Are Brazilian Firms Savings
Sensitive to Cash Windfalls?

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Abstract

One of the most studied topics in the corporate finance literature is the effect of financial constraints on firms' investments decisions. Trying to explain this issue, Almeida, Campello and Weisbach (2003) modeled the relationship between the financial constraints faced by firms and their demand for liquidity. They show that if one firm is financial constrained we must expect positive cash flow sensitivity from cash windfalls, while for unconstrained firms this relation does not hold. The aim of this article is to check this proposition using annual data of 336 non-financial Brazilian public firms, from 1993 to 2002. Our results show that financial constrained Brazilian firms presented a positive relationship between cash flow increases and variations of cash holdings. We also suggest that credit constraints in Brazil are directly related to the size of firms.

Keywords: Financial Constraints, Cash Policy, Brazilian Firms.
JEL Code: D23, G31, G32.

Resumo

Um dos tópicos mais estudados em finanças coporativas é o efeito das restrições financeiras sobre os investimentos das firmas. Tentando explicar esta questão Almeida, Campello e Weisbach (2003) modelaram a relação entre as restrições financeiras e a demanda por liquidez das empresas. Eles mostram que se uma firma encontra-se restrita então deveríamos observar um aumento das variações de caixa quando as firmas obtém lucros extraordinários, enquanto isto não seria válido para as firmas irrestritas financeiramente. Neste artigo, buscamos verificar esta proposição usando dados anuais de 336 empresas abertas brasileiras e não-financeiras, de 1993 até 2002. Os resultados mostraram que esta relação positiva é válida também para as empresas brasileiras. Por fim, argumentamos que as restrições de crédito no Brasil estão ligadas ao tamanho das firmas.

Palavras-Chaves: Restrição de Crédito, Política de Caixa, Firmas Brasileiras.
JEL: D23, G31, G32.

Área 3 : Economia Internacional e Finanças

1 Introduction

The role of financial constraints on the choices of investments made by firms is an important field of research on corporate finance. The main point investigated by economists in this field is the fact that financially constrained firms will not choose the optimal level of investment, being more specifically, the constrained firms will underinvest. At the same time, economists have stressed the importance of a liquid balance sheet since it allows implementation of new profitable projects when they arise.

The gap between these two standpoints (underinvestment and preference for liquidity) is clear: the choices of liquidity made by firms are directly linked to credit restrictions faced by organizations. If a firm is financially constrained, it tends to hold more liquid assets for precautionary reasons. Otherwise, if the firm is not financially constrained, it will not hold too much liquid assets because the firm may borrow money if it becomes necessary.

A possible way to study this relationship between cash holdings and investment is the use of the liquidity choices (or the savings variations) as a proxy for investment decisions. However, the economic literature concerning the role of credit constraints on firms' investments have focused on the investment demand. Fazzari et al. (1988) presented the first influential framework in this way[1]. The idea was to relate the investments made by firms to internal funds, hoping to find a positive relation for credit-constrained firms. But this approach, had led to theoretical and empirical problems.

On the theoretical side, Kaplan and Zingales (1997) question the usefulness the relationship investment-cash as a measure os financial constraints, they argue that Fazzari et al. (1988) result is not necessary implied by a financial constraint situation[2]. On the empirical side, Erickson and Whited (2000) show that a possible difference in the investments cash flow sensitivities across groups of constrained and unconstrained firms can be explained by an empirical framework where the investment is a function of investments opportunities, and these opportunities are computed in a wrong measure. Alti (2003) show that cash flows contain much valuable information about firms' opportunities of investments, more precisely, the author demonstrates that results obtained by Fazzari et al. (1988) can be also obtained in a model without financing constraints (see also Gomes (2001)).

More recently, Almeida, Campello and Weisbach (2003), hereafter ACW, trying to avoid these problems, developed a theoretical model where firm's demand for liquidity depends on its financial position. In the ACW setup, if the firm anticipates that it will be constrained in future periods, the best strategy is to hold more cash today. Therefore, constrained firms will manage their cashes balancing the expected profits of the current and future investments. Using this approach is possible to estimate the effects of the financial constraint on firms' investments using the effects of financial constraint on firms' savings decisions. The model predicts that constrained firms will save more cash when they receive extraordinary amounts of cash (cash windfalls): they will present a positive cash flow sensitivity of cash. Rather, the unconstrained firms will not display a predetermined behavior facing cash windfalls.

ACW used an empirical model to test this prediction, using a sample of manufacturing American firms between 1971 and 2000. They confirmed the model predictions implementing empirical tests using five distinct financial criteria to separate the firms among constrained and unconstrained firms.

In this paper we will use the methodology developed by ACW in order to estimate the Brazilian firms' savings sensitivity to cash windfalls. In addition, we will discuss the applicability of ACW criteria used to split the sample into constrained and unconstrained firms for the Brazilian case.

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[1]Terra (2003) provides an empirical investigation for Brazilian firms using this methodology.

[2]See also Povel and Raith (2001) and Almeida and Campello (2002).

From the five criteria used by them, only three were feasible to use with Brazilian firms data. Interestingly two criteria proved to be useful, and using these two, the results obtained by us were perfectly aligned with those obtained by ACW.

This paper aims to stress the importance of the comparative analysis between samples. To use this new method to Brazilian data is important because Brazilian and American firms face different institutional arrangement with respect to financial systems. It's well known that Brazilian credit market is more restrictive, when compered to the American market, in the sense even firms listed on São Paulo Stock Exchange (Bovespa) face credit constraints. Moreover, our results, being aligned with those obtainded by ACW, contributes to confirm the importance of the theoretical model and the recent debate in this area.

The rest of the article is organized as follow. Section 2 describes the theoretical model used by Almeida, Campello and Weisbach (2003) and its main predictions. In Section 3 the empirical model is developed and the expected results are briefly commented. Section 4 presents the sample and data used on the empirical part. Section 5 explains the estimation procedures used and reports the main results. Finally, some concluding remarks are done.

2   Analytical Framework

Many different models are available in the literature studying the effects of financial constraints on firms' investment choices. The empirical work to be developed in subsequent sections is based on the ACW model. A brief review of the original model is presented below.

The ACW model has three periods. In the first period the firm has a cash holding of c_0 and has the chance to invest in a project that costs I_0 in the first period and returns $F(I_0)$ on the third period. Moreover, the firm may have another chance to invest in the second period. Investing I_1 in the second period, the firm will obtain a return of $G(I_1)$ on the third period. It is important to stress that $F(.)$ and $G(.)$ are standard production functions (increasing, concave, and continuously differentiable). The firm will produce an uncertain cash flow on the second period. The cash flow will be high (c_1^h) with probability p and low $(c_1^l < c_1^h)$ with probability $(1-p)$. The discount factor is one, all agents are risk neutral and the investment costs is one in both periods (1 and 2). The model also supposes that I_0 and I_1 can be liquidated on the third period. This case earns a discounted income of $q(I_0 + I_1)$, with $q \leq 1$. The total cash flow of the investments cannot be contracted. The firm can not pledge the cash flows, but it can raise external financial resourses by pledging the productive assets as collateral.

The model also assumes that the liquidation value of the assets, which can be captured by creditors, is $(1 - \tau)qI$, where $\tau \in (0,1)$. If τ is high, witch means low capacity for external finance, the firm may become financially constrained. The firm must choose the amount of cash to be held from the first to the second period (denoted by C). The final assumption is that the firm can hedge all the future earnings at a fair cost.

If the firm is unconstrained (with low q and/or high c_0 and c_1) it will invest in the first-best level on both periods, and its investment policies satisfies all financial constraints. Moreover, ACW shows that for unconstrained firms there are no relationship between changes in cash holding and current cash flow. In other words, the cash flows of unconstrained firms does not affect the cash holding policies and therefore it does not affect investment choices, i. e.,

$$\frac{\partial C}{\partial c_0} \text{ is indeterminate for financially unconstrained firms.}$$

If the firm is constrained the investment will stay below the first-best level. Moreover, the cash holdings will be sensitive to cash flows in a positive way. In other words if a constrained firm receives an extra amount of cash on the first period, it will distribute these funds across the two periods (saving part of the money for the second period). That is,

$$\frac{\partial C}{\partial c_0} > 0 \quad \text{for financially constrained firms.}$$

In conclusion, this model leads to an important testable prediction. If a firm is financially constrained the cash holdings will be positively sensitive to cash flows. Otherwise, if the firm is unconstrained, this relationship will be is indeterminate. The next section describes the empirical model developed to test this strong prediction using Brazilian firms' data.

3   Empirical Model

In order to test the prediction that cash holdings of financial constrained firms are sensitive to cash windfalls, we need to distinguish the firms between the financial constrained ones and the financial unconstrained ones. This can be accomplished by using a criterium to split the sample. In addition, we will also have to control for the sensibility of each firm by the size of the firm and by each firm's opportunities of investments. These variables were included into the model to take into account two facts. The first is related to the scale economies in cash management, because a larger firm can better manage the allocation of money in its activities. The second is that we should control for the investment opportunities because the attractiveness of the investment may interfere on the choices of the firms cash holdings.

This last control, however, is very hard to implement, because not only it is is difficult to measure but also there is no ready proxy variable to use. Following the literature, we will construct a proxy variable well used by economists: the Tobin's Q[3].

The first empirical model can be written as equation (8) of ACW paper, here presented as equation (1).

$$\triangle CashHoldings_{i,t} = \alpha_0 + \alpha_1 CashFlow_{i,t} + \alpha_2 Q_{i,t} + \alpha_3 Size_{i,t} + \varepsilon_{i,t} \tag{1}$$

where i is the firm and t is the time. According to the theoretical model α_1 is expected to be positive for constrained firms and unsigned for unconstrained firms.

An augmented model was proposed by ACW in order to include other variables to control for traditional relations present in the cash flow management and investment demand literature. Additionally we control for variations of non-cash net working cash because it may be a substitute for cash. Moreover, we can use the variations on short-term debt as a explanatory variable because firms may use short-term debt to built cash reserves[4]. This augmented empirical model, equation (9) in their paper, can be represented as follow:

$$\begin{aligned} \triangle CashHoldings_{i,t} = {} & \alpha_0 + \alpha_1 CashFlow_{i,t} + \alpha_2 Q_{i,t} + \alpha_3 Size_{i,t} \\ & + \alpha_4 Expenditures_{i,t} + \alpha_5 Acquisitions_{i,t} \\ & + \alpha_6 \triangle NWC_{i,t} + \alpha_7 \triangle ShortDebt_{i,t} + \varepsilon_{i,t} \end{aligned} \tag{2}$$

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[3]Almeida, Campello and Weisbach (2003) argue that the use of the Tobin's Q on regression will not bias our estimative of cash sensitivity because we are using a financial variable as the endogenous variable.

[4]The literature of investment demand includes for example Fazzari et al (1988), Fazzari and Petersen (1993) and Calomiris et al. (1995). The cash flow management insighs are taken from the works of Kim et al. (1998), Opler et al. (1999) and Hardford (1999).

ACW argue that the sensitivity of cash coefficient (α_1) must to be higher in this last specification because we are adding controls for alternative uses of cash reserves. In this alternative setup we still expect that constrained firms are positively sensitive to cash and the unconstrained are not. The next section describes the data set available for Brazillian firms.

4   Data Set

Our data set is composed by 336 non-financial companies accounting data. These companies are publicly traded at São Paulo Stock Exchange (Bovespa). The data range from 1993 to 2002, making a total of 1640 observations (excluding six removed outliers). The source of them is Económatica. We used a base of annual data and all monetary values were taken in American dollars. Our main restriction was the shares price, because many firms have their shares traded few times. Moreover, the changes occurred in Brazilian economy during the 1990's leads to privatization, mergers, acquisitions and failure of many firms, therefore we don't have accounting data for all companies and for all years.

However, our sample is composed of many important firms from eighteen different economic sectors, characterizing a representative sample of the Brazilian economy. Table (1) presents the relative frequency of the economic sectors represented by our sample.

Using this data base we construct all the variables used to test the ACW propositions. These variables are presented in the next subsection.

Table 1 - Relative frequency of the firms by Economic Sector

Economic Sector	Relative Frequency (%)
Agric. & Fisheries	0.21
Basic & Fab. Metal	11.37
Chemical	9.58
Construction	3.93
Electric Electronics	4.29
Electric Power	12.23
Food & Beverage	7.43
Industrial Machinery	4.22
Mining	1.14
Nonmetallic Min.	2.28
Oil & Gas	2.86
Other	10.58
Pulp & Paper	3.64
Telecommunication	5.07
Textile	9.94
Trade	3.71
Transportat Serv	1.21
Vehicle & Parts	6.22

4.1   Variables Constructed

Below, we will present the formulas used to construct variables similar to those used by ACW using the firms' accounting data.

Cash Holdings = Cash + Short-term Financial Investments

Cash Flow= Net Income + Depreciation and Amortization - Dividendes

Acquisitions = Investments in subsidiaries + Inv. in colligateds + Inv. in others

Non-Cash Net Working Capital = Other Short-Term Assets

Short Debt = Short term Debt + Short term Debentures

Q1 = [Total Assets + (Price$_{ON}$.x Quant.$_{ON}$.) – Net Equity] / Total Assets

Q2 = [Total Assets + (Price$_{ON}$.x Quant.$_{ON}$ + Price$_{PN}$ x Quant$_{PN}$.) – Net Equity] / Total Assets

Size = ln (Total Asset)

All the variables, except for Q1, Q2 and size, were scaled by the respective firm total assets.

4.2   Financial Constraint Criteria

ACW use five criteria to qualify firms as financial constrained or unconstrained. According to them, the firms were qualified every year based on their:

- Payout ratio: assign to the financial constrained group those firms that belong to the bottom three deciles of the payout ratio distribution and assign to the financial unconstrained group the ones that belong to the top three deciles.

- Total assets: assign to the financial constrained group those firms in the bottom three deciles of the total assets distribution and assign to the financial unconstrained group the ones that belong to the top three deciles.

- Bond ratings: financially unconstrained firms are those whose bonds have been rated during the sample period and firms which never had their public debt rated during our sample period as financially constrained.

- Commercial paper ratings: the financially constrained group is composed by those firms which never had their issues rated during our sample period and the firms that issued commercial papers receiving ratings at some point during the sample period are considered unconstrained.

- Kaplan and Zingales rating: an index of firm financial constraints based on results in Kaplan and Zingales (1997) and separate firms according to this measure, i. e., assign to the financial constrained group those firms that belong to the top three deciles of the payout ratio distribution and assign to the financial unconstrained group the ones that belong to the bottom three deciles.

Only the first two of these five criteria have a straight application for the Brazilian case. The last criterium is not useful because the Kaplan and Zingales paper were done for American firms data. After all, we employed three criteria in our estimations, namely, the first two criteria from ACW paper and a third criterium that is a kind of mix of the third and fourth ACW's criteria. Our criteria are explained below:

- Payout Ratio: assign to the financial constrained group those firms that belong to the bottom three deciles of the payout ratio distribution and assign to the financial unconstrained group the ones that belong to the top three deciles.

- Firm Size: assign to the financial constrained group those firms in the bottom three deciles of the total assets distribution and assign to the financial unconstrained group the ones that belong to the top three deciles.

- Outstanding ADRs: assign to the financial constrained group the firm that does not have outstanding American Depositary Receipts of its securities, regardless of the level, in United States market in that year, and assign to the financial unconstrained group the firm that has outstanding ADRs.

Although we are using three criteria we expect that the payout ratio criterium will have a poor performance in our estimations. It is generally accepted fact that Brazilian firms do not pay much dividends and the split between constrained and unconstrained firms is the result of the extremely large number of zero payout observations. In addition, the high real interest rate prevent firms from contracting long term loans, either through loans or through debentures. The larger firms are able to raise funds in foreign markets whereas the smaller ones may apply for a subdized loan from BNDES. After all, the fact of issuing debentures may not be related to financial constraints. Table (2) summarizes the results for the cross-classification of financial constrained firms.

Table 2: Cross-Classification of Financial Constrained Firms

Financial Constraint Criteria	Payout Ratio		Firm Size		ADR	
	(A)	(B)	(A)	(B)	(A)	(B)
1. Payout Ratio						
Constrained Firms (A)	854					
Unconstrained Firms (B)		479				
2. Firm Size						
Constrained Firms (A)	349	66	448			
Unconstrained Firms (B)	194	216		471		
3. Outstanding ADR						
Constrained Firms (A)	765	368	447	315	1288	
Unconstrained Firms (B)	89	111	1	156		228

5 Estimation Procedures and Results

The estimation procedure consists in estimate the model using the constrained-firm and the unconstrained-firm samples. The instrumental variables (IV) method will be used to estimate the first econometric model presented in section 3, equation (1), and to estimate the augmented model, equation (2).

This method was chosen to deal with possible endogeneity problems of the firm-level accounting variables. It was also used the Huber/White/sandwich estimator of variance to provide robust estimates of the coefficiestns' standard errors.

Moreover, as a robustness check, the econometric models will be estimated using the both definition of Tobin's q (Q1 and Q2). It's important to use Q2 because there is two types of stocks in Brazil (common and preferred), therefore the firm's market value is not only given by the common shares, and this fact may lead to different results because each firm has a different amount of preferred shares.

5.1   Basic Model

The first empirical exercise consists in estimating equation (1) with our pooled cross-section data divided into constrained and unconstrained firms, according to each criterium. The results obtained are presented in table (3), which reports the IV regression using Q2 output. The instruments used (Group 1) were Cash Flow (-2), and Size (-1), where (-1) means the first lag of the variable. The estimations with other instruments and the ones using the Q1 variable are reported in the appendix.

In this case our estimatives were not aligned with those obtained by ACW. In fact, for all the three criteria none of our regressions and their estimated coefficients were statistically significant, even using different mixes of instruments. At a first glance these results were unexpected, but our regressions could be suffering of omitted variables bias, so we preoceeded with the estimation of the augmented model.

Table 3: Baseline Regression Model Using Q2 - IV Estimations

Dependent Variable	Independent Variables			F-Stat
△CashHoldings	Cash Flow	Size	Q2	
Financial Constraints Criteria				
1. Payout Ratio				
Constrained Firms	0.317	-1514.6	155.9	1.07
	(0.200)	(0.519)	(0.581)	(0.359)
Unconstrained Firms	-0.503	-47425	519.8	0.50
	(0.340)	(0.275)	(0.345)	(0.683)
2. Firm Size				
Constrained Firms	–0.503	47425	519.8	0.50
	(0.340)	(0.275)	(0.345)	(0.683)
Unconstrained Firms	-0.370	86323	4781.5	0.70
	(0.487)	(0.344)	(0.430)	(0.550)
3. Outstanding ADR				
Constrained Firms	-0.245	14513	915.84	0.67
	(0.607)	(0.365)	(0.276)	(0.570)
Unconstrained Firms	-0.0388	-16541	-82.67	1.77
	(0.805)	(0.198)	(0.202)	(0.154)

Instrumented Variables: Cash Flow and Size
Instruments: Cash Flow(-2) and Size(-1) - Group 1

Note: *, **, *** indicate statistical significance at, 1-percent, 5-percent and 10 percent (two tail) test levels, respectively.

5.2 Augmented Model

The augmented model, equation (2), was estimated using IV with lagged variables as instruments, namely Cash Flow (-1), Size (-1), Expenditures (-1), Aqcquisitions.(-1), $\triangle$NWC(-1), and $\triangle$Short Debt(-1). Table (4) reports the results obtained for the augmented model when the proxy for investment's opportunities is Q2. At this time we have got some interesting results. For two out of three criteria the regression output was the expected result, i. e., the Cash flow coefficient were statistically significant for constrained firms and not statistically significant for the unconstrained firms.

In this new setup, the Payout Ratio criterium led to non statistically significant regressions with both samples. We suspect that this Payout Ratio is not a very good criterium to distinguish between financial constrained and unconstrained Brazilian firms, because the payment of dividends is not a common practice in Brazil, which also stress the credit constraint the Brazilian firms suffer.

Under the firm size criterium. the estimated cash flow sensitivity of cash was -0.248, and statistically significant, for constrained firms whereas this coefficient were not statistically significant for the unconstrained firms. The intuition for the former result is that for each extraordinary dollar received by constrained firms, about a quarter of dollar is invested. Although the sign was not the same as the ACW one, the absolut value of the estimated coefficient was similar.

Under the Outstanding ADR criterium. the estimated cash flow sensitivity of cash was 0.462, and statistically significant, for constrained firms whereas this coefficient were not statistically significant for the unconstrained firms. The intuition for the former result is that for each extraordinary dollar received by constrained firms, about a half dollar is saved. The magnitude of the estimated coefficient was similar to ACW.

Contrary to ACW, we found that firm size and investment opportunities were not statistically significant in any of the three criteria. The results for the American firms had shown a positive relation between firm size and Cash Holdings Variations, using their criteria. Moreover, the authors find a positive relation between the investments opportunities and cash savings.

We also ran the augmented model with a different set of instruments. The output is presented in the Appendix. However, the results were similar to those already commented here.

The comparative analysis between samples is important because Brazilian and American firms face different institutional arrangement, with relation to financial systems. For example, it's well known that Brazilian credit market is more restrictive, compared to the American market, in the sense that the firms listed on Bovespa are, in general, less constrained than those with private capital strucuture, but they still face credit constraints. Therefore, our estimatives are aligned with those expected for Brazilian economy. That is, we expect that Brazilian constrained firms faces the same credit problems than American constrained firms. It is important to stress that this result does not mean that constrained Brazilian firms are less constrained than American firms.

Table 4: Augmented Regression Model Using Q2 - IV Estimations

Dependent Variable	Independent Variables							F-Stat
△CashHoldings	Cash Flow	Size	Expend.	Acquis.	△NWC	△Short Debt	Q2	
Financial Constraints Criteria								
1. Payout Ratio								
Constrained Firms	0.337	-38325	0.4821	0.02124	-0.964	0.561	-3988	0.53
	(0.926)	(0.691)	(0.553)	(0.742)	(0.583)	(0.780)	(0.651)	(0.815)
Unconstrained Firms	-0.050	15564	-0.106	-0.0018	0.4837	-0.0759	175.76	0.73
	(0.926)	(0.744)	(0.907)	(0.809)	(0.346)	(0.944)	(0.596)	(0.739)
2. Firm Size								
Constrained Firms	-0.248	-699.3	0.175	-0.055	0.223	-0.052	-84.52	19.0
	(0.044)**	(0.311)	(0.771)	(0.00)*	(0.122)	(0.132)	(0.183)	(0.000)*
Unconstrained Firms	0.944	-25110365	-9.636	0.105	-12.51	22.25	121750	0.01
	(0.968)	(0.972)	(0.971)	(0.973)	(0.973)	(0.972)	(0.967)	(1.0)
3. Outstanding ADR								
Constrained Firms	0.462	3361	-1.16	-0.0107	0.358	0.464	644.4	5.37
	(0.011)**	(0.840)	(0.107)	(0.040)**	(0.404)	(0.583)	(0.644)	(0.000)*
Unconstrained Firms	-0.612	2007	0.451	0.004	0.283	-0.135	252.2	0.59
	(0.141)	(0.926)	(0.127)	(0.547)	(0.544)	(0.467)	(0.611)	(0.767)

Instrumented Variables: Cash Flow, Size, Expend., Aqcquis., △NWC, △Short Debt

Instruments: Cash Flow(-1), Size(-1), Expend.(-1), Aqcquis.(-1), △NWC(-1), and △Short Debt(-1)

Notes:a) trend included in all regressions; b) *, **, *** indicate statistical significance at, 1-percent, 5-percent and 10 percent (two tail) test levels, respectively.

6 Concluding Remarks

The discussion about the effects of financial constraints on the firm decisions of investments is an important topic on corporate finace literature. Many authors have proposed different forms to identify this effect. Almeida, Campello and Weisbach (2003) developed an interesting framework that avoids most of the problems faced by models based on the demand for investments.

This work attempts to check the estimatives made by original authors to American economy using data from Brazilian public firms. Our results show that, under specific financial constraint criteria (firm size), the cash flow sensitivity of cash for Brazilian firm is positive and statistically significative. Therefore, our estimatives are aligned with those obtained by original authors. That is, we expect that Brazilian constrained firms face the same credit problems than American constrained firms, presenting a positive cash flow sensitivity of cash. Specially, our results suggest that credit constraints in Brazil are directly related to the size of firms.

Finally, the evidences provided by our results can be also viewed as a strong evidence that the theoretical model may be a good representative view of the financial decision choices made by firms.

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A Appendix

In this appendix we present our OLS estimatives using a second version of the variable proxy for investment opportunities (Q1) and using a second group of instruments for the IV estimation. Tables (5) to (7) present results for the Baseline Model using Q1, in the OLS case, and using Q1 and Q2 for the new IV estimation. Table (8) presents results of the Augmented Model using Q1.

Table 5: Baseline Regression Model Using Q1 - IV Estimations

Dependent Variable	Independent Variables			F-Stat
$\triangle$CashHoldings	Cash Flow	Size	Q1	
Financial Constraints Criteria				
1. Payout Ratio				
Constrained Firms	0.317	-1530	138.32	1.05
	(0.200)	(0.514)	(0.612)	(0.369)
Unconstrained Firms	-0.503	47357	-45.50	0.52
	(0.340)	(0.276)	(0.894)	(0.665)
2. Firm Size				
Constrained Firms	-0.032	-540.4	-30.44	0.60
	(0.547)	(0.261)	(0.516)	(0.614)
Unconstrained Firms	-0.371	87516	-6854	0.73
	(0.489)	(0.352)	(0.816)	(0.532)
3. Outstanding ADR				
Constrained Firms	-0.245	14441	866.9	0.67
	(0.607)	(0.365)	(0.256)	(0.571)
Unconstrained Firms	-0.038	-16644	-223.4	1.58
	(0.807)	(0.195)	(0.337)	(0.195)

Instrumented Variables: Cash Flow and Size
Instruments: Cash Flow(-2) and Size(-1) - Group 1

Note: *, **, *** indicate statistical significance at, 1-percent, 5-percent and 10 percent (two tail) test levels, respectively.

Table 6: Baseline Regression Model Using Q1- IV Estimations

Dependent Variable	Independent Variables			F-Stat
$\triangle$CashHoldings	Cash Flow	Size	Q1	
Financial Constraints Criteria				
1. Payout Ratio				
Constrained Firms	-0.124	-1987	-240.3	1.21
	(0.474)	(0.482)	(0.539)	(0.304)
Unconstrained Firms	-0.369	31045	-78.28	0.35
	(0.491)	(0.444)	(0.833)	(0.7905)
2. Firm Size				
Constrained Firms	-0.0695	-855.9	-100.9	0.56
	(0.328)	(0.246)	(0.318)	(0.640)
Unconstrained Firms	-0.191	39549	2693	0.78
	(0.675)	(0.573)	(0.921)	(0.503)
3. Outstanding ADR				
Constrained Firms	-0.163	9003	761.6	0.54
	(0.697)	(0.447)	(0.281)	(0.657)
Unconstrained Firms	-0.058	-7076	-78.8	0.71
	(0.494)	(0.491)	(0.647)	(0.546)

Instrumented Variables: Cash Flow and Size

Instruments: Cash Flow(-1), Cash Flow(-2), Size(-1) and Size(-2) - Group 2

Note: *, **, *** indicate statistical significance at, 1-percent, 5-percent and 10 percent (two tail) test levels, respectively.

Table 7: Baseline Regression Model Using Q2 - IV Estimations

Dependent Variable	Independent Variables			F-Stat
$\triangle$CashHoldings	Cash Flow	Size	Q2	
Financial Constraints Criteria				
1. Payout Ratio				
Constrained Firms	-0.124	-1994	-249.4	1.25
	(0.474)	(0.481)	(0.532)	(0.291)
Unconstrained Firms	-0.369	31086	363.98	0.32
	(0.491)	(0.443)	(0.418)	(0.809)
2. Firm Size				
Constrained Firms	-0.065	-802.3	-82.9	0.56
	(0.333)	(0.245)	(0.321)	(0.642)
Unconstrained Firms	-0.191	39217	10140	0.77
	(0.673)	(0.566)	(0.489)	(0.513)
3. Outstanding ADR				
Constrained Firms	-0.163	9054	777.3	0.56
	(0.697)	(0.447)	(0.285)	(0.643)
Unconstrained Firms	-0.058	-6990	35.95	0.85
	(0.492)	(0.497)	(0.882)	(0.470)

Instrumented Variables: Cash Flow and Size

Instruments: Cash Flow(-1), Cash Flow(-2), Size(-1) and Size(-2) - Group 2

Note: *, **, *** indicate statistical significance at, 1-percent, 5-percent and 10 percent (two tail) test levels, respectively.

Table 8: Augmented Regression Model Using Q1- IV Estimations

Dependent Variable				Independent Variables				F-Stat
△CashHoldings	Cash Flow	Size	Expend.	Acquis.	△NWC	△Short Debt	Q1	
Financial Constraints Criteria								
1. Payout Ratio								
Constrained Firms	0.343	-38561	0.484	0.021	-0.972	0.565	-4024	0.52
	(0.925)	(0.693)	(0.554)	(0.743)	(0.809)	(0.781)	(0.651)	(0.819)
Unconstrained Firms	-0.050	15545	-0.106	-0.0018	0.483	-0.0759	6.192	0.61
	(0.926)	(0.744)	(0.907)	(0.809)	(0.346)	(0.944)	(0.986)	(0.747)
2. Firm Size								
Constrained Firms	-0.251	-1008	0.247	-0.053	0.210	-0.050	-151.1	20.91
	(0.041)**	(0.194)	(0.688)	(0.00)*	(0.151)	(0.141)	(0.075)***	(0.00)*
Unconstrained Firms	0.936	-2595074	-10.06	0.106	-13.12	23.37	-245017	0.01
	(0.970)	(0.973)	(0.973)	(0.974)	(0.974)	(0.973)	(0.976)	(1.0)
3. Outstanding ADR								
Constrained Firms	0.463	3437	-1.16	-0.010	0.359	0.463	799.5	5.35
	(0.011)**	(0.837)	(0.107)	(0.040)**	(0.404)	(0.584)	(0.631)	(0.00)*
Unconstrained Firms	-0.611	1735	0.451	0.0048	0.283	-0.134	-6.987	0.57
	(0.141)	(0.936)	(0.127)	(0.546)	(0.543)	(0.468)	(0.979)	(0.777)

Instrumented Variables: Cash Flow, Size, Expend., Aqcquis., △NWC, △Short Debt

Instruments: Cash Flow(-1), Size(-1), Expend.(-1), Aqcquis.(-1), △NWC(-1), and △Short Debt(-1)

Note: *, **, *** indicate statistical significance at, 1-percent, 5-percent and 10 percent (two tail) test levels, respectively.