

Is cash negative debt under the perspective of hedging in Brazil?

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ABSTRACT

The present study investigates whether listed Brazilian companies between 1995 and 2008 coordinated cash and debt policies for effects of hedging against underinvestment under conditions of financial constraint. The results indicate the absence of a hedging component when simultaneously using cash and debt policies in constrained firms. For firms with financial constraints there was positive sensitivity of cash to cash flow and negative sensitivity of debt to cash flow, regardless of the need for hedging. The unconstrained firms did not present statistically significant sensitivity of cash to cash flow, but presented negative sensitivity of debt to cash flow, results that were also independent of the need for hedging. These findings run counter to those of Acharya, Almeida & Campello (2007) in the American market, where cash and negative debt were found to play different roles in intertemporal optimization of investments among constrained firms, according to the need for hedging.

Keywords: Hedging; cash; debt; investment; financial constraint.

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1 INTRODUCTION

The propositions of Modigliani and Miller (1958) suggest that the value of a company is independent of the manner how it is financed and its hedging activities. For the separation theorem is valid, that is, in an environment in which there is no friction, companies can totally finance their investment opportunities without depending on their financing decisions. In the same manner, the hedging activities carried out by the company are irrelevant, given the possibility that the investors may individually adjust their exposure to risk.

Theoretical papers developed implications when these propositions are invalidated in the presence of market frictions, such as asymmetric information (Myers; Majluf, 1984) and agency problems (Jensen; Meckling, 1976). These frictions can generate from an increase in costs of external funds relative to internal ones, up to credit rationing (Stiglitz; Weiss, 1981). In these conditions, companies are characterized as financially constrained when making sub-optimal investment decisions as a result of the insufficiency of internal and external financing sources, implying in sub-investment and the consequent reduction of the company's value.

In the literature of financial constraint, the Almeida, Campello and Weisbach study (2004) not only presented a new approach for the identification of companies with financial constraint, but also expanded the analysis of the relationship between financial constraint, financial policies and investment, in considering aspects of the companies' cash policies. This is a result of the supposition that companies, in face of a costly financing source, alter their current financial policies to facilitate the execution of future investments. The critical issue involving the financial constraint is the risk of sub-investment. In this context, loosening the propositions of Modigliani and Miller (1958), Froot, Scharfstein and Stein (1993) point out that hedging can increase the value as it contributes so that the company has sufficient internal funds available to finance its investment opportunities.

Acharya, Almeida and Campello (2007), in suggesting the findings of Almeida, Campello and Weisbach (2004) focus on companies with a high need for hedging, allowed us to understand the different functions of cash and the borrowing capacity as regards investment when the companies are subject to different degrees of uncertainty about their cash flow. In the light of the theoretical work of Froot, Scharfstein and Stein (1993), they show the possibility of using the coordination between cash and debt policies as a hedging *strategy*, to reduce the risk of sub-investment. The empirical implications of the model by Acharya, Almeida and Campello (2007) allow us to identify when cash is not negative debt; and

indicate situations in which the debt and cash policies are used as an effective hedging instrument, contributing to the debates on the full substitutivity between cash and debt (Kim; Mauer; Sherman, 1998; Opler *et al.*, 1999).

Institutional characteristics mold the orientation of the financial system and the companies, for countries with weak protection for stockholders and creditors tend to have a less developed capital market and companies have more concentrated property structures more concentrated as a substitute for legal protection (LA PORTA *et al.*, 1998; LA PORTA; LOPEZ-DE-SILANES; SHLEIFER, 1999). In fact, *cross-country* evidence suggests that the degree of development of the capital market and the degree of protection to creditors and stockholders tend to condition the capacity to raise external funds and the incentives to retain cash (Jensen, 1986; Dittmar; Mahrt-Smith; Servaes, 2003; Baum, Schäfer; Talavera, 2006; Khurana; Martin; Pereira, 2006; Kalcheva; Lins, 2007) and perform hedging (TUFANO, 1996).

Therefore, there is evidence suggesting relevant differences between countries with low protection for investors and others. In considering: that the empirical verification of the theory by Acharya, Almeida and Campello (2007), and most research that sustain it was carried out in an environment with strong protection for investors and a well developed financial architecture; that Brazil is considered a country with weak protection for investors (La Porta *et al.*, 2000) and a less developed capital market; the existence of evidence of differences in cash (Koshio; Cia, 2004) and debt policies (Leal, 2008) between Brazil and the USA; makes it reasonable and important to question if Brazilian companies would present the behavior set out by the theory, that is, coordinate debt and cash policies for hedging purposes in financing constraint conditions.

Using estimations through two-stage least squares (2SLS) and three-stage least squares (3SLS), in a sample of Brazilian publicly traded companies during the period between 1995 and 2008, results were found that contradict the behavior anticipated by the theory of Acharya, Almeida and Campello (2007).

The empirical studies on capital structure frequently ignore the interrelation between corporate investment and financing decisions, supposing that investment is exogenous to financial policies. Also, the interdependencies between financial policies to satisfy an optimal level of investment intertemporally are not studied. The present study is related to the literature of corporate hedging, financing constraint, cash and debt policies. A new dimension of *hedge* is tested empirically, involving the interaction between the cash and debt policies,

which contribute to the understanding of the role of hedging behavior and its effect on the preference for cash or borrowing capacity in emerging economies like Brazil. In the same manner, it reinforces the argument on the need to adjust the assumptions of financial theory to emerging markets and to consider the environmental variables that affect companies' financial behavior.

The present study is structured in the following manner: in chapter 2 a brief review of the literature is presented, in chapter 3 the methodological aspects are presented; in chapter 4 the results of the empirical tests are analyzed; and, in chapter 5, the final considerations are made.

2. FINANCING CONSTRAINT, DEMAND FOR LIQUIDITY AND THE NEED FOR HEDGING AGAINST SUB-INVESTMENTS

According to Froot, Scharfstein and Stein (1993), the variability in cash flows of the existing assets results in the variability of the borrowing capacity and/or variability in the making of investments. In this case, the coordination between the investment and financing decisions allows an optimal and not necessarily complete hedging. These authors suppose: the existence of frictions in the market that generate a growing marginal cost of the external funds as a result of the amount raised; that the product of the investment is a growing and concave function of the invested value; the insufficiency of liquid assets to finance all the attractive investment opportunities; the inexistence of *hedge* costs; the cash flows are perfectly subject to hedging. In these conditions, it is expected that the *hedge* will elevate the availability of internal funds, allowing a reduction in sub-investment and, therefore, generate value at it performs hedging.

In the Almeida, Campello and Weisbach model (2004), firms are characterized as financially constrained if the investment policies do not fulfill the optimal level because of the adverse effects of market frictions. A constrained company submits to a *trade-off* between costs and benefits of cash holdings to relieve this financial constraint: the costs of sacrificing current investment opportunities in relation to the greater capacity of financing future investment opportunities.

Therefore, the constrained company in obtaining an evolution in its cash flow for a certain period, this is optimally allocated intertemporally, retaining a fraction of these resources for the financing of more lucrative future investments. This behavior is observed by the occurrence of a positive cash flow sensitivity of cash, which has the following properties: it is positive for constrained companies and undetermined for unconstrained companies.

For Acharya, Almeida and Campello (2007), the unconstrained companies would be indifferent between cash and negative debt, as well as their investment decisions are independent of the future financing capacity. Differently than companies with financing constraints, in which the relation between cash and debt is determined by the need for hedging.

Acharya, Almeida and Campello (2007) demonstrate that the company's ability to *hedge* using cash and debt depends on the payment expected by creditors (the value of the debt) correlates positively with the companies' cash flows. In the model developed by the authors, this is captured by the fact that the debt is less risky in the high cash flow state, but becomes risky in the low cash flow state. Investors who maintain the risky debt receive future payments that are contingent on the execution of the company cash flows. Investors that are holders of a risky debt provide funds to the company, which can be maintained in low risk financial instruments. Therefore, the creditors of the risky debt can absorb part of the volatility of the company's cash flows.

In this context, the company's optimal financial policy depends on the financing constraint and the correlation between cash flow and investment opportunities. In this case, unconstrained companies should be indifferent between the possible choices of level of liquid variation of debt, which assures that the company will remain without financing constraint. In contrast, the optimal financial policy of constrained companies would depend crucially on the correlation between cash flows and new investment opportunities. If the correlation between cash flow and investment opportunities is high, then the investment opportunities tend to appear in the state of nature of the high cash flow. In this case, the constrained company maximizes the value of future investments increasing the financing capacity in the high cash flow state. This decision has the implication of minimizing the liquid variation of indebtedness. Reciprocally, if the correlation between the cash flow and the investment opportunities is low, the constrained firms benefit in increasing the financing capacity in the low cash flow state, which implies preferring the liquidity obtained by the larger cash holdings in detriment of the borrowing capacity.

For these authors, therefore, if the correlation between cash flow and investment opportunities is low, then the ideal company policy involves the issue of debt against future cash flows and later cash holdings. Therefore, the additional cash flows will be mainly allocated in cash balance. Supposing that the creditors have priority over the fraction of the cash balance and the cash flows of new investment opportunities are alienable, the borrowing

capacity increases and the company can increase its debt as well. So cash and debt should respond positively to the increases in cash flow. In contrast, if the correlation between cash flow and investment opportunities is high, the ideal company policy consists in maintaining the borrowing capacity for future periods, and reserving little cash. In this case, cash flows are mainly used to reduce the demand for debt.

Empirical evidence supports the theoretical arguments of Froot, Scharfstein and Stein (1993). Gay and Nam (1998), to verify the role of the sub-investment hypothesis in the determination of hedging, examine the interactions between investment opportunities, cash holdings and cash flow. The results indicated that firms that do not use derivatives have the sub-investment relieved for having larger levels of correlation between cash flow and investment expenditures relative to derivatives users. For these authors, the sub-investment problem is more important for firms with low cash levels, being that these presented a larger use of derivatives. Therefore, the results suggest a negative relation between the use of derivatives and the cash level, in the same manner as Geczy, Milton and Schrand (1995) and Nance, Smith and Smithson (1993). These findings suggest that, besides hedging with derivative instruments, firms use alternative means of hedging that involve financial as well as operational strategies (PETERSEN; THIAGARAJAN, 2000). Other evidence in the cash policy literature strengthen the results of Almeida, Campello and Weisbach (2004) and Acharya, Almeida and Campello (2007). Kim, Mauer and Sherman (1998) and Opler *et al.* (1999) observe that the stock of liquid assets reduces in answer: to the reduction of the interest rate and the debt leveraging costs; to the ease of sale of the assets, to the reduction of dividends and debt renegotiation; to the costs of hedging; and with a marginal tax rate.

3 METHODOLOGICAL PROCEDURES

3.1 Research Hypothesis

For Acharya, Almeida and Campello (2007), the cash and debt policies for firms with financing constraint are coordinated for hedging reasons. Constrained firms and with a high need for hedging allocate their free cash flows especially to cash balance at the same time that they present a net debt issuance. These companies prefer to reserve resources to finance future investment opportunities by means of cash and not by borrowing capacity, consequently, they transfer resources from states of nature in which the investment opportunities and high cash flows do not meet. From this comes the first hypothesis:

H1 - Constrained companies with high hedging needs present a positive cash flow sensitivity of cash and debt.

Constrained companies and with low hedging needs do not present incentives to hold cash, but have incentives to reduce the debt. Then comes the second hypothesis:

H2 – Constrained companies with low hedging needs present a negative cash flow sensitivity of debt, but no cash flow sensitivity of cash.

The authors' model also suggests that financially unconstrained companies are indifferent between cash and debt. And then comes the third hypothesis:

H3 – Unconstrained companies, independently of the need for hedging, do not present significant cash flow sensitivity of cash, but present negative cash flow sensitivity of debt.

3.2 Sample Selection

The population encompasses all the Brazilian publicly-traded companies, except financial firms and diversified *holdings*, whose accounting and market information were available in Economática's databases, for the period between 1995 and 2011¹. The data was adjusted by the IGP-DI to 2011 values. The annual data referring to ADR holding companies was obtained through a consultation to the *site* of the Comissão de Valores Mobiliários (CVM). The observations that presented one of the following restrictions were eliminated: (a) companies that do not present debt in any year of the analyzed period; (b) observation of company with a cash reserve balance inferior to R\$ 500 thousand; (c) net annual sales growth or total asset superior to 100%; (d) value of the Q variable lower than zero or higher than 10; (e) companies with a debt superior to the accounting value of the assets; (f) companies with less than four consecutive years of data available; (g) companies in sector, on level 3 or 2 of the NAICS classification, which did not present at least two companies every year.

These sample restrictions have the following purpose: (a) and (b) exclude companies incapable of adopting an active cash and debt policy; (c) eliminate observations of companies that presented significant changes in the foundations of the business; (d) diminish the potential effects of errors of measurement of the Q variable; (e) eliminate companies that could be close to *default*; (f) and (g) allow the measurement of the *proxy* for the hedging need and lessen the effects of endogeneity.

The sample encompassed 344 companies, distributed in 62 sectors according to NAICS classification level 3. The 10 sectors, according to NAICS 3, more representative correspond to 47.70% of the sample; generation, transmission and distribution of electric energy companies (12.79%); telecommunications (8.72%); transformation of steel into steel products (4.07%); automotive parts industry (4.07%); chemical industry (3.78%); textiles (3.2%);

apparel industry (2.91%); meatpacking (2.91%); residential building construction (2.62%); and fertilizer and pesticide industry (2.62%).

3.3 Operational Definition of Variables

The cash level (RC) was measured as the sum of the availabilities and the short term financial investments, while the level of long term financial debt (DLP) was measured as the sum of long term financing and debentures, both variables were divided by the total assets. These measurements were used to capture, among the different states of nature, the debt and cash sensitivity in the cash balance as well as in the level of indebtedness. Just as their lagged measurements in one of two periods also served as an instrument of the endogenous variables: variation in the cash holdings and the variation in long term indebtedness.

To capture the cash and debt sensitivity to the cash flow, it was necessary to measure the variables' annual variation in the cash reserve (ΔRC) and the variation of the long term financial indebtedness (ΔDLP), or net debt issuance (issuance minus redemption). These measurements allow the capture of the cash and debt accumulations occurred during a specific period, without the influences of the existing balances. The ΔRC variable was defined as the annual variance of the cash sum and financial investments. While ΔDLP was defined as the annual variation of the sum of the long term debentures and financing. Both measurements were divided by the total assets.

The following additional variables were used as a control for the cash substitutes and uses: variation of the current assets minus the cash reserve ($\Delta AC-C$); variation of the financial short term indebtedness (debentures and financing) (ΔDCP); and the applications in permanent assets (AAP), including affiliates and subsidiaries. All variables were divided by the total assets, except Ln (AT). In recognizing a possible endogeneity of variables, the lagging in two years of the endogenous variables was adopted as an instrument.

With the purpose of studying the effects of free cash (FC) on the cash and debt policies, it was necessary to measure a *proxy* for this construct. For Jensen (1986), the free cash flow is cash in excess after considering all the investment projects with a positive net present value. In this study, the *proxy* of Acharya, Almeida and Campello is adopted (2007), that is, the uncompromised cash flow is defined as operational profit minus the depreciation, dividends, interest on own capital, financial expenses and tributes, all divided by the total assets. Therefore, the minimum reinvestment in capital, associated with the depreciation, as well as the dividends and interests on won capital were considered as non-discretionary.

The Size ($\ln(AT)$) of the company was defined as the neperian logarithm of the book value of the company's assets during the period. The size allows to control the effects of the transaction costs and economies of scale that affect the decisions on cash and debt policies. As a *proxy* for investment opportunity, Tobin's Q is used, which is measured as ((total assets – net worth + market value of the shares)/ total assets).

3.4 Classifications of Companies According to Financing Constraint Criteria and Hedging Need

To perform the empirical tests, it was necessary to separate the companies according to their state of financing constraint and hedging need.

3.4.1 A Priori Classification Method as to Financing Constraint

In the period between 1995 and 2008¹ the companies were classified every year according to three classification criteria as to the state of financing constraint: *payout* total (PAY); ADR issuance; intersection between the criteria Size and *Payout* Total (TAM \cap PAY). *Payout* Total (PAY) was defined as the sum of the dividends and interest payment on own capital, both divided by the net profit. The companies that annually do not pay dividends, interest on own capital and do not perform stock repurchases were classified as financially constrainedⁱⁱ. Among the companies that presented a total *payout* greater than zero, the company with the three lowest distribution decimals were considered financially constrained companies, while companies with the three highest distribution decimals were classified as financially unconstrained.

For Myers and Majluf (1984), the differential of costs and internal funds limits justifies the existence of a financial slack that, according to Fazzari, Hubbard and Petersen (1988), can be promoted by the smallest payment of dividends. Evidence associates the smallest payment of dividends to difficulties to accessing external funds (Fama and French, 2002) and greater opportunities for growth (FUTEMA; BASSO; KAYO, 2009; IQUIAPAZA; ROBERT; LAMOUINER, 2008).

By the ADR Issuers criteria (ADR), the companies were annually classified, based on the condition of being level 2 or 3 ADR issuers. Each year, the ADR issuing companies are considered unconstrained and financially constrained companies are those that do not present ADR every year. According to Bruni (2002), companies which are subjected to greater informational demands by the *Securities and Exchange Commission* (SEC) and subject to the lower cost of capital and limitations to the local offers of external funds. Costa, Paz and

Funchal (2008), in using the ADR criteria isolatedly, find results compatible with Almeida, Campello and Weisbach (2004).

By the Intersection criteria between the criteria Size and *Payout* Total ($TAM \cap PAY$), only those that present the same state in both criteria are classified as constrained or unconstrained. According to the Size criteria, the companies were classified annually, based on the size using total assets as the *proxy*. The companies considered financially constrained had observations located in the three lowest inferior decimals, and financially unconstrained those in the three highest decimals of the distribution of the value of the total assets.

The justification for the Size criteria is in the evidence that the company's size is associated with its degree of financial friction (FAMA; FRENCH, 2002; FRANK; GOYAL, 2003), implying high costs of transaction and lower benefits with the economy of scale in the financing (FAULKENDER, 2002).

3.4.2 A Priori Classification Method as to the Hedging Need

If the investment opportunities occur in states of nature in which the cash flow is high, the possibility of the company financing them with internal funds increases, and even if external funds are necessary, these tend to present lower costs. So, if the future investment opportunities and the cash flow are positively correlated, there will be less need to *hedge*. However, if this correlation is negative, it makes sense to adjust the debt and cash policies as hedging against sub-investment, in transferring resources to a state of nature in which the internal funds are insufficient and the external funds are restricted or too costly.

As did Acharya, Almeida and Campello (2005), one adopts a correlation between cash flow and investment opportunities as a *proxy* for hedging needs. Just as two measurements for hedging *need* are adopted, based on two different *proxies* for investment opportunities.

The first *proxy* for investment opportunity was the sectorial average of the growth rate of net sales revenues of the three subsequent years (NH-Sales). It is supposed that the companies perceive the investment opportunities according to the growth estimates of future sales in their industry, and that these estimates coincide with the data observed *ex post*. The second *proxy* for investment opportunity was the annual variation of the sectorial average of Tobin's Q (NH-Q). The use of the variation of Tobin's Q avoids the high correlation with the company's Q and captures only the evolution of the investment opportunities.

The companies were classified sectorially by NAICS level 2. The *proxies* for investment opportunities on the sectorial level avoid potential endogeneity problems with the cash flow variable.

The sample was divided in groups of companies with low and high correlation between investment demand and cash flow. The observations with correlation between the cash flow and investment opportunities below -0.20 are classified as companies with high need of hedging (ANH), while companies that present a correlation above 0.20 were considered with low need of hedging (BNH)³.

3.5 Econometric Procedures

The first econometric procedure sought to verify if the classification criteria chosen to separate the companies between financially constrained and unconstrained are consistent. Based on the approach suggested by Almeida, Campello and Weisbach (2004), it is expected that the constrained companies present a positive and significant cash flow sensitivity of cash, while the unconstrained companies do not present a significant behavior. The following model⁴ was adopted, estimated by two-stage least squares (2SLS)ⁱⁱⁱ, with fixed effects for company and year:

$$\begin{aligned} \Delta RC_{i,t} = & \beta_0 + \beta_1 FC_{i,t} + \beta_2 Q_{i,t} + \beta_3 Tamanho_{i,t} \\ & + \beta_4 \Delta DLP_{i,t} + \beta_5 RC_{i,t-1} + \sum_i Firma_i + \sum_t Ano_t + e_{i,t} \end{aligned} \quad (1)$$

In which ΔRC was defined as the annual variation of the sum of cash and short term financial investments. Cash flow (FC) is defined as net profit, plus depreciation, minus dividends and interest on own capital. The Size (Ln(AT)), was defined as the neperian logarithm of the book value of the company's assets during the period. As a *proxy* for investment opportunities, Tobin's Q was used, measured as (total assets – net worth + market value of shares/total assets). In this first specification, the ΔDLP variable was considered endogenous and treated using the first lag of the balance of the long term financial indebtedness.

The second econometric specification sought to test the hypotheses raised in the present study. The theory suggests that the debt and cash holdings decisions are determined simultaneously. Therefore, the estimation by ordinary least squares would generate an inconsistency of the estimates, because the error associated with the equation finds itself correlated with the other endogenous variables, violating the hypothesis of the interdependence of errors with relation to the explaining variables. To avoid the problem at

issue, one adopts the estimated system of equations by least squares in three stages (3SLS)⁵ with fixed effects (company and year), represented thus:

$$\Delta DLP_{i,t} = a_0 + a_1 FC_{i,t} + a_2 Q_{i,t} + a_3 Tamanho_{i,t} + a_4 \Delta RC_{i,t} + a_5 DLP_{i,t-1} + \sum_i Firma_i + \sum_t Ano_t + e_{i,t}^d \quad (2)$$

$$\Delta RC_{i,t} = \beta_0 + \beta_1 FC_{i,t} + \beta_2 Q_{i,t} + \beta_3 Tamanho_{i,t} + \beta_4 \Delta DLP_{i,t} + \beta_5 RC_{i,t-1} + \sum_i Firma_i + \sum_t Ano_t + e_{i,t}^{rc} \quad (3)$$

To identify the system of equations, the difference in balance of the cash reserve and the long term debt was added. The identification strategy follows the approach by Fazzari and Petersen (1993), in which the variation of one specific asset is correlated negatively with the first balance of this asset. In this manner, the difference in balances in a cash period and the long term debt as instruments are added.

4 RESULTS ANALYSIS

Table 1 presents the descriptive, medium (superior in bold) and standard deviation (inferior) statistics, of the relevant variables for the study, between the periods of 1994 and 2008, as well as differences in averages between constrained (R) and unconstrained (I) companies.

Table 1 - Descriptive Statistics according to the Financial Constraint State

Criteria	Status	RC	AC-C	DCP	DLP	Q	FC	Ln(AT)	
ADR	Constrained	M	0.0939	0.3099	0.1079	0.1577	1.0545	0.0319	6.0247
		DV	0.1162	0.2215	0.1017	0.1328	0.6925	0.0898	0.7051
	Unconstrained	M	0.1227	0.2254	0.1097	0.2053	1.3545	0.0729	7.0667
		DV	0.1083	0.4154	0.0859	0.1109	0.7170	0.0708	0.5052
	<i>R ≠ I(p-value)</i>		0.0001	0.0000	0.7850	0.0000	0.0000	0.0000	0.0000
	FAYOUT	Constrained	M	0.0826	0.3073	0.1223	0.1680	1.1599	0.0153
DV			0.1149	0.2404	0.1168	0.1434	0.8242	0.1253	0.7663
Unconstrained		M	0.0997	0.2803	0.0942	0.1675	1.0991	0.0355	6.3642
		DV	0.1117	0.2773	0.0824	0.1279	0.6845	0.0503	0.7051
<i>R ≠ I(p-value)</i>		0.0003	0.0120	0.0000	0.9353	0.0754	0.0000	0.0000	
Constrained		M	0.0926	0.3168	0.1129	0.1579	1.1268	0.0252	5.9338
	DV	0.1187	0.2582	0.1098	0.1358	0.7825	0.1094	0.7760	

TAMHPAY	Unconstrained	M	0.0795	0.2023	0.0932	0.2110	1.1376	0.0405	6.9598
		DV	0.0833	0.1400	0.0715	0.1320	0.6247	0.0429	0.3849
		$R \neq I(p\text{-value})$	0.0713	0.0000	0.0005	0.0000	0.9244	0.0306	0.0000

Source: Prepared by the authors.

Note: Median (M), Standard Deviation (DV),

It is observed in Table 1 that, in general, the constrained companies present smaller cash reserves, a higher balance in other liquid assets, greater short term debt, smaller long term debt, fewer investment opportunities, smaller cash flow generation, smaller Total Assets, in relation to the unconstrained companies. These descriptive statistics suggest an empirical adaptation as to the theoretical profile of the constrained and unconstrained companies, more strongly identified by the debt and cash flow variables.

The first test involved the empirical verification of the capacity of the classification criteria to discriminate the companies between constrained and unconstrained, according to the cash flow sensitivity of cash. Table 2 presents the results for cash flow sensitivity of cash for the groups of constrained and unconstrained companies. Equation 1 is estimated, starting from 2SLS, with fixed effects for company and year. The *p-values* are informed between brackets.

Table 2: Cash Flow Sensitivities of Cash

Dependent Variable	Status	Independent Variables					R ²	N
		FC _{i,t}	Q _{i,t}	Ln(AT) _{i,t}	RC _{i,t-1}	ADLP _{i,t}		
ADR	Constrained	0.1461 (0.000)***	0.0294 (0.000)***	0.0784 (0.000)***	-0.5970 (0.000)***	-0.0343 (0.475)	0.318	1759
	Unconstrained	0.0071 (0.922)	0.0138 (0.252)	0.0246 (0.520)	-0.5382 (0.000)***	-0.1128 (0.373)	0.283	264
RAYOUT	Constrained	0.1416 (0.000)***	0.0322 (0.000)***	0.0787 (0.000)***	-0.5346 (0.000)***	0.0795 (0.186)	0.289	986
	Unconstrained	0.0070 (0.874)	0.0241 (0.024)**	0.0648 (0.019)**	-0.5880 (0.000)***	-0.0431 (0.453)	0.329	611
TAM ∩ PAY	Constrained	0.1015 (0.000)***	0.0251 (0.000)***	0.0742 (0.000)***	-0.5872 (0.000)***	0.1084 (0.036)**	0.345	348
	Unconstrained	-0.0397 (0.357)	0.0113 (0.390)	0.0057 (0.861)	-0.5248 (0.000)***	0.0106 (0.883)	0.351	314

Source: Prepared by the authors.

Note: ***, ** and *, indicate a statistical significance on the level of 1, 5 and 10%, respectively.

Table 2 indicates that the constrained companies present a cash flow sensitivity of cash, while unconstrained companies do not present a statistically significant behavior. The results were insensitive to the *a priori* classification criteria. The Q variable showed itself to be systematically positive and significant only for constrained companies, a behavior consistent with the empirical implication that the adjustment of the financial policies to finance the investment opportunities would be a concern only for constrained companies^{6,7}.

The separation of the companies as to their state of financial constraint was empirically successful, considering the theoretical correspondence observed in the descriptive statistics and the regressions to verify the cash flow sensitivity of cash.

Table 3 reports, for constrained companies, the results of the estimation of equations 2 and 3 using 3SLS (fixed effects for company and year). Cash flow and debt sensitivity of cash is reported between the groups of constrained companies with high (ANH) and low (BNH) need for hedging using the measurements NH-Sales (Panel A) and NH-Q (Panel B). The *p-values* are informed between brackets.

The results shown in Table 3 indicate that the constrained companies, when separated by degree (ANH/BNH) and by measurement (NH-Sales/NH-Q) of the need for hedging, presented a cash flow sensitivity of cash in all tested groups. Constrained companies present a negative cash flow sensitivity of debt in all groups, independently of the degree or measurement of the need for hedging.

Table 3: Constrained Companies: Need for Hedging and Propensity to Generate Cash Versus Reduce Debt.

Criteria	Status	Dependent Variable	Independent Variables					R ²	N
			FC _{i,t}	Q _{i,t}	Ln(AT) _{i,t}	RC _{i,t-1} / DLP _{i,t-1}	ΔDLP _{i,t} / ΔRC _{i,t}		
PANEL A: Need for Hedging (Measurement Based on the Sectorial Average of the Sales Growth Rate)									
ADR	ANH	ΔRC _{i,t}	0.0511	0.0112	0.0459	-0.6801	0.0503	0.399	843
			(0.068)*	(0.036)**	(0.003)***	(0.000)***	(0.273)		
	BNH	ΔDLP _{i,t}	-0.2186	0.0062	0.1374	-0.5277	-0.0679	0.414	540
			(0.000)*	(0.390)***	(0.000)***	(0.000)***	(0.351)		
	BNH	ΔRC _{i,t}	0.1781	0.0447	0.0826	-0.6368	-0.0972	0.436	540
			(0.000)***	(0.000)***	(0.312)	(0.000)***	(0.076)*		
BNH	ΔDLP _{i,t}	-0.1898	-0.0359	0.1745	-0.4510	0.2021	0.506	540	
		(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.035)**			
PAYOUT	ANH	ΔRC _{i,t}	0.0743	0.0114	0.0667	-0.7558	0.1028	0.526	483
			(0.004)***	(0.018)**	(0.001)***	(0.000)***	(0.029)**		
	BNH	ΔDLP _{i,t}	-0.2134	0.0126	0.1476	-0.5288	-0.2149	0.462	324
			(0.000)***	(0.136)	(0.000)***	(0.000)***	(0.058)*		
	BNH	ΔRC _{i,t}	0.1713	0.0618	0.0773	-0.4612	0.1767	0.511	324
			(0.000)***	(0.000)***	(0.013)**	(0.000)***	(0.035)**		
BNH	ΔDLP _{i,t}	-0.2014	-0.0282	0.1655	-0.4195	0.3835	0.516	324	
		(0.000)***	(0.061)*	(0.000)***	(0.000)***	(0.019)**			
ANH	ΔRC _{i,t}	0.0802	0.0172	0.0743	-0.7185	0.1040	0.445	142	
		(0.003)***	(0.001)***	(0.000)***	(0.000)***	(0.032)**			
ANH	ΔDLP _{i,t}	-0.1994	0.0080	0.1616	-0.5179	-0.4344	0.437	142	

<i>TAM</i> ∩ <i>PAY</i>		(0.000)***	(0.302)	(0.000)***	(0.000)***	(0.581)	
	$\Delta RC_{i,t}$	0.1497	0.0528	0.1055	-0.4634	0.1239	0.448
		(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.130)	
<i>BNH</i>							114
	$\Delta DLP_{i,t}$	-0.1864	-0.0258	0.1414	-0.4336	0.1902	0.493
		(0.000)***	(0.019)**	(0.000)***	(0.000)***	(0.079)*	

Source: Prepared by the authors.

Note: ***, ** and *, indicate a statistical significance on the level of 1, 5 and 10%, respectively.

Table 3: Constrained Companies: Need for Hedging and Propensity to Generate Cash Versus Reduce Debt (continued)

Criteria	Status	Dependent Variable	Independent Variables					R ²	N
			FC _{i,t}	Q _{i,t}	Ln(AT) _{i,t}	RC _{i,t-1} / DLP _{i,t-1}	$\Delta DLP_{i,t}$ / $\Delta RC_{i,t}$		
PANEL B: Need for Hedging (Measurement Based on Variation in Sectorial Average of Tobin's Q)									
		$ARC_{i,t}$	0.1782	0.0244	0.0672	-0.6155	0.0925	0.471	
			(0.000)***	(0.000)***	(0.006)***	(0.000)***	(0.124)		
	<i>ANH</i>	$ADLP_{i,t}$	-0.2568	-0.0096	0.1187	-0.5128	0.2136	0.475	601
			(0.000)***	(0.242)	(0.000)***	(0.000)***	(0.006)***		
<i>ADR</i>		$ARC_{i,t}$	0.2524	0.0401	0.0704	-0.7259	0.1483	0.522	
			(0.000)***	(0.000)***	(0.010)***	(0.000)***	(0.096)*		
	<i>BNH</i>	$ADLP_{i,t}$	-0.2566	-0.0201	0.2030	-0.4758	0.0431	0.504	679
			(0.000)***	(0.004)***	(0.000)***	(0.000)***	(0.423)		
		$ARC_{i,t}$	0.1588	0.0169	0.0018	-0.5614	0.1806	0.497	
			(0.000)***	(0.023)**	(0.949)	(0.000)***	(0.011)**		
	<i>ANH</i>	$ADLP_{i,t}$	-0.2286	0.0034	0.1721	-0.4890	0.2471	0.507	382
			(0.000)***	(0.719)	(0.000)***	(0.000)***	(0.049)**		
<i>PAYOUT</i>		$ARC_{i,t}$	0.2700	0.0657	0.0438	-0.5927	0.1691	0.674	
			(0.000)***	(0.000)***	(0.098)*	(0.000)***	(0.098)**		
	<i>BNH</i>	$ADLP_{i,t}$	-0.2979	-0.0108	0.1591	-0.4071	0.0355	0.612	386
			(0.000)***	(0.339)	(0.000)***	(0.000)***	(0.694)*		
		$ARC_{i,t}$	0.1274	0.0226	0.0735	-0.5935	0.1045	0.473	
			(0.000)***	(0.001)***	(0.001)***	(0.000)***	(0.116)		
	<i>ANH</i>	$ADLP_{i,t}$	-0.2497	-0.0069	0.1253	-0.4905	0.2110	0.474	121
<i>TAM</i> ∩ <i>PAY</i>			(0.000)***	(0.373)	(0.000)***	(0.000)***	(0.007)***		
-		$ARC_{i,t}$	0.2358	0.0661	0.0772	-0.6766	0.1157	0.542	
			(0.000)***	(0.000)***	(0.005)***	(0.000)***	(0.261)		
	<i>BNH</i>	$ADLP_{i,t}$	-0.2882	-0.0207	0.1640	-0.4140	0.0841	0.513	139
			(0.000)***	(0.027)**	(0.000)***	(0.000)***	(0.165)*		

Source: Prepared by the authors.

Note: ***, ** and *, indicate a statistical significance on the level of 1, 5 and 10%, respectively.

Table 4 reports, for unconstrained companies, the results of the estimation of equations 2 and 3 using 3SLS (fixed effects for company and year). Cash flow sensitivity of cash and

debt is reported between the groups of constrained companies with high (ANH) and low (BNH) needs for hedging using the measurements NH-Sales (Panel A) and NH-Q (Panel B). The *p-values* are informed between brackets.

The results shown in Table 4 indicate that the unconstrained companies, when separated by degree (ANH/BNH) and by measurement (NH-Sales/NH-Q) of the need for hedging, did not present a cash flow sensitivity of cash in any of the tested groups. Unconstrained companies also presented a negative and systematic cash flow sensitivity of debt, independently of the degree of the need for hedging.

Table 4: Unconstrained Companies: Need for Hedging and Propensity to Generate Cash Versus Reduce Debt.

Criteria	Status	Dependent Variable	Independent Variables				R ²	N		
			FC _{i,t}	Q _{i,t}	Ln(AT) _{i,t}	RC _{i,t-1} / ΔDLP _{i,t} / ΔRC _{i,t}				
PANEL A: Need for Hedging (Measurement Based on the Sectorial Average of the Growth Rate of Sales)										
ADR	ANH	ARC _{i,t}	0.0903 (0.301)	0.0101 (0.485)	0.0529 (0.285)	-0.5496 (0.000)***	0.2127 (0.311)	0.295	137	
		ADLP _{i,t}	-0.1744 (0.122)	0.0218 (0.256)	0.0272 (0.759)	-0.4354 (0.000)***	0.0607 (0.795)	0.313		
	BNH	ARC _{i,t}	-0.0362 (0.809)	0.0189 (0.466)	-0.0057 (0.942)	-0.4469 (0.000)***	0.0802 (0.537)	0.529		89
		ADLP _{i,t}	-0.3914 (0.020)**	0.0002 (0.994)	0.2046 (0.032)**	-1.1898 (0.000)***	-0.5891 (0.059)*	0.528		
FAYOUT	ANH	ARC _{i,t}	-0.0043 (0.927)	0.0271 (0.020)**	0.0783 (0.002)***	-0.5964 (0.000)***	-0.1185 (0.036)**	0.539	330	
		ADLP _{i,t}	-0.1345 (0.063)*	-0.0118 (0.517)	0.2078 (0.006)***	-0.7820 (0.000)***	-0.0582 (0.676)	0.476		
	BNH	ARC _{i,t}	0.0595 (0.410)	0.0091 (0.529)	0.1809 (0.000)***	-0.6833 (0.000)***	0.0710 (0.433)	0.579		196
		ADLP _{i,t}	-0.3647 (0.000)***	0.0239 (0.119)	0.1749 (0.000)***	-0.6832 (0.000)***	0.1720 (0.112)	0.684		
TAMOPAY-	ANH	ARC _{i,t}	0.0224 (0.703)	0.0068 (0.608)	0.0441 (0.267)	-0.3780 (0.000)***	0.0236 (0.720)	0.435	151	
		ADLP _{i,t}	-0.0705 (0.422)	-0.0354 (0.074)*	0.1516 (0.007)***	-0.8823 (0.000)***	-0.4085 (0.115)	0.489		
	ARC _{i,t}	0.1629	0.0236	0.1702	-0.8107	0.0293	0.590			

		(0.130)	(0.171)	(0.032)**	(0.000)***	(0.855)	
	BNH	<hr/>					118
	ADLP _{i,t}	-0.1797	0.0241	0.1401	-0.6988	-0.2898	0.504
		(0.233)	(0.373)	(0.249)	(0.000)***	(0.278)*	
PANEL B: Need of Hedging (Measurement Based on Variation of the Sectorial Average of Tobin's Q)							
		0.0476	-0.0036	0.0236	-0.4337	-0.0540	
	ANH	<hr/>					128
	ADLP _{i,t}	-0.2153	0.0079	0.0956	-0.6778	-0.0628	0.474
		(0.019)**	(0.732)	(0.055)*	(0.000)***	(0.822)	
ADR		<hr/>					
	ANH	-0.2336	0.0277	0.0004	-0.5990	-0.2213	0.455
		(0.190)	(0.423)	(0.996)	(0.000)***	(0.344)	
	BNH	<hr/>					111
	ADLP _{i,t}	-0.5281	0.0173	0.0833	-0.6811	0.0479	0.642
		(0.020)**	(0.567)	(0.296)	(0.000)***	(0.754)	
		<hr/>					
	ANH	-0.0207	0.0287	0.0292	-0.6142	0.0491	0.682
		(0.716)	(0.013)**	(0.265)	(0.000)***	(0.540)	
	BNH	<hr/>					235
	ADLP _{i,t}	-0.2249	-0.0210	0.0339	-0.7269	0.2164	0.600
		(0.000)***	(0.160)	(0.309)	(0.000)***	(0.096)*	
FAYOUT		<hr/>					
	ANH	-0.0156	0.0361	0.0969	-0.6827	-0.0772	0.639
		(0.856)	(0.016)**	(0.057)*	(0.000)***	(0.561)	
	BNH	<hr/>					238
	ADLP _{i,t}	-0.3704	-0.0039	0.2873	-0.5827	0.1397	0.499
		(0.000)***	(0.816)	(0.000)***	(0.000)***	(0.185)	
		<hr/>					
	ANH	0.0499	0.0057	-0.0975	-0.5326	0.0510	0.541
		(0.372)	(0.704)	(0.015)**	(0.000)***	(0.436)	
	BNH	<hr/>					122
	ADLP _{i,t}	-0.1426	0.0062	-0.1110	-0.8507	-0.3588	0.599
		(0.117)	(0.797)	(0.070)*	(0.000)***	(0.166)	
TAMOPAY		<hr/>					
	ANH	0.0269	0.0005	-0.0092	-0.4232	-0.1436	0.484
		(0.763)	(0.973)	(0.852)	(0.000)***	(0.363)	
	BNH	<hr/>					164
	ADLP _{i,t}	-0.3453	0.0374	0.1390	-0.4577	-0.2199	0.629
		(0.000)***	(0.040)**	(0.012)**	(0.000)***	(0.357)	

Source: Prepared by the authors.

Note: ***, ** and *, indicate a statistical significance on the level of 1, 5 and 10%, respectively.

The results do not allow the acceptance of hypotheses H1 and H2 of the present study. That is, constrained companies with high need of hedging, although they have presented a positive cash flow sensitivity of cash, do not simultaneously present a positive cash flow sensitivity of debt. Just as constrained companies with a low need for hedging, although they have presented a negative cash flow sensitivity of debt, they also present a positive and significant cash flow sensitivity of cash.

Hypothesis H3 cannot be rejected for unconstrained companies, independently of the hedging need, do not present cash flow sensitivity of cash, but present a negative and significant cash flow sensitivity of debt. Therefore, the test results after the separation of the companies according to the degree of hedging need were not different in relation to the cash policies, as observed in Table 2 for companies separated only by their state of financial constraint.

Therefore, the evidence suggests that Brazilian publicly-traded companies do not coordinate the cash and debt policies as a hedging mechanism against sub-investment. At the same time, the evidence reinforces the hypothesis of Almeida, Campello and Weisbach (2004) of the relevance of liquidity only for financially constrained companies.

Some robustness testing was performed involving alternative *proxies* for the following theoretical constructs: (1) for Investment Opportunities: a) approximation by Chung and Pruitt and, b) sectorial growth tax (NAICS level 3) of the net sales revenues of the three subsequent years; (2) for Cash Flow (Free): a) net profit plus depreciation (*proxy* for non-discretionary reinvestments) minus non-recurring results, dividends and interest on the own capital, and b) in which a) less applications in permanent assets (*proxy* for non-discretionary reinvestments); (3) for Cash Reserve: a) available plus short terms investments plus other short term investments; (4) For Financial Debt: a) total debentures (short and long term) plus total investments (short and long term); Size: a) natural logarithm of the sales net revenue.

Also, a sampling restriction was performed, involving the exclusion of companies from regulated sectors. The exclusion is justified by the lesser flexibility that these companies potentially would have in determining their financial policies. The results were qualitatively similar.

The cause of the non-correspondence between the findings of Acharya, Almeida and Campello (2007) and the present research can be associated to the supposition adopted in the theory that the administrators, having a greater capacity to visualize the realization of the future cash flow in relation to the *outsiders*, tend to anticipate the effects of the financial frictions adjusting the financial policies of the companies so that the impact of these frictions is minimized.

However, for Baum *et al.* (2006), in increasing the macroeconomic uncertainty, the ability of the administrators to accurately predict the future cash flow is hindered, causing them to become conservative. Differently from times of macroeconomic stability, the

administrators would be capable of producing accurate predictions of the future cash flow, allowing the cash policy to become idiosyncratic. Therefore, given the macroeconomic uncertainties, typical of emerging markets, under which the companies were subjected, may have harmed the adjustment capacity of the financial policies in the manner that Acharya, Almeida and Campello's theory (2007) defends.

The differences in behavior between the findings of the present research and that of Acharya, Almeida e Campello (2007), between the states of financial constraint and the need for hedging, may also be associated to the financing characteristics of Brazilian companies. According to Pimentel *et al.* (2008), Brazilian companies have a high rate of financing by means of bank loans. This occurs because, despite the considerable growth, the Brazilian debt market is still small compared to that of developed countries.

Beyond these limitations, Leal and Saito (2003) add that the costs of *underwriting* and *underpricing* of stocks and bonds are higher than those found in the USA. And a large part of the companies is limited to the resources of the Banco Nacional de Desenvolvimento Econômico e Social (BNDES) as a source of long term financing. For Zani and Procianoy (2006), the Brazilian credit market is supported by guarantees, given the high uncertainty related to the cash flow of companies resulting from the economic instability. In these circumstances, it is expected that, even in the occurrence of a positive cash flow sensitivity of debt, there is no cash flow sensitivity of cash. The demand for collateral causes the resources cleared by the creditors to be applied immediately, making it difficult to transfer these resources between the states of low and high need of hedging.

Another factor associated to the collateral is the supposition of the model by Acharya, Almeida and Campello (2007) that cash can be turned into collateral, at least partially. However, in Brazil, evidence suggests that the mechanisms that favor this possibility, such as the institution of contractual *covenants* is still incipient (SILVA, 2008).

Not only that, there is evidence of the behavior observed by Almeida and Campello (2010) in American companies, that is, companies that presented a negative cash flow sensitivity of debt independently of the state of financial constraint. However, it is observed that the constrained companies presented, on average, a significantly lower cash flow sensitivity of debt in relation to unconstrained companies.

The argument of these authors for this behavior is that the relationship between internal and external funds in constrained companies is not one of substitutivity, but of

complementarity. This complementarity arises from the interdependence of the financing and investment decisions, given the endogeneity of the investment when the companies are subject to more costly financing sources. In this case, constrained companies would have greater benefits in using the marginal cash flow in capital expenditures in the present, when forming a reserve of liquid assets to finance future investments and generating a collateral effect to increase the borrowing capacity, and fewer reasons to reduce the demand for external funds.

5 FINAL CONSIDERATIONS

The objective of the present study was to investigate if Brazilian publicly-traded companies coordinated the cash and debt policies for hedging purposes in conditions of financial constraint. For this purpose, the hypothesis was tested that constrained companies coordinate their cash and debt policies as a hedging mechanism, preferring cash to borrowing capacity in states of high need of hedging, while they prefer borrowing capacity instead of cash in states of low need of hedging. The financial policies of the unconstrained companies would be independent of the state of need of hedging. The results show that the constrained companies do not present a behavior predicted by theory. The group of constrained companies presented a positive cash flow sensitivity of cash, in low and in high need of hedging, in a systematic manner among the classification criteria. Just as they presented a negative cash flow sensitivity of cash, systematically among the classification criteria and among the states of the need for hedging.

The additional empirical results indicate that, in the same manner as in Almeida, Campello and Weisbach (2004), the companies with financial constraint present a positive cash flow sensitivity of cash while the unconstrained companies did not present this behavior. However, differently from what proposed the theory of Acharya, Almeida and Campello (2007), the constrained companies presented, systematically, a negative cash flow sensitivity of debt, although to a lesser degree than that presented by unconstrained companies. This evidence has a correspondence to the arguments of Almeida and Campello (2010) that the relationship between internal and external funds in constrained companies is not one of substitutivity, but of complementarity. This reinforces the argument that the managers not only react to the financial frictions when they occur, but also anticipate these frictions by adjusting the financial policies to reduce the adverse impact of the financial restriction.

The observed results were maintained while using alternative *proxies* for the theoretical constructs and sampling restrictions involving the exclusion of regulated sectors.

The divergent results to those of Acharya, Almeida and Campello (2007) obtained in the present research reinforce the arguments of Bekaert and Harvey (2002) about the importance of revising financial theory, according to the emerging markets. According to Tirole (2006), the financial decisions do not occur in an institutional vacuum. One must consider the existing relations between the incentives to commit the results and raise funds: such as *covenants*; monitoring structures; control rights; composition of the administrative council; composition of the management council; financial structure of the country; taxation; *enforcement*; and macroeconomic policies.

Therefore, because of macroeconomic uncertainty, the low degree of development of the capital market, or even through the low use of contractual *covenants*, the need becomes evident of understanding how the suppositions of the model of Acharya, Almeida and Campello (2007) can differ between the different environments, which is reflected in the difference in behavior between Brazilian and American companies.

The present study contributes to the national literature about capital structure and credit rationing. The empirical studies on capital structure in Brazil still systematically ignore the interrelation between corporate investment and financing decisions, supposing that investment is exogenous to financial policies. Also, the interdependencies between financial policies to satisfy an optimal level of investment intertemporally are not studied. The present study contributes to fill up this gap.

This work is also related to hedging literature. The studies in Brazil on corporate hedging policy have focused on the use of financial derivative instruments. However, there have emerged evidence in the international literature that companies use, as a substitute or complement, other hedging mechanisms, especially against sub-investment. Among the mechanisms are the operational strategies for the formation of an active internal capital market (TONG; 2011; SUBRAMANIAM *et al.* 2011; ALMEIDA; KIM, 2012), and the adjustment strategies in financial policies, like the interaction between cash and debt policies (ACHARYA; ALMEIDA and CAMPELLO; 2007).

The study of alternative hedging instruments to financial derivatives intensify in an emerging economy like Brazil, where the risks to which the companies are subject tend to be less marketable. In Brazil, a new dimension of hedging is being tested empirically, involving the interaction between the cash and debt policies, which contributed to the understanding of how and in what environmental conditions the interaction between cash and debt policies is used as a hedging mechanism against sub-investment. Also, this allows a better understanding

of the role of hedging need and its effect on the preference for cash or borrowing capacity in emerging economies like Brazil.

One of the practical contributions of studies of this nature occurs through the fact that the evaluation of the cash balance is an unresolved issue in *valuation* (DAMODARAN, 2006). Understanding when cash is negative debt contributes to understanding the results of empirical works that have reported that the market can evaluate one dollar in cash at more or less one dollar, depending on certain corporate and institutional characteristics (FAULKENDER e WANG, 2006; PINKOWITZ; STULZ and WILLIAMSON, 2006).

The results found strengthen the arguments on the need to adjust the suppositions of financial theory to emerging markets and of considering environmental variables that condition the financial behavior of the companies.

In general, it is suggested that future research advance this promising line of research. In Brazil, the study of cash policies is still neglected, even more when it is an integrated study with other financial policies, as is the case of the present research.

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ii However, the analysis period comprehended the period between 1995 and 2008, for three consecutive years and subsequent data were necessary to measure the *proxy* need for hedging.

2 According to Laws 6.404/76 and 10.303/01, when the statute is silent and the general assembly deliberates to alter it to introduce a rule on dividends, the mandatory dividend cannot be lower than 25% of the adjusted net profit. Therefore, the justification for the separation of the companies with payout zero or with a payout lower than 25% is to avoid that these companies be classified as unconstrained. In this study, therefore, no unconstrained companies were observed with a payout total lower than 25%.

3 Qualitatively similar results were obtained using the sectorial classification NAICS-3 and using as a cutoff range the correlation between 0.10 and -0.10.

4The great advantage of using the two-stage least squares method is that this provides, asymptotically, the best estimation of the parameters of an equation in a system of simultaneous equations.

5 The three stage least squares method is formed from the junction between the two-stage least squares and SUR methods, seeking in this manner, to obtain an efficient estimator for the simultaneous equation system.

6 Additional analyses demonstrate that companies had a low degree of variation between the states of financing restriction during the analyzed period. The companies alter with greater intensity their positions between low and high need of hedging. Association tests were made between the financial constraint test and the hedging need where a strong association between the classification criteria was detected, indicating the robustness of its application. Additional tests and descriptive statistics are available on demand.

7 Portal, Zani and Silva (2012) tested the alternative specification suggested by Almeida, Campello and Weisbach (2004) and reported qualitatively similar results to those reported in Table 3.