The Behavior of Leverage and Value of Financially Constrained and Unconstrained Firms During the Crisis Period

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The global financial crisis (2007-2009) provides us good opportunity to examine the behavior of leverage and value of financially constrained and unconstrained firms during the crisis period. Using data on 4865 private firms, results shows that financially constrained firms were squeezed during the credit retrenchment period. The leverage ratio, investment and performance of these firms were adversely affected due to unavailability of credit. The unconstrained firms, on the other hand, which face less market frictions were not much exposed to the credit shocks.

Key words: Financially Constrained, Leverage, Investment, Performance, Financial Crisis

The financial decisions of firms are not relevant for firm value in the world of perfect capital market (Modigliani & Miller, 1958). However, other studies , (such as, Greenwald, Stiglitz, & Weiss, 1984; Myers, 1984; Myers & Majluf, 1984, for example) have provided evidences which demonstrate that financial mix decision is relevant to firm value in an imperfect capital market where the cost of external finance exceeds that of internal finance. Bernanke and Gertler (1989, 1990) argue that agency cost increases the cost of external capital as net worth of the borrowers' decreases. The performance and investment decisions of firms performing in an imperfect capital market would be sensitive to the availability of internal finance because it has cost advantage over the external capital.

Subsequently, the relationship between the market frictions and value of the firm has got the attention of the academicians and researchers. However, empirical evidences on the market frictions and its impact on firm behavior are mixed and inconclusive. Fazzari, Hubbard, Petersen, Blinder, and Poterba (1988) for instance, argue that sensitivity of investment to cash flow is high for financially constrained (FC) firms. Similar result is also reported by Bhaduri (2008). There are other studies which have reported that sensitivity of investment to internal fund (cash flow) is high for the financially unconstrained (FUC) firms (Cleary, 1999; Kaplan & Zingales, 1997). Lin (2007) demonstrates that both constrained and unconstrained firms exhibit positive cash flow sensitivity to cash.

Most of the existing literature is focused on the US public firms while very limited evidence exists outside the US market. Moreover, in depth examination of the existing literature revealed that the relationship between the leverage, investment and performance of financially constrained and unconstrained firms especially, during the crisis period has not yet been thoroughly investigated. This clearly highlights gap in the existence literature. Moreover, none of the studies have utilized data on private firms which clearly justifies the need for this research.

The aim of this paper is to examine the behavior of leverage and value of the financially constrained and unconstrained privately held enterprises especially, in the period of global credit retrenchment. Getting insight from the existing literature, the study utilized panel data set for the period 2004-2009 and followed and adopted the methodology recently proposed by Akbar, Rehman, and Ormrod (2013) and S. Rehman and Akbar (2011). The results of the study are largely consistent with the existing literature.

Literature Review

A great amount of existing literature on corporate finance focuses on various frictions that a firm faces when raising external finance. The researchers and academicians have conjectured that these constraints may have impact on a firm's financial decisions, including the investment decisions and financial mix decisions (Hennessy & Whited, 2007).

Fazzari et al. (1988) show that investment is sensitive to cash flow, if one holds investment opportunities. Ozkan (2002) establishes the link between the R & D investment decision and internal finance. The author discovers that R & D investment decision is associated with the internal fund availability for the FC the US manufacturing firms than FUC firms. Using data on 576 Indian manufacturing firms, Bhaduri (2008) demonstrates that association between investment decision and cash flow is high for the firms which are identified as financially constrained.

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Other researchers, such as, Gertler and Gilchrist (1993) demonstrate that financial structure and investment decisions of financially constrained small firms were more sensitive than large firms following tight monetary policy. Similar results are also reported by number of researchers (see for example,Mateut, Bougheas, & Mizen, 2006; Oliner & Rudebusch, 1995, for details)

Kaplan and Zingales (1997) examine the relationship between the investment decision and cash flow of financially constrained and unconstrained firms. They discover that sensitivity of investment to internal finance (cash flow) is high for the unconstrained firms. Cleary (1999) supports the results of Kaplan and Zingales (1997). The author examines the behavior of financially constrained and unconstrained firms. He shows that investment of unconstrained firms is much sensitive to the availability of internal fund (cash flow). However, the study by Lin (2007) shows that both FC and FUC firms exhibit positive sensitivity of cash flow to cash. Agca and Mozumdar (2008) believe that the sensitivity of investment decisions to internal fund depends on factors which are related to financial market imperfections.

Blalock, Gertler, and Levine (2008) examine the behavior of financially constrained domestically owned and foreign owned firms during the emerging market financial crisis. They report that domestically owned financially constrained firms were more squeezed during the crisis period. Campello, Graham, and Harvey (2010) examine the effect of financial constraint on firms behavior during the global financial crisis in 2008. Using survey of 1050 Chief Financial Officers, they find that impact of financial crisis is more pronounced on financially constrained firms than unconstrained firms. Similarly, the study by S. U. Rehman (2012) shows that financially constrained firms were in difficult situation during the credit crisis of 2007-2009.

To summarize the above mentioned literature, it seems to suggest that results reported by the above mentioned studies are mixed and inconclusive. Further, there is very limited or no studies exist which have examined the leverage, performance and investment behavior of firms especially, in the credit drought or retrenchment period. It is also clear from the review of literature that no one has focused on private firms, which justifies the need and scope of this research.

Method

Investigation of the relationship between firms leverage ratio, performance and investment decision of the privately held firms especially, in the global credit retrenchment period, is the purpose of this research. To this end, the study adopted and followed the fixed effects models recently proposed and used in Akbar et al. (2013) and S. Rehman and Akbar (2011), which is reproduced as follow:

$$\text{Leverage} = \beta_0 + \Psi_1 * GT + \Psi_2 * GT * CR + \Psi_3 * ROA + \Psi_4 * ROA * CR + \Psi_5 * CR + \mu_{it} \quad (01)$$

$$\text{Investment} = \beta_0 + \Psi_1 * GT + \Psi_2 * GT * CR + \Psi_3 * CF + \Psi_4 * CF * CR + \Psi_5 * CR + \mu_{it} \quad (02)$$

$$\text{Performance} = \beta_0 + \Psi_1 * GT + \Psi_2 * GT * CR + \Psi_3 * TD + \Psi_4 * TD * CR + \Psi_5 * CR + \mu_{it} \quad (03)$$

Dependent variable in first equation (model No. 1) is leverage ratio, measured as total debt to total assets (TD). In models 2 & 3, the dependent variables are investment and performance. Investment is measured as change in fixed assets scaled by firm assets; performance is measured as EBIT/total asset. CF represents cash flow of firms. CR is crisis dummy variable which captures the credit supply shocks impact on dependent variable. GT is firm growth opportunity and is measured as $\text{turnover}_t / \text{turnover}_{t-1}$.

The data for the study is collected from the UK database (named as Financial Analysis Made Easy (FAME)). Data is extracted for the period 2004-2009. A total of 4865 private firms were extracted from the FAME data base. The existing literature has used various proxies to classify firms into financially constrained and unconstrained. However, due to data unavailability the study has used cash and cash equivalent and classified firms into financially constrained and unconstrained. Firms whose average cash and cash equivalent is lower than the study sample average (mean) are put in one group and is called constrained group. Likewise, unconstrained group consists of firms whose cash and cash equivalent is more than the study sample average (mean).

Results

The objective of the study is to examine the leverage, investment and performance behavior of constrained and unconstrained firms in the global crisis time period. For this purpose, equation 1 is run and the results obtained from the regression are reported in table 1. As expected, the coefficient of ROA is negative and statistically significant for both constrained and unconstrained firms. This confirms that firms prefer the pecking order in their financing decisions. The ROA * CR is also negative for the constrained firms. However, ROA * CR is positive and statistically significant for the unconstrained firms, which may indicate that high performing firms borrow more during the crisis period.

The coefficient of GT is positive, for both the FC and FUC firms however, the result is significant for the unconstrained firms only. It shows that financially unconstrained growing firms borrow more to finance their growth. Table 1 further reveals that GT interacted with the CR is positive and weakly significant for the constrained firms. Results become negative and weakly significant for the unconstrained firms. Now, we turn our attention to study main variable i-e the CR variable. The coefficient of the CR is negative. The result is significant at 5% for the constrained firms, which indicates that leverage ratio of the financially constrained firms decreased during the crisis period. It may be due to the fact

that constrained firms face high market frictions in raising external finance. On the other hand, the coefficient of CR for the unconstrained firm is positive and the result is weakly significant that may indicate that credit supply shocks have not negatively affected the unconstrained firms. These results are in line with the findings reported in (Akbar et al. (2013); S. Rehman & Akbar, 2011).

Table 1

Leverage Ratio and Credit Crisis

Leverage = $\beta_0 + \Psi_1 * GT + \Psi_2 * GT * CR + \Psi_3 * ROA + \Psi_4 * ROA * CR + \Psi_5 * CR + \mu_{it}$

Variable	Constrained Firms (Total debt)	Unconstrained Firms (Total debt)
C	0.560	0.422
	(68.23)***	(27.19)***
GT	0.006	0.054
	(0.90)	(3.46)***
GT*CR	0.022	-0.030
	(1.73)*	(-1.68)*
ROA	-0.256	-0.359
	(-6.63)***	(-7.85)***
ROA*CR	-0.162	0.202
	(-3.04)***	(3.91)***
CR	**-0.036**	**0.033**
	(-2.54)**	**(1.77)***
R-squared	0.772	0.765
N Obs	14881	7650
F-statistic	15.132	14.887
Prob(F-statistic)	0.000	0.000

Notes: Inside the parentheses are T-statistics values. 1% level of significance are represented by (***), 5% by (**), and 10% by (*) respectively.

To examine the investment behavior of constrained and unconstrained firms during the crisis period, model 2 is regressed on Investment. Regression results are reported in table 2. The results reveal that coefficient of CR is not positive. Results are also statistically significant at 1% confidence level for the constrained firms. It indicates that constrained firms face high market frictions and as a result, cannot obtain the required capital from the external market. Therefore, their investment in fixed assets reduced in the credit retrenchment period, which is the real cost of the global crisis 2007-2009.

In contrast, the coefficient of the CR for the unconstrained firm is positive. Result is also significant at 1% level. It reveals that investment of the unconstrained firms increased in the credit drought period. It may be because these firms are less opaque and as a result, the financial institutions are willing to extend loan to these firms. Hence, the table 2 shows that investments of the constrained firms are more affected during the crisis period than unconstrained firms. These results are consistent with the existing literature (Bernanke, Gertler, & Gilchrist 1996; Kashyap, Lamont, & Stein, 1994).

Table 2

Investment and Credit Crisis

Investment= $\beta_0 + \Psi_1 * GT + \Psi_2 * GT * CR + \Psi_3 * CF + \Psi_4 * CF * CR + \Psi_5 * CR + \mu_{it}$

Variable	Constrained Firms (Investment)	Unconstrained Firms (Investment)
C	-0.000	-0.042
	(-0.11)	(-4.66)***
GT	0.024	0.046
	(3.19)***	(5.31)***
GT*CR	0.026	-0.039
	(2.76)**	(-3.45)***
CF	0.034	0.016
	(1.72)*	(-4.66)***
CF*CR	-0.057	0.012
	(-2.44)***	(3.54)
CR	**-0.036**	**0.047**
	(-3.61)***	**(3.61)*****
R-squared	0.337	0.252
N Obs	7001	3447
F-statistic	1.655	1.193
Prob(F-statistic)	0.000	0.000

We also examine the performance of both FC and FUC firms during the crisis period. The study ran model 3 on performance and the results obtained are reported in table 3. Findings in table 3 show that coefficient of interest i-e CR is negative and statistically significant at the level of 1 % or better, for the financially constrained firms. The negative coefficient and statistical significance reveal that performance of the private firms also decreased in credit retrenchment period which is in line with our earlier results that demonstrate when financial crisis squeezes the supply of credit financially constrained firms will be hit hard.

However, the coefficient of the crisis dummy CR for the unconstrained firms is positive and statistically significant. This implies that there is no negative impact of retrenchment of credit on ROA of firms. The performance of the unconstrained firms has rather increased during the crisis period. Hence, the performance of the constrained firms is more affected during the global crisis however, its effect is positive on the performance of unconstrained firms.

Table 3

Performance and Credit Crisis

Performance= $\beta_0 + \Psi_1 * GT + \Psi_2 * GT * CR + \Psi_3 * TD + \Psi_4 * TD * CR + + \Psi_5 * CR \mu_{it}$

Variable	Constrained Firms (ROA)	Unconstrained firms (ROA)
C	0.057	-0.013
	(7.70)***	(-1.32
GT	0.036	0.105
	(9.19)***	(13.18)***
GT*CR	0.038	-0.058
	(6.02)***	(-5.41)***
TD	-0.094	-0.070
	(-8.47)***	(-4.24)***
TD*CR	0.017	-0.026
	(2.22)**	(-2.40)***
CR	**-0.050**	**0.079**
	(-6.44)***	**(6.35)*****
R-squared	0.585	0.576
N Obs	14881	7650
F-statistic	6.292	6.213
Prob(F-statistic)	0.000	0.000

Sensitivity Analysis

The study used the fixed effects regression model, which was recently proposed by Akbar et al. (2013) and S. Rehman and Akbar (2011). To statistically test whether the fixed effects or random effects model is appropriate for this study, Hausman (1978) model test is performed. In unreported analysis, the results reveal that random effect is not appropriate for this study rather support the use of fixed effects for investigating the relationship of leverage, investment and performance of FC and FUC firms in crisis period.

Multicollinearity is another issue because it affects the results of the fixed effects regression. Therefore, this issue needs to be properly addressed. To check whether the study has mutlicollinearity problem, insight from the existing literature has taken. Following Akbar et al. (2013), simple correlations is calculated. The highest correlation among the study's variables is 0.22, which is less than the threshold suggested by existing literature (see for example, Aivazian, Ge, & Qiu, 2005 , for details; Gujarati, 2003).

There are other econometric issues such as heteroscedasticity and serial correlation which also need to be properly addressed. These issues are called for by adjusting standard error i-e robust standard error are used (Arellano, 1987). All the models mentioned above are again estimated by adjusting for heteroscedasticity and serial correlation. The results are reported in table 4. It is noted that all results are qualitatively similar to our original results. Hence, it is concluded that our results are not subject to any econometric issues.

Conclusion

The study examines the behaviour of financially constrained and unconstrained private firms in the global financial crisis. The study utilized data of 4865 firms obtained from the UK database. Using the fixed effects model, the results reveal that leverage ratio, investment and performance of financially constrained firms are more affected than unconstrained firms in credit retrenchment period. The financial crisis has exerted more effects on the behaviour of FC firms than FUC private firms. Findings of this study will further enhance our understanding regarding the behaviour of non-listed firms during the crisis period. The study's findings contributed to the existing literature by examining the behaviour of financially constrained and unconstrained private firms in the global crisis. The results of the study are also helpful for the managers, investors and policy making bodies.

Table 4

Leverage, Investment, Performance and Credit Crisis, after adjusting for Heteroscedasticity and Serial Correlation

Variables	**Financially Constrained (Leverage)**	**Financially Unconstrained (Leverage)**	**Financially Constrained (Investment)**	**Financially Unconstrained (Investment)**	**Financially Constrained (Performance)**	**Financially Unconstrained (Performance)**
C	0.560	0.422	-0.000	-0.042	0.057	0.079
	(68.23)***	(27.19)***	(-0.11)	(-4.66)***	(7.70)***	(6.35)***
GT	0.006	0.054	0.02	0.046	0.036	0.105
	(0.905)	(3.46)***	(3.19)***	(5.31)***	(9.19)***	(13.18)***
GT*CR	0.022	-0.030	0.024	-0.039	0.038	-0.058
	(1.73)*	(-1.68)*	(2.76)***	(-3.45)***	(6.02)***	(-5.41)***
CF			0.034	0.016		
			(1.72)*	(1.16)		
CF *CR			-0.057	0.012		
			(-2.44)***	(0.54)		
TD					-0.094	-0.07
					(-8.47)***	(-4.24)***
TD*CR					0.017	-0.026
					(2.22)***	(-2.40)***
ROA	-0.256	-0.359				
	(-6.63)***	(-7.85)***				
ROA*CR	-0.162	0.202				
	(-3.04)***	(3.91)***				
CR	**-0.036**	**0.033**	**-0.038**	**0.047**	**-0.050**	**0.079**
	(-2.54)* **	**(1.77)***	**(-3.61)*** **	**(3.61)*** **	**(-6.44)*** **	**(6.35)*** **
No of observation	14881	7650	7001	3447	14881	7650
R-Square	**0.77**	**0.76**	**0.33**	**0.25**	**0.58**	**0.57**

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