.d. stochastic error. For the random effects model, v_i should be taken as i.i.d. random variables distributed with zero mean and constant variance.

Empirical Evidence and Discussion

In this section we first discuss the empirical evidence of dominated behavior in Brazilian Credit Unions by analyzing the results obtained for the variables $NMBS_{it}$ (net monetary benefits received by saver members), $NMBB_{it}$ (net monetary benefits received by borrower members), dif_{it} (the difference between $NMBS_{it}$ and $NMBB_{it}$), and ID_{it} (the index of domination for Brazilian credit unions). In the second part of this section we present the estimates of the panel regression models and, relying on them, discuss the determinants of the index of domination in Brazilian Credit Unions.

The values for $NMBS_{it}$ were calculated according to Equation (1) such that a positive (negative) value for $NMBS_{it}$ means the ith CU offers more favorable (less favorable) dividend rates to their members than the best outside alternatives in the financial market. We find 92% of the calculated values of $NMBS_{it}$ were positive, which shows most Brazilian CUs offered more favorable dividend rates to their members than the outside financial market from January 2000 to June 2008.

We calculate the values for $NMBB_{it}$ according to Equation (2) such that a positive (negative) value for $NMBB_{it}$ means the ith CU offers more favorable (less favorable) loan rates to their saver members than the best outside alternatives in the financial market. Note that by Equation (2), $NMBB_{it}$ is calculated adjusting the loan rates charged by the ith CU so to consider the proportion of interest income on loans refunded to CU borrower members. We found 77.8% of the calculated $NMBB_{it}$ were

positive, which shows most Brazilian CUs offered more favorable loan rates to their members than the outside financial market from January 2000 to June 2008. In other words, the Brazilian CUs were more attractive as source of money for potential borrowers than other financial institutions.

Although observed values of $NMBS_{it}$ and $NMBB_{it}$ indicate Brazilian CUs are more attractive for borrowing and depositing money than the outside financial market, it is the difference between $NMBS_{it}$ and $NMBB_{it}$, dif_{it} calculated by Equation (3) which gives the ith CU orientation/domination at time t. We found 73.6% of the calculated values of dif_{it} were negative, which gives evidence that most Brazilian CUs allocated more monetary benefits to their borrower members than to saver members from January 2000 to June 2008. To shed more light on this result, as a first step we tested the hypothesis by which the variable dif_{it} follows a normal distribution by the Jarque and Bera (1980) and Doornik and Hansen (1994) tests. The rejection of the null hypothesis by these tests indicates there is no statistical basis for testing the difference between the mean of dif_{it} for the group with $dif_{it}>0$ (*i.e.*, CUs are more favorable to saver members) and the mean of dif_{it} for the group with $dif_{it}<0$ (*i.e.*, CUs are more favorable to borrower members) by a paired Student's t-test as in Patin and McNiel (1991a).

As an alternative to the paired Student's t-test, we used the non-parametric Wilcoxon's (1945) signed-rank test, and in addition tested if the medians of dif_{it} for the group with $dif_{it}>0$ and for group with $dif_{it}<0$ come from the same probability distribution by the Mann-Whitney test. Results for these two tests indicated the medians of dif_{it} for the group with $dif_i > 0$ and for the group with $dif_i<0$ are statistically and significantly different, and did not come from the same probability distribution. In other words, the group of CUs more favorable to saver members is statistically different from the group of CUs more favorable to borrower members. Based on this and in the fact that 73.6% of calculated values of dif_{it} are negative in the panel, we conclude that most individual Brazilian CUs generated more benefits for the group of borrower members at the expense of the group of saver members from January 2000 to June 2008.

Patin and McNiel (1991a) criticized the simple use of dif_{it} as an indicator of CUs orientation/domination, and suggested fixing the size bias created with the use of dif_{it} by calculating the index of domination ID_{it} as given by Equation (4). Thus, the sign of ID_{it} indicates if ith CU at time t was dominated by borrower members ($ID_{it} < 0$) or by saver members ($ID_{it} > 0$), and the magnitude of the absolute value of ID_{it} gives a relative measure of the deviation from the neutral behavior such that the closer to zero ID_{it} is, the closer to neutrality a CU behaves. The calculated vales of ID_{it} ranged from -21.7481 to 22.4244 with a mean of 0.0326 and standard deviation of 0.6467. We found 87.3% of ID_{it} values were negative, which confirms the individual Brazilian CUs are borrower dominated, as they generated more benefits for the group of borrower members at the expense of the group of saver members. We also observed that most ID_{it} values are close to zero. Therefore, we conclude that individual Brazilian CUs are borrower dominated, but behave close to neutrality.

Determinants of the index of domination in Brazilian Credit Unions

Having found that individual Brazilian credit unions are mostly dominated by borrower-members, we proceed to investigate the determinants of such domination behavior using the estimates obtained for the panel data regression models. First we present in Table 2 summary statistics for the variables we used in the estimation of the models.

Table 2

Sample Descriptive Statistics of Variables

Variables	Mean	Standard Deviations	Minimum	Maximum
Dependent variable				
ID	-0.0323	0.6470	-21.7480	22.4240
Explanatory variables				
size	1.25e+07	4.17e+07	134.9700	1.31e+09
lsc	4.4970	11.5190	0.0000	646.1670
age	10.3011	7.8979	0.4050	41.4600
dt	0.9670	0.1790	0.0000	1.0000
aeta	0.2520	1.9420	-268.235	2.7700
oeta	0.0330	0.0460	0.000	3.7940
ol	0.0930	3.3170	1.68e-06	583.5680

The estimates for the panel data regression models are reported in Table 3.

Table 3

Estimates of the Determinants of the Index of Domination for Brazilian Credit Unions, from January 2000 to June 2008

Explanatory Variable	Pooled	Fixed Effects	Random Effects	Fixed Effects by FGLS
size	-0.0000*	-0.0000*	-0.0000*	-0.0000
lsc	-0.0037*	-0.0016*	-0.0012*	-0.0012*
age	0.0042*	0.0092*	0.0068*	0.0030*
dt	0.0905*	0.0484*	0.0435*	0.0030
aeta	-0.8650*	-1.5225*	-1.4412*	-0.2878*
oeta	2.7773*	0.5697*	0.7773*	0.2342*
ol	0.0005	0.0002	0.0002	0.0000
constant	0.0660*	0.2871*	0.3180*	2.0235*
N. of observations	40 664	40 664	40 664	40 664
N. of groups	0	533	533	533

Chow test: $F(532, 40\ 124) = 21.09$, *p*-value = 0.0000

Breusch-Pagan test: $\chi 2\ (1) = 32{,}431.63$, *p*-value = 0.0000

Hausman test: $\chi 2\ (6) = 528.10$, *p*-value = 0.0000

Wooldridge test: $F(1{,}532) = 18.507$, *p*-value = 0.0000

Wald test: $\chi^2(112) = 8.7E+07$, *p*-value = 0.0000

Note: An *denotes a coefficient statistically significantly different from zero at the 1% level.

Test results presented in the bottom of Table 3 show fixed effects model is preferred to pooled model by Chow test, and random effects model is preferred to pooled model by Breusch-Pagan test. In other words, random and fixed effects models are preferred to the pooled model, but fixed effects

model is preferred to random effects by Hausman test. Finally, because first-order autocorrelation and group homoscedasticity are rejected respectively by the Wooldridge and Wald tests, the preferred model is the fixed effects model estimated by Feasible Generalized Least Squares (FGLS) or simple Fixed Effects by FGLS as in the fourth column of table 2. Thus, the following discussion is all based on the results for Fixed Effects by FGLS

Table 3 shows that for the fixed effects model estimated by FGLS, the coefficient of **size** is not statistically significantly different from zero, which means the CU's size has no effect on the domination by members. Note that despite the coefficients of **size** are statistically significant for the other models, its coefficient estimates are all very close to zero.

The coefficient of lsc_{it} (**total amount of loans over social capital**) is negative and statistically significantly different from zero, and indicates that for a one-unit increase in lsc_{it} the predicted value of the index of domination ID_{it} should fall by 0.0012. Although the literature gives no conclusive direction for the effect of lsc_{it} on ID_{it}, its negative signal seems reasonable. For instance, lsc_{it} can grow as a result of an increase of the total amount of loans produced by a reduction in the interest/loan rates, which will certainly benefit borrower members. Note that the effect of lsc_{it} on ID_{it} is not big in practical terms. For instance, for a 10 unit increase in lsc_{it} which is a huge increase, ID_{it} falls only by 0.012 which is very small compared to the sample range of variation of ID, -21.75 to 22.42 (see Table 2).

Table 3 shows the coefficient of age_{it} is positive and statistically significant, which implies that is more likely for younger CUs to be dominated by borrower members and for older CUs to be dominated by saver members, which is in line with Smith (1986), Kohers and Mullis (1990) and Goddard and Wilson (2005). Despite this, this result should be taken with caution. For instance, for a one year increase in age_{it} the index of domination ID_{it} would increase only by 0.0030, which is very small compared with the sample range of variation of ID, -21.75 to 22.42 (see Table 2). Thus, the effect over time of increased age_{it} on ID_{it} will likely be insufficient to move any CU in the sample from being dominated by borrowers to be dominated by savers and vice-versa. In other words, it is likely the 87.3% of negative values of ID_{it} observed in our sample will remain close to this value in the following years if age_{it} is the only variable changing.

The coefficient of the dummy variable dt_{it} is not statistically significant, which implies that if a CU is of a multiple or common bond, type has no significant effect on its index of domination. Note that dt_{it} is a dummy variable with value zero for common bond type of CUs and value one for multiple bond type of CUs and we would expect a negative signal for its coefficient.

The coefficient of $aeta_{it}$ (**adjusted equity over total assets**) is negative as expected, and statistically significant (see Table 3), indicating that for a one-unit increase in $aeta_{it}$ the expected value of the index of domination ID_{it} should fall by 0.2878. Note that $aeta_{it}$ can be taken as the reciprocal of the leverage index[10] where the lower the leverage index is for a financial institution the less likely it will be capable of raising funds outside in the market. Thus, an increase in $aeta_{it}$, which is equivalent to a decrease in the leverage index, implies the CU can more easily raise funds from market, without relying on its saver members and, therefore, making it possible for the CU to reduce benefits for saver members.

The coefficient of $oeta_{it}$ (**current operational expenses over total asset**) is positive as expected and statistically significant (see Table 3), indicating that for a one-unit increase in $oeta_{it}$ the expected value of the index of domination ID_{it} should increase by 0.2342. Note that an increase in the current operational expenses relative to the total asset of a CU indicates that the CU is providing more benefits to its members. For instance, the CU is likely to be paying high dividend rates to saver members. Furthermore, $oeta_{it}$ measures the costs of managing the CU's assets and can be seen as the degree of operational efficiency of a CU. According to the World Council of Credit Unions (WOCCU), to be considered operationally efficient a CU should have an $oeta_{it}$ below 10% (Richardson, 2002). From Table 2, we observed that the mean value of $oeta_{it}$ in the sample is 3.3%, indicating the CUs in the sample were in average operationally efficient.

Finally, the variable ol_{it} (**overdue loans**) is not statistically significant to explain the index of dominance in Brazilian credit unions. In addition, its estimated coefficient shows a value almost equal to zero. Despite this, we keep this variable in the model because of the overall statistic significant of the model by the Wald test.

Summary and Conclusion

In this paper, a Credit Union (CU) is taken as a financial institution, which inherently intermediates conflict between saver members who want high dividend rate on savings and borrower members who prefer low interest rates on loans. Based on previous theoretical works, a borrower- (saver-) oriented/dominated CU benefits borrower (saver) members at the expenses of saver (borrower) members, and a neutral CU equally benefits its member groups.

In order to explain member group orientation/domination for Brazilian CUs, we used a unique panel data composed of 40,664 observations of monthly accounting information from January 2000 to June 2008 for 533 CUs affiliated to the Brazilian Credit Cooperative System (Sicoob-Brasil), which is by far the largest cooperative network in Brazil. We found that individual Brazilian CUs are dominated by borrower members, but behave closely to neutrality, as expected (Smith, Cargill, & Meyer, 1981). We also observed that individual Brazilian CUs are more attractive to their borrower and saver members than are other financial institutions, for instance, banks. In other words, Brazilian CUs seem to have complied with their primary objectives of promoting thrift and providing credit at reasonable rates.

In order to investigate the determinants of member group orientation/domination for Brazilian CUs, we used Feasible Generalized Least Squares estimates obtained for a fixed effects panel data regression model. Based on its estimates, we found that **common** or **multiple bond type**, **size** and **overdue loans** of a CU have no individual effect on its orientation/domination. Hence, we expect new regulatory measures introduced by the Central Bank of Brazil as of July of 2003, which allow for the creation of multiple bond CUs, will have no effect on the domination behavior of Brazilian CUs.

The preferred model estimates also showed that the **total amount of loans over social capital** and **adjusted equity over total assets** for a CU are individually significant to explain a CU orientation/domination so that the greater each one of them is, the more likely a CU will be borrower dominated. On the other hand, results showed that the **age** and **current operational expenses over total asset** of a CU are individually significant so that the greater each of them, is the more likely a CU will be saver dominated. Finally, the average value of the **current operational expenses over total asset** in the panel data indicated that the Brazilian CUs were operationally efficient according to the criterion of the World Council of Credit Unions.

We suggest that future research should focus on investigating the implications Brazilian CU domination has on the way the Brazilian CUs are administrated and on their financial sustainability. Also, as more data become available, the analysis conducted in the present paper should be extended so as to include CUs affiliated with the other Brazilian cooperative systems Sicredi, Unicredi, and Ancosol.

Acknowledgments

Notes

[1] Patin and McNiel (1991a) criticized this classification criterion, arguing that it fails to directly incorporate any measures of the benefits accruing to either borrowers or savers.

[2] Freitas, A. F. de, Amaral, I. C., & Braga, M. J. (2008). A influência dos riscos de liquidez e de crédito no processo de conversão das cooperativas de crédito rural em cooperativas de crédito de livre admissão: um estudo de caso [Versão eletrônica]. *Revista de Contabilidade e Organizações, 2*(4), 126-147, found that Brazilian common bond CUs who converted to open-admission experienced a significant increase in their levels of credit risk. Thus, it seems reasonable to conjecture that the increase in credit risk has been caused by the expansion of credit to new CUs members who, therefore, should have been necessarily borrowers.

[3] Demirgüç-Kunt, A., Karacaovali, B., & Laeven, L. A. (2005). Deposit insurance around the world: a comprehensive database [World Bank Policy Research Working Paper No. 3628]. *The World Bank*, Washington-DC, USA, presents a detailed description about financial cooperatives in Brazil.

[4] This paper was presented at the "2nd Brazilian Summit of Researchers on Cooperatives".

[5] We used as proxy the total of the CU's expenses with dividends payments divided by the total monetary volume of member savings balances, both measured as Real (R$) which is the Brazilian currency unit.

[6] We used as proxy the nominal interest rate for savings accounts at Brazilian banks measured as percentage per month.

[7] We use as proxy the average of the pre-fixed referential interest rates for free resources – personal credit – measured as percentage per month.

[8] We use as proxy the total income obtained by a CU from all charges on loans over the total volume of loans to CU members, both measured as R$.

[9] Smith (1986) does not find evidence of member groups' domination but points out that the size effect can be captured by the variable **age**.

[10] Leverage is defined as the Total Assets over Adjusted Equity.

References

Baltagi, B. H., & Wu, P. X. (1999). Unequally spaced panel data regressions with AR(1) disturbances. *Econometric Theory*, *15*(6), 814-823. doi: 10.1017/S0266466699156020

Black, H., & Dugger, R. H. (1981). Credit union structure, growth and regulatory problems. *Journal of Finance*, *36*(2), 529-538. doi: 10.1111/j.1540-6261.1981.tb00471.x

Davidson, R., & MacKinnon, J. G. (1993). *Estimation and inference in econometrics*. Oxford: University Press.

Doornik, J. A., & Hansen, H. (1994). An omnibus test for univariate and multivariate normality [Working Paper]. *Nuffield College*, Oxford. Retrieved from http://www.doornik.com/research/normal2.pdf

Fischer, K. P. (2000). *Deposit insurance and moral hazard in financial cooperatives*. Quebec: Université Laval. Retrieved from http://www.cofi.ecn.ulaval.ca/PubDom/cu_di.pdf

Flannery, M. J. (1974). *An economic evaluation of credit unions in the united states* (Report Nº 54), Boston, Federal Reserve Bank of Boston.

Goddard, J., & Wilson, J. O. S. (2005). US credit unions: an empirical investigation of size, age and growth. *Annals of Public and Cooperative Economics*, *76*(3), 375-406. doi:10.1111/j.1370-4788.2005.00283.x

Hansen, C. B. (2007). Generalized least squares inference in panel and multilevel models with serial correlation and fixed effects. *Journal of Econometrics*, *140*(2), 670-694. doi: 10.1016/j.jeconom.2006.07.011

Jarque, C. M., & Bera, A. K. (1980). Efficient tests for normality, homoscedasticity and serial independence of regression residuals. *Economics Letters*, *6*(3), 255-259. doi: 10.1016/0165-1765(80)90024-5

Judge, G. G., Griffiths, W. E., Hill, R. C., & Lütkepohl, H. (1985). *The theory and practice of econometrics* (2nd ed.). New York: Wiley.

Kohers, T., & Mullis, D. (1990). The impact of a financial institution's age on its financial profile and operating characteristics: the evidence for the credit union industry. *Review of Business and Economic Research*, *26*, 38-49.

Leggett, K. J., & Stewart, Y. H. (1999). Multiple common bond credit unions and the allocation of benefits. *Journal of Economics and Finance*, *23*(3), 235-245. doi: 10.1007/BF02757708

Nair, A., & Kloeppinger-Todd, R. (2007). Reaching rural areas with financial services: lessons from financial cooperatives in Brazil, Burkina Faso, Kenya, and Sri Lanka [Agriculture and Rural Development Discussion Paper No. 35]. *The International Bank for Reconstruction and Development/The World Bank*, Washington-DC, USA.

Patin, R. P., Jr., & McNiel, D. W. (1991a). Benefit imbalances among credit union member groups: evidence of borrower-dominated, saver-dominated and neutral behavior? *Applied Economics*, *23*(4), 769-780. doi: 10.1080/00036849108841034

Patin, R. P., Jr., & McNiel, D. W. (1991b). Member group orientation of credit unions and total member benefits. *Review of Social Economy*, *49*(1)*, 37-61. doi: 10.1080/00346769100000003

Richardson, D. C. (2002). *PEARLS monitoring system*. World Council of Credit Unions Toolkit series [Number 4]. Madison, WI, EUA. Retrieved from http://www.woccu.org/pdf/monogr4.pdf

Smith, D. J. (1984). A theoretic framework for the analysis of credit union decision making. *Journal of Finance*, *39*(4), 1155-1168. doi: 10.1111/j.1540-6261.1984.tb03899.x

Smith, D. J. (1986). A test for variant objective functions in credit unions. *Applied Economics*, *18*(9), 959-970. doi: 10.1080/00036848600000053

Smith, D. J. (1988). Credit union rate and earnings retention decisions under uncertainty and taxation. *Journal of Money, Credit, and Banking*, *20*(1), 119-131.

Smith, D. J., Cargill, T. F., & Meyer, R. A. (1981). Credit unions: an economic theory of a credit union. *Journal of Finance*, *36*(2), 519-528. doi: 10.1111/j.1540-6261.1981.tb00470.x

Soares, M. M., & Melo, A. D. de, Sobrinho (2007). *Microfinanças: o papel do Banco Central do Brasil e a importância do cooperativismo de crédito*. Brasília, DF: Banco Central do Brasil.

Spencer, J. E. (1996). An extension to Taylor's model of credit unions. *Review of Social Economy*, *54*(1), 89-98. doi: 10.1080/00346769600000004

Taylor, R. A. (1971). The credit union as a cooperative institution. *Review of Social Economy*, *29*(2), 207-217. doi: 10.1080/00346767100000033

Walker, M. C., & Chandler, G. G. (1977). On the allocation of the net monetary benefits of credit union membership. *Review of Social Economy*, *35*(2), 159-168. doi: 10.1080/00346767700000018

Wilcoxon, F. (1945). Individual comparisons by ranking methods. *Biometrics Bulletin*, *1*(6), 80-83. doi: 10.2307/3001968

Wooldridge, J. M. (2002). *Econometric analysis of cross section and panel data*. Cambridge*:* MIT Press.

APPENDIX

Operationalization of RRT

RRT = proportion of interest income on loans refunded to CU borrower members: (E/C)

E = refunded income in R$

Number of COSIF Account	**Description**
(+) 6.1.7.00.00-2	Leftover or losses accumulated (balance at the end of month)
(+) 4.9.3.10.00-5	Dividends and bonus to pay (balance at the end of month)

C = income earned by the CU or fee charged by the CU on loans (movement of the month in R$)

Number of COSIF Account	**Description**
(+) 7.1.1.03.00-8	Income from advances to depositors (movement of the month)
(+) 7.1.1.05.00-6	Income from loans (movement of the month)
(+) 7.1.1.10.00-8	Income on discounted securities (movement of the month)
(+) 7.1.1.15.00-3	Income from financing (movement of the month)
(+) 7.1.1.40.00-9	Income of rural financing - free applications (movement of the month)
(+) 7.1.1.50.00-6	Income of rural financing - passed and refunded applications (movement of the month)
(+) 7.1.1.55.00-1	Income from agribusiness financing (movement of the month)

Note. Source: Elaborated by authors.