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INFLUENCE OF CASH FLOW ON LEVERAGE ADJUSTMENTS: EMPIRICAL EVIDENCE FROM BRAZIL

Eduardo Ottoboni Brunaldi
Mestrando em Finanças pela FEA-USP.
eduardo.brunaldi @usp.br

Eduardo Kazuo Kayo
Doutor em Administração pela FEA-USP.
Professor da Faculdade de Economia, Administração e Contabilidade da Universidade de São Paulo.
kayo@usp.br

José Roberto Securato
Doutor em Administração pela FEA-USP.
Professor da Faculdade de Economia, Administração e Contabilidade da Universidade de São Paulo.
securato @usp.br

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OBJETIVO
A pesquisa tem como objetivo verificar a influência da geração de caixa (negativa ou positiva) na velocidade com a qual as empresas ajustam a sua estrutura de capital.

METODOLOGIA
Este estudo baseia-se na metodologia de velocidade de ajuste proposta por Faulkender et al (2012). O modelo de ajuste parcial estabelece que a mudança observada na estrutura de capital é uma função da mudança desejada. A partir dessa premissa, os autores propõem uma metodologia em que a mudança desejada seja colocada em função do fluxo de caixa gerado pela empresa para avaliar os seus efeitos na velocidade de ajuste da estrutura de capital. Esta, por sua vez, foi aferida a partir do estimador de Mínimos Quadrados Ordinários com Erros Robustos, para dirimir a heteroscedasticidade. A amostra refere-se às empresas brasileiras de capital aberto na BM&F Bovespa no período de 2003 a 2013.

RESULTADOS E CONCLUSÕES
Consistentes com Faulkender et al (2012), os resultados evidenciam que as empresas brasileiras ajustam a sua estrutura de capital em direção ao alvo, e que a geração de fluxo de caixa tem influência na velocidade desse ajuste. Mais especificamente, em empresas sub-endividadas o fluxo de caixa aumenta a velocidade de ajuste, independentemente do nível de geração de caixa. Nas empresas sobre-endividadas, o fluxo de caixa influencia significativamente a velocidade de ajuste somente quando a sua geração é alta.

IMPLICAÇÕES PRÁTICAS
A literatura recente indica que os custos de transação impedem que as empresas ajustem a sua estrutura de capital mais rapidamente. No entanto, conforme sugere Faulkender et al (2012), incentivos ao acesso ao mercado de capitais, como a geração de caixa, desempenham um papel importante na velocidade de ajuste, visto que pode fazer com os ajustes ocorram a custos marginais. Os resultados deste estudo vão ao encontro de Faulkender et al (2012), ao evidenciar que as decisões de estrutura de capital das empresas brasileiras são influenciadas não só pelo custo de transação, mas também pelo incentivo a acessar o mercado de capitais.

PALAVRAS-CHAVE
Fluxo de caixa, velocidade de ajuste, estrutura de capital

INFLUENCE OF CASH FLOW ON LEVERAGE ADJUSTMENTS: EMPIRICAL EVIDENCE FROM BRAZIL

OBJECTIVE

This paper intend to assess the influence of absolute cash flow realization (negative or positive) on the capital structure adjustments in Brazilian firms.

METHODOLOGY

This study is based on the methodology proposed by Faulkender et al (2012). The standard partial adjustment model states that the observed leverage change is a function of the desired leverage change. Based on this assumption, the authors developed a methodology that adjusts the desired leverage change in function of cash flow realization in order to assess its effects on leverage adjustments. The speed of adjustment was estimated through the OLS estimator with robust errors in order to decrease the heteroskedastic effect. The sample is comprised by publicly-traded Brazilian firms (BM&F Bovespa) in the period 2003-2013.

RESULTS AND CONCLUSIONS

Consistent with Faulkender et al (2012), the results evidence the adjustment behavior in Brazilian firms and the influence of cash flow in the speed of adjustment. Cash flow influences positively the speed of adjustment in underleveraged firms, regardless its realization level. However, speed of adjustment in overleveraged firms are significantly influenced by cash flow just when its realization is high.

PRACTICAL IMPLICATIONS

According to recent corporate finance literature, firms do not adjust their capital structure faster due to transaction costs. However, Faulkender et al (2012) defend that incentives to access capital market play an important role on capital structure decisions. According to the authors, these incentives can be performed by cash flow realization. The results of this paper corroborate Faulkender et al's (2012) hypothesis by showing that in Brazilian firms not only transaction costs influence financing decisions, but also cash flow realization.

KEY-WORDS

Cash-flow; speed of adjustment; capital structure

INTRODUCTION

How do capital structure decisions influence firm value? Initial corporate finance studies that focus on providing answers to this matter were the theoretical basis of trade-off theory. The latter defends the existence of an optimal leverage where debt benefits (tax shields) and costs (bankruptcy) are balanced, and accordingly, a firm's value is maximized. In addition, recent trade-off research shows target behavior, that is, firms continually make financing decisions in order to reach their target leverage (Flannery & Rangan, 2006; Huang & Ritter, 2009; Flannery & Hankins, 2013).

The speed at which firms close the gap between the actual and target leverage is related to adjustment costs (Flannery & Rangan, 2006). For instance, if these costs were absent, firms would adjust their capital structure immediately, and if they were infinite no adjustment would be noted. Recent evidence, however, shows that some endogenous mechanism such as corporate governance, investment, and debt level influence firms' sensibility to adjustment costs (Hovakimian, 2004; Dudley, 2012; Chang, Chou & Huang, 2014).

Faulkender, Flannery, Hankins, and Smith (2012) point out that cash flow acts on the firm's incentive to access capital markets. That is, cash flow realization boosts the firm's access capital market to issue debt or equity, repurchase stock, or pay off debt in order to fulfill the deviation from target. The authors conclude that firms that generate absolute cash flow (negative or positive) adjust faster than firms with cash flow realization close to zero. Based on Faulkender et al. (2012), we analyzed the relationship between cash flow and the speed of capital structure adjustment in publicly-traded Brazilian firms.

Our sample refers to Brazilian firms whose stock are traded on the BM&F Bovespa from 2003 to 2013. The data were collected from Economatica and, according to standard practices, financial, and regulated utilities were excluded. Using the standard partial adjustment model and variables proposed by Flannery and Rangan (2006) and Faulkender et al. (2012), we estimate the speed of adjustment (SOA) through the OLS estimator with robust errors in order to decrease the heteroskedastic effect.

Our initial results show that firms adjust their capital structure between 18.41% and 38.20%, consistent with prior literature - See Fama and French (2002), Flannery and Rangan (2006), Faulkender et al. (2012) for more details. Moreover, after we categorized the sample as under or overleveraged, we found that the latter adjust faster, which is also consistent with prior literature - See Hovakimian (2004) for more details. We then decomposed the desired change (right side of the partial adjustment model) in function of cash flow. Our results show that firms with higher absolute cash flow realization adjust their capital structure faster. Specifically, when cash flow is lower than the absolute deviation from target (absolute actual minus absolute target), firms seem to use it to adjust faster. After cash flow is exhausted, the coefficients indicate that decisions are made in order to reach the target. When cash flow is higher than the absolute deviation, the results indicate that firms use it to close the gap. When the target has been reached, firms maintain their leverage at an optimal point.

This paper contributes to corporate finance literature by providing empirical evidence of the influence of cash flow on financing decisions in Brazil, especially in regards to the speed at which firms adjust their capital toward a target. The structure of the paper is as follows: Section 2 presents a summary of the literature; Section 3 offers the econometric model, variables and development of the hypothesis; Section 4 exhibits and discusses the results; and, in the last section, conclusions are presented.

LITERATURE REVIEW

The two main capital structure chains, trade-off and pecking order, are divergent on the influence of cash flow on leverage. On the one hand, pecking order defends that firms with high cash flow realization tend to be less leveraged, since firms prefer to invest with internal resources rather than external. On the other hand, according to trade-off theory, a high cash flow surplus enables a higher payment of debt interests and principle and, consequently, a higher leverage.

Although recent literature indicates a potential complementarity between the aforementioned theories, it is possible to affirm – to the best of our knowledge – that the majority of capital structure papers indicates that trade-off theory is more consistent with firms' financing behavior. Flannery and Rangan (2006) and Huang and Ritter's (2009) results not only corroborate trade-off, but also justify low SOA (between 25% and 40% per year) with adjustment costs. In addition to those authors, Faulkender et al. (2012) state that the incentive to access capital markets is a determinant factor that is as important as transaction costs in the SOA. Moreover, depending on the incentive, adjustment costs become marginal.

Faulkender et al. (2012) focus on the incentive produced by cash flow realization, regardless of whether it is positive or not. If it is positive, firms can access the capital market to repurchase stock (if firms are underleveraged) or pay off debts (if firms as overleveraged). If cash flow is negative, firms can access the capital market in order to cover this deficit with debt or equity issuance, depending on the leverage condition. In other words, absolute cash flow creates opportunities for firms to adjust their capital structure toward a target, if managers so wish. From this premise, Faulkender et al. (2012) show that firms with a cash flow close to zero adjusted 23%-26% per year, which is consistent with Flannery and Rangan (2006). However, firms with a high cash flow realization – that is, higher than the deviation from the target – adjusted from 69% to 90% when overleveraged and from 27%-52% when underleveraged. This is consistent with the hypothesis of cash flow as an incentive for adjustment. Facing Faulkender et al.'s (2012) evidence, we ran tests to see if cash flow realization has a catalytic effect on the speed of capital structure adjustment in a Brazilian context.

METHODS

SAMPLE AND DATA

The sample is comprised of publicly-traded Brazilian firms (BM&F Bovespa) in the period 2003-2013, with financial information being collected from Economatica. From the initial sample, we excluded financial and regulated utilities, according to standard practices (Chang, Chou, & Huang, 2014; Uysal, 2011; Fama & French, 2002), as their capital structure decisions reflect distinct factors in comparison with the remainders industries.

ECONOMETRIC MODEL

Equation [1] is the standard partial adjustment model:

$$LEV_{i,t} - LEV_{i,t-1} = \omega\left(LEV^{*}_{i,t} - LEV_{i,t-1}\right) + \varepsilon_{i,t-1} \quad [1]$$

Where $LEV_{i,t}$ and $LEV_{i,t-1}$ refer to the contemporaneous *(t)* and the previous period *(t-1)* leverage of firm i, respectively. $LEV^{*}_{i,t}$ refers to the target leverage and ω refers to the speed on which capital structure is adjusted. By definition, this coefficient varies from zero (0) to one (1), where 0 means no adjustment observed and one (1), in turn, means immediately adjustment. In other words, firms leverage equals to the their target one. Following Flannery and Rangan (2006) and Faulkender et al. (2012), we defined the target as a function of lagged firms' characteristics ($X_{i,t-1}$), according to Equation [2]:

$$LEV^{*}_{i,t} = \theta X_{i,t-1} \quad [2]$$

In order to use a more robust estimator like difference-GMM (Arellano & Bond, 1991) and system-GMM (Blundell & Bond, 1998), researches usually substitute Equation [2] in [1]. However, we followed Faulkender et al. (2012) and hence, we estimated the SOA with the OLS estimator with robust errors in two steps. Firstly, we calculated the target ([2]) year-by-year and then the SOA ([1]).

VARIABLES AND HYPOTHESIS DEVELOPMENT

LEVERAGE

We adopted the concept of active book leverage, which follows Faulkender et al. (2012). In contrast with standard book leverage, the active measure discards a passive change on leverage due to the addition of net income in net worth accounts on balance sheets. The authors note that when the leverage is adjusted passively, there is no incidence of transaction costs and cash flow does not influence such changes. This could rendering the analysis biased. Our intention specifically is to analyze the changes that occurred through debt or equity issuances or stock repurchase that demand access to capital markets. From Equation [1], we changed both its sides, including the concept of lagged leverage, as noted in Equation [3]:

$$LEV_{i,t} - LEV^{p}_{i,t-1} \equiv \frac{TD_{i,t}}{TA_{i,t}} - \frac{TD_{i,t-1}}{TA_{i,t-1} + NI_{i,t}} = \lambda\left(LEV^{*}_{i,t} - LEV^{p}_{i,t-1}\right) + \epsilon_{i,t} \qquad [3]$$

After the inclusion of the active leverage, all the residual changes would represent the active leverage adjustment. That is, if an observed change occurs passively, the left side of Equation [3] assumes zero value.

Active book leverage decreases the potential bias on the analysis of book measures of leverage changes. This bias is mainly due to accounting practices, especially in Brazil, which usually sacrifice assets in order to maintain the balance between the two sides of the balance sheet (Welch, 2004). Furthermore, Myers (1977) advocates book leverage as, despite the aforementioned bias, debt is still collateralized by book assets rather than growth opportunities.

CASH FLOW AND FIRM CHARACTERISTICS

Following prior literature, we used cash flow measured by the operational cash flow realization net of capital expenditure (CAPEX). However, it is known that Economatica database might suffer from unbalance data problem and hence, some firms might have missing value instead of the their actual

CAPEX. To deal with this, we used the mean of industry CAPEX rather than the firms'. Our cash flow measure is as follows:

$$CF_{i,t} = \frac{EBITDA_{i,t} - IndCAPEX_t}{TA_{i,t-1}} \quad [4]$$

Where EBITDA refers to contemporaneous earnings before interest, taxes, depreciation, and amortization and IndCAPEX refers to the mean of industry's CAPEX, scaled by lagged total assets. Our industry criterion follow the Brazilian Securities and Exchange Commission of Brazil (CVM).

To compose the X vector, we chose the firms' characteristics based on Flannery and Rangan (2006) and Flannery and Hankins (2013). The absence of data related to research and development investments (R&D) on the financial statements means that we could not use the entire proposed set of the firms' characteristics. R&D intensive firms are prone to use internal resources and equity rather than debt, because of their specific maturity time to start generating cash flow. Thus, except for R&D variables, our vector is comprised by market-to-book ratio (MB), size (LnTA), tangibility (fixed assets by total assets), depreciation (depreciation by total assets), and profitability (earnings before taxes and interest by total assets). In order to control industry specificity, which is not controllable through the aforementioned variables, we included the mean leverage of industries, following standard practice from prior literature.

HYPOTHESIS

The paper focused on the analysis of the influence of cash flow realization on the speed at which firms close deviation from a target. We measured the target deviation as the difference between the target and the lagged active leverage as follows:

$$Dev_{i,t} = LEV^{*}_{i,t} - LEV^{p}_{i,t-1} \quad [5]$$

Our hypothesis is that absolute cash flow realization creates an opportunity to adjust the leverage toward target at marginal transaction costs. Following Faulkender et al. (2012), we expected that when a firm generates cash flow |CF| at a lower level than its target deviation |Dev|, that is |Dev|>|CF|, the firm will use this |CF| to close the gap between its actual and target leverage (Scenario 1, instant A). Beyond the |CF| level, financing decisions are still made in order to close the gap but at a slower speed (Scenario 1, instant B), unless costs are near to zero. Suppose, for example, that firm X whose deviation is 10%, realizes 6% of cash flow. We hypothesized that from 10% to 4% firms adjust at a certain speed and that from 4% to 0% the adjustment is slower.

On the other hand, when a firm generates cash flow |CF| at a higher level than its deviation |Dev|, that is |CF|>|Dev|, the firm will use it to close the entire gap (Scenario 2, instant A), and after reaching the target, financing decisions are made in order to maintain this level (Scenario 2, instant B). Now suppose that firm X, whose deviation is still 10%, but realizes, this time, a 12% of cash flow. We hypothesized that firms adjust at a certain speed from 10% to 0%, covering the whole gap, and that after reaching this target the speed decreases to almost 0%.

In order to test the effect of cash flow on capital structure decisions in accordance with our hypothesis, we built four variables as follows:

- ExcDev ≡ (|Dev|-|CF|)*LargerDev
- Overlap ≡ |Dev|>|CF|=|FC|*LargerDev
- Overlap ≡ |CF|>|Dev|=|Dev|*(1- LargerDev)
- ExcCF ≡(|CF|-|Dev|)*(1- LargerDev)

ExcDev (Scenario 1 instant B) is the difference between absolute deviation and the absolute realized cash flow when deviation is larger than cash flow realization. This difference interacts with the binary variable LargerDev that assumes 1 if deviation is larger than cash flow and 0, otherwise. The variable |CF|*LargerDev (Scenario 1 instant A) is the absolute cash flow interacting with the binary LargerDev. The |Dev|*(1-LargerDev) represents Scenario 2 instant A, and it is the absolute deviation interacting with a binary variable that assumes 1 if the cash flow is larger than the deviation and 0, otherwise.

ExcCF (Scenario 2 instant B), refers to an excess of cash flow, which is the difference between absolute cash flow and deviation interacting with the same binary variable as the latter one.

Including these variables on Equation [3]:

$$LEV_{i,t} - LEV_{i,t-1}^{p} =$$
$$\{[\beta_1(|Dev| - |CF|) + \beta_2|CF|) * DevLarger + [\beta_3|Dev| + \beta_4(|CF| - |Dev|)] * (1 - DevLarger)\} * OverLEV + \varepsilon_{i,t}$$

Where OverLEV assumes -1 if a firm is overleveraged, and 1 if otherwise. If our hypothesis is consistent with financing behavior and the influence of cash flow, we expect that $\beta 2 \sim \beta 3 > \beta 1 > \beta 4 \sim 0$.

RESULTS

Table 1 presents our sample's summary of statistics. As expected, the inclusion of net income in order to filter the passive adjustment was efficient. The difference between book and active deviation was significant and greater in overleveraged firms.

Table 1 – Summary Statistics

	Mean	Median	Standard deviation	Underleveraged	Overleveraged
Panel A: Target and deviation					
Book target	0.2483	0.2421	0.0956	0.2378	0.2464
Book deviation	0.0037	0.0095	0.1406	0.0930	-0.0821
Active deviation	0.0193	0.0278	0.1333	0.1047	-0.0582
Market target	0.2667	0.2794	0.1318	0.2699	0.2893
Market deviation	-0.0015	0.0211	0.1829	0.0976	-0.0502
ExcDev	0.0786	0.0631	0.0664	0.0557	0.0687
Overlap, |Dev|>|CF|	0.0650	0.0548	0.0501	0.0592	0.0502
Overlap, |CF|>|Dev|	0.0876	0.0666	0.0793	0.0874	0.0473
ExcCF	0.7052	0.1165	2.3951	0.1163	0.1166
Panel B: Firms characteristics					
Book Leverage	0.2495	0.2484	0.1645	0.1259	0.3581
Market Leverage	0.2703	0.2454	0.2091	0.1227	0.3452
MB	1.0391	0.7223	1.0490	0.7459	0.6872
DEP_TA	0.0328	0.0301	0.0252	0.0303	0.0300
FA_TA	0.2770	0.2598	0.2023	0.2512	0.2674
LnTA	21.0512	21.0111	1.5453	20.8942	21.0893
EBIT_TA	0.0983	0.0858	0.0956	0.0871	0.0836
IND_LEV	0.2495	0.2440	0.0807	0.2365	0.2442

Table 1 show the means, median, and standard deviation of all variables from our model. The fourth and fifth columns present the median from the same variable for underleveraged and overleveraged firms, respectively. The data were extracted from Economatica and refer to publicly-traded Brazilian firms from the period 2003-2013. Financial and regulated utilities were excluded from the sample. Panel A refers to the target and deviation variables, whilst Panel B displays the summary statistics of the firms' characteristics. The development of active book leverage is explained in Section 3. Book deviation is the difference between target and actual firm leverage. Active deviation is the difference between target book leverage and active firm leverage. Market deviation is the difference between target market leverage. ExcDev refers to the difference between the active deviation and the absolute cash flow. Overlap, |Dev|>|CF|, refers to absolute cash flow. Overlap, |CF|>|Dev|, refers to active deviation. ExcCF refers to the difference between absolute cash flow and the active deviation. Book leverage refers to total debt by total assets. Market leverage refers to total debt by the sum of total debt plus market value. MB is the market to book ratio. DEP_TA is the depreciation value by total assets. FA_TA is fixed assets to total assets.. Ln_AT is the natural logarithm of total assets. EBIT_TA is the EBIT to total assets. IND_LEV is the mean leverage of industry.

Table 2 presents the SOA estimated by the standard partial adjustment model (Eq. [1]). The first column refers to book leverage and shows that firms adjust their capital structure by a speed of 22.82% per year. The second one refers to the market measure of leverage that, in turn, presents a SOA of 38.20% per year. Finally, the third column refers to the active leverage whose estimated

SOA, as expected, is close to the book leverage. All the coefficients are statistically significant at 1%.

Table 2 – Speed of adjustment

$$LEV_{i,t} - LEV_{i,t-1} = \lambda\left(LEV^{*}_{i,t} - LEV_{i,t-1}\right) + \xi_{i,t}$$
$$LEV_{i,t} - LEV^{p}_{i,t-1} = \lambda\left(LEV^{*}_{i,t} - LEV^{p}_{i,t-1}\right) + \xi_{i,t}$$

	ΔBook Leverage	ΔMarket Leverage	ΔActive Leverage
Book Leverage	0,2282***		
	(0,03)		
Market Leverage		0,3820***	
		(0,02)	
Active Leverage			0,1841***
			(0,03)
N	1213	1213	1213
R^2	0,0919	0,1916	0,1465

Table 2 presents the speed of adjustment estimated by the standard partial adjustment model, where the left size is the observed (active) change and the right side, the desired (active) change. The first column is the speed of adjustment with book leverage. The second one, the speed of adjustment with market leverage and the third, with active book leverage. The standard deviation are in parenthesis. *, ** and *** refers to significance at ten, five and one percent, respectively.

In order to examine the influence of leverage condition on the SOA, we then split the sample between over and underleveraged firms. Table 3 reports the results. Overleveraged firms adjust at a speed of 54.17%, while the other group adjusts at 41.41% per year. These results are consistent with Hovakimian (2004) and Faulkender et al. (2012), as their results demonstrate that overleveraged firms adjust faster than underleveraged. Still, the latter authors hypothesize that it is probable that overleveraged firms either face lower transaction costs or are more sensitive to the benefits from leverage adjustment.

The right side of Table 3 refers to the decomposition of SOA in function of cash flow. For underleveraged firms, the coefficients corroborate our hypothesis. That is, when cash flow is lower than deviation, firms adjust their capital structure at 38.74% per year until the cash flow level partially overlaps deviation. After this, the speed becomes slower, specifically 17.98% per year, but still significant enough to be consistent with our hypothesis that financing decisions are made aiming the target leverage. When cash flow is higher than deviation, the results show that cash flow positively influences the SOA, as firms adjust their leverage at a speed of 23.56% per year. When it reaches target, the speed loses economic significance as it is very close to zero. For overleveraged firms, it seems that when cash flow is lower than deviation, the adjustment occurs regardless of cash flow realization. The hypothesis of $\beta 1 = \beta 2$ cannot be rejected. Our assumption for this is that when firms are in the latter condition, financing decision are made to fill up the deviation and cash flow seems to not directly influence it. When cash flow is higher than deviation, the SOA reaches 54.04% per year, but beyond the target the coefficient of speed it loses economic significance. These results are consistent with Faulkender et al. (2012).

Table 3 – Speed of adjustment – By leverage condition and cash flow

$$LEV_{i,t} - LEV_{i,t-1}^{p} = \{[\beta_1(|Dev| - |CF|) + \beta_2|CF|] * DevLarger + [\beta_3|Dev| + \beta_4(|CF|-|Dev|)]*(1\text{-}DevLarger)\}*OverLEV + \varepsilon_t$$

ExcDev ≡ (|Dev|-|CF|)*DevLarger
Overlap, |Dev|>|CF| ≡ |CF|*DevLarger
Overlap, |CF|>|Dev|≡ |Dev|*(1-DevLarger)
ExcCF ≡ (|CF|-|Dev|)*(1-DevLarger)
DevLarger= 1 se |Dev|>|CF| e 0, otherwise
OverLEV = -1 if firms is overleveraged and 1, otherwise

	Δ Active Leverage		Δ Active Leverage	
	Underlev.	Overlev.	Underlev.	Overlev.
Active Deviation	0,4141***	0,5417***		
	(0.03)	(0.05)		
ExcDev			0,1798**	0,4121***
			(0.07)	(0.09)
Overlap, |Dev|>|CF|			0,3874***	0,2687**
			(0.08)	(0.13)
Overlap, |CF|>|Dev|			0,2356***	0,5404***
			(0.04)	(0.13)
ExcCF			-0,0031*	0,0019**
			(0,00)	(0,00)
N	629	584	574	541
R^2	0.3376	0.456	0.1082	0.1789

Table 3 presents the speed of adjustment estimated by the standard partial adjustment model. The first and second columns present the coefficient of adjustment, where the left size is the observed active change and the right side, the desired active change. Columns 3 and 4 (the right side) are the desired change in function of cash flow. The even columns refers to underleveraged firms whilst the odds refers to overleveraged. The definitions of variables are on Table 1. The standard deviations are in parenthesis. *, **, and *** refer to significance at ten, five and one percent, respectively.

Although our results are consistent with our hypothesis, it is possible that the coefficients are biased due to the measure of cash flow. In order to decrease this potential bias, we followed Faulkender et al. (2012) and rebuilt cash flow from two alternative measures. For the first one, we added the beginning-of-cash holding on *t* (ending-cash holding on *t-1*) with the original cash flow measure. For the second, we added the excess of cash (firms' beginning-of-cash holding net of the mean cash holding of industry). Table 4 presents the estimated coefficients of these two rebuilt variables. As expected, the adjustment coefficients changed but the meaning remained unchanged. First, an overleveraged firm adjusts faster than an underleveraged one. Second, cash flow does not seem to influence overleveraged firms whose cash flow realization is lower than deviation. Finally, when cash flow is higher than deviation, when actual leverage reaches the target, SOA loses economic significance.

Table 4 – Speed of adjustment with alternative cash flow measures

$$LEV_{i,t} - LEV^{p}_{i,t-1} = \{ [\beta_1(|Dev| - |CF|) + \beta_2|CF|] * DevLarger + [\beta_3|Dev| + \beta_4(|CF|-|Dev|)]*(1\text{-}DevLarger)\}*OverLEV+\varepsilon_t$$

ExcDev ≡ (|Dev|-|CF|)*DevLarger
Overlap, |Dev|>|CF| ≡ |CF|*DevLarger
Overlap, |CF|>|Dev|≡ |Dev|*(1-DevLarger)
ExcCF ≡ (|CF|-|Dev|)*(1-DevLarger)
DevLarger= 1 se |Dev|>|CF| e 0, otherwise
OverLEV = -1 if firms is overleveraged and 1, otherwise

	Underleveraged		Overleveraged	
	Initial Cash	Excess	Initial Cash	Excess
ExcDev	0,2227***	0,1983***	0,3793***	0,3678***
	(0,06)	(0,06)	(0,08)	(0,07)
Overlap, |Dev|>|CF|	0,2759***	0,2654***	0,3557***	0,3577***
	(0,05)	(0,05)	(0,07)	(0,07)
Overlap, |CF|>|Dev|	0,2349***	0,2407***	0,5398***	0,5435***
	(0,04)	(0,04)	(0,13)	(0,13)
ExcCF	-0,0030*	-0,0017**	0,0021**	0,0009
	(0,00)	(0,00)	(0,00)	(0,00)
N	570	570	574	541
R^2	0,105	0,116	0,185	0,1838

Table 4 refers to the coefficients generated by alternative cash flow measures. Columns 1 and 3 refers to the cash flow measure on which the beginning-of-the-period cash holding was added onto the numerator of Equation [4]. Columns 2 and 4 refers to the measure on which the excess of cash was added onto the numerator of Equation [4]. Columns 1 and 2 refers to underleveraged firms whilst the others refer to overleveraged ones. The standard deviations are in parenthesis. *, **, and *** refer to significance at ten, five and one percent, respectively.

Summarizing our results, the coefficients displayed on Table 3 and 4 are consistent with Faulkender et al. (2012). In other words, we reinforce the evidence that absolute cash flow realization creates opportunities for firms to adjust their capital structure toward a target at marginal costs. Nevertheless, our contribution to the finance literature is mainly through the evidence that Brazilian firms' managers seem to enjoy this opportunity.

ROBUSTNESS TEST

Table 5 provides coefficients of robustness tests. For the first one, we re-estimated the target. According to Korajcyk and Levy (2003), financing decisions usually take into consideration macroeconomic contexts. In Brazil, capital structure decisions can be potentially related to SELIC tax (Brazilian free cash flow), inflation, and exchange rate. In order to consider the macroeconomic factors, following Faulkender et al. (2012), we included binaries variables of years with the pooled OLS estimator instead of year-by-year. We maintained the following procedures. The results from column I on both sides refer to coefficients generated by the aforementioned procedure. Columns II and III present two other alternative measures of cash flow. For column II, we deducted the net working capital (current assets minus current liability) from the numerator of Equation [4]. In column III, in turn, we subtract the current liability from the numerator of Equation [4]. The three robustness tests provide distinct coefficients, however the results support our hypothesis.

Table 5 – Robustness test

$LEV_{i,t} - LEV^{p}_{i,t-1} = \{ \quad [\beta_1(|Dev| - |CF|) + \beta_2|CF|] * DevLarger + [\beta_3|Dev| + \beta_4(|CF|-|Dev|)]*(1-DevLarger)\}*OverLEV+\varepsilon_t$

ExcDev ≡ (|Dev|-|CF|)*DevLarger
Overlap, |Dev|>|CF| ≡ |CF|*DevLarger
Overlap, |CF|>|Dev|≡ |Dev|*(1-DevLarger)
ExcCF ≡ (|CF|-|Dev|)*(1-DevLarger)
DevLarger= 1 se |Dev|>|CF| e 0, otherwise
OverLEV = -1 if firms is overleveraged and 1, otherwise

	Underleveraged			Overleveraged		
	I	II	III	I	II	III
ExcDev	0,1926***	0,2052***	0,2648***	0,4480***	0,3207***	0,3776***
	(0,06)	(0,06)	(0,07)	(0,09)	(0,08)	(0,08)
Overlap, |Dev|>|CF|	0,3041***	0,2770***	0,2620***	0,2286*	0,2499***	0,2035**
	(0,08)	(0,05)	(0,06)	(0,12)	(0,08)	(0,08)
Overlap, |CF|>|Dev|	0,2140***	0,2396***	0,2378***	0,5180***	0,4530***	0,4759***
	(0,04)	(0,04)	(0,05)	(0,16)	(0,13)	(0,10)
ExcCF	-0,0030**	-0,0125	-0,0474**	0,0023**	-0,0797***	-0,1056**
	(0,00)	(0,01)	(0,02)	(0,00)	(0,02)	(0,04)
N	581	625	524	534	576	546
R^2	0,0859	0,112	0,1056	0,1661	0,1932	0,2115

Table 5 present the coefficients of robustness tests. Column I present the coefficient whose target was re-estimated through pooled OLS with dummy of years, in order to control macroeconomic factors. Column II, the net working capital was subtracted from Equation [4]; Column III, the current liability was subtracted from Equation [4]. The standard deviation are on parenthesis. *, ** and *** refers to significance at ten, five and one percent, respectively.

CONCLUSION

In order to analyze the relationship between cash flow and capital structure decisions, Faulkender et al. (2012) develop an interesting econometric method to test how absolute cash flow influences the speed at which firms adjust their capital structure. The authors conclude that firms with higher cash flow realization adjust faster toward their target.

Our results are consistent with Faulkender et al. (2012). Firms whose cash flow is lower than deviation from the target face marginal adjustment costs and close deviation until the level where cash flow overlaps deviation. Beyond this point, leverage condition influence the SOA: overleveraged firms seem to be less sensitive to cash flow and their SOA is not dependent, while underleveraged firms present a decrease in SOA. Firms whose cash flow is higher than deviation present a fast SOA until the whole gap is closed. Beyond this point, our evidence shows that SOA loses economic significance, regardless leverage condition.

Our paper contributes to literature by demonstrating that publicly-traded Brazilian firms present similar financing behavior to that shown by Faulkender et al. (2012). In other words, absolute cash flow realization seems to create opportunities for leverage adjustment and firms' managers seem to enjoy it and adjust their capital structure at marginal adjustment costs.

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