European Journal of Business and Management
ISSN 2222-1905 (Paper) ISSN 2222-2839 (Online)
Vol.7, No.18, 2015

Financial crises and Adjustment rate of firms towards target capital structure: Evidence from China[1]

Sultan Sikandar Mirza[1] Tanveer Ahsan[2] Xianzhi Zhang[3*] Wang Man[4]

1. Ph.D student, School of Accounting, Dongbei University of Finance and Economics, Dalian, China
2. Ph.D student, School of Accounting, Dongbei University of Finance and Economics, Dalian, China
3. Professor, School of Accounting, Dongbei University of Finance and Economics, Dalian, China
4. Professor, School of Accounting, Dongbei University of Finance and Economics, Dalian, China

Abstract:
This paper examines the impact of the global financial crisis of 2007-08 on 897 Chinese listed non-financial firms by examining changes in their adjustment rate towards target capital structure from 2003 to 2012. Dynamic panel data technique has been used and it is found that there is noticeable change on both firm level and macroeconomic level determinants of target capital structure before and after the financial crisis. The study observes increased adjustment rate towards target capital structure after the financial crises. During pre-financial crises period Chinese non-financial firms adjust toward their leverage targets at an annual adjustment rate of 15-53% and fully reach their leverage targets within 2-7 years. While during post-financial crises period Chinese non-financial firms adjust toward their leverage targets at an annual adjustment rate of 24-60% and fully reach their leverage targets within 1.7-4.1 years.
Keywords – Target capital structure, adjustment rate, dynamic panel data models, China.

1. Introduction

There are two main competing capital structure theories: trade-off theory and pecking order theory. The trade-off theory claims that there is an optimal capital structure and firms try to achieve it to enjoy the benefits associated with it while on the other hand pecking order theory explains a strict order of financing where retained earnings comes at first then debt and equity at the end. Empirical research carried out in different economies provides mixed results (Qureshi et al., 2012, Titman and Wessels, 1988, Sheikh and Qureshi, 2014). Moreover, studies have also been carried out to explain adjustment rate of firms towards their target or optimal capital structure. Such as a study carried in Pakistan explains that firms adjust towards their target capital structure at the rate of 10-37 percent annually (Ahsan et al., 2015b). Another study carried out in Asian economies explains this adjustment rate between 24-45 percent (Getzmann et al., 2014). A recent study carried out in China explains adjustment rate between 26-69 percent during different life cycle stages (Tian et al., 2015). Another study carried out for US firms explains negative impact of global financial crises on leverage adjustment rate (Dang et al., 2014). The purpose of this study is to find out impact of global financial crises on the adjustment rate of Chinese firms.

The financial crisis of 2007-08 affected the whole world in one way or another. The crisis did not spare the Chinese economy either. Following the global decline in economic growth, the Chinese economic growth rate fell from 13 percent to 6.8 percent in the fourth quarter of 2008 alone. The main reason was that the Chinese economy is mainly an export-oriented economy. The country's export declined sharply because of adverse economic conditions of other big economies, which ultimately shattered the Chinese economy. In response to this crisis, Chinese government took very impressive measures like a stimulus package of 4 trillion Yuan. The central bank of china, the People's Bank of China (PBOC), decreased their interest rates sharply which helped boost the growth rate of credit. As early as the first quarter of 2009, the stimulus package and the revised monetary policy began to show their positive impact on the Chinese economy. But it is still early to talk about the sustainability of the present growth rate of the Chinese economy as a number of big economies are still under the influence of the crisis, especially European economies.

[1] This paper is affiliated by the "Unintended consequences of accounting standards evolution: the effect on business operating pattern and investment", which is sponsored by National Natural Science Foundation of China (NSFC:71372068), and also affiliated by the " Enterprises risk management framework research: a perspective on managerial risk behavior ", which is sponsored by Education Agency of Liaoning Province (WT2010006).

Till now, no significant work has been done on determining the impact of financial crisis on capital structure and adjustment rate towards optimal capital structure of Chinese firms. This study aims to fill this gap in literature with respect to non-financial listed firms of China for the time period of 2003-2012.

While using dynamic panel data technique (GMM-System) the study explores that Chinese firms increased their adjustment rate after the financial crises. Before financial crises these firms have adjustment rate between 15-53% annually but after the financial crises their adjustment rate towards target debt ratios is between 24-60% annually. The study explains increased liquidity as well profitability and decreased inflation rate as a plausible reason for increased leverage adjustment rate after the financial crises. Because liquidity and profitability by providing firms both the options (to go for cheaper debt or to use internal sources) make it easy for them to adjust quickly and reduced inflation rate lowers uncertainty.

2. Literature Review

The quest about capital structure started with (Modigliani and Miller, 1958) when they gave their theory of irrelevancy: capital structure is irrelevant to the firm's value in perfect market with symmetric information if there are no agency costs, bankruptcy costs and taxes. Till now, certain theories have been defined to explain various variables to determine the capital structure. Pecking order theory, trade off theory and market timing theory are the main capital structure theories which have identified variables like tangibility, profitability, size, liquidity and market to book ratio as the determinants of capital structure (Tong and Green, 2005). In this section we will discuss factors which may affect the capital structure decisions of firms and adjustment rate towards optimal or target capital structure.

2.1. Tax

Tax is one of the more important factors for determining the capital structure for firms. (Modigliani and Miller, 1963) have suggested that companies should gain more debt financing for their on-going projects or for new investments because of tax deduction associated with it due to interest payments on debt. Following this a direct relationship is expected between tax rate, leverage ratio and adjustment rate towards leverage target. But a recent study carried out in China explains this relationship as negative (Tian et al., 2015).

2.2. Non-debt Tax Shield

According to (DeAngelo and Mesulis, 1980), non-debt tax shield (NDTS) is an alternative to tax shield on debt financing. Following this an inverse relationship is expected between NDTS and leverage. But studies have shown quite mixed results regarding the relationship between NDTS and leverage. (Bradley et al., 1984) have shown a positive relationship between the NDTS and leverage but (Wald, 1999) has shown a negative correlation between NDTS and leverage. For Pakistan studies explain mix results for different proxies of leverage (Sheikh and Qureshi, 2014, Ahsan et al., 2015a). In China, (Huang and Song, 2006) provide evidence that leverage and non-debt tax shield has negative relationship.

2.3. Volatility

Business risk measured as income volatility explains the probability of financial distress of a firm. Greater the volatility, greater will be the probability of financial distress. Therefore, firms with higher income volatility are perceived as riskier firms by the creditors. Accordingly, debt is available for them but with higher interest rates. Therefore, an inverse relationship is expected between income volatility or business risk, leverage and adjustment rate. Studies such as (Booth et al., 2001) (Jong et al., 2008)have found that volatility has a negative relationship with leverage. (Huang and Song, 2006) have found the same results for Chinese firms. Further, firms with higher volatility are expected to stay close to their target or an optimal leverage ratio, therefore a positive relationship is also expected between volatility and adjustment rate. Moreover, volatility may make it difficult for the firms to adjust their target debt ratios therefore, a negative relationship is also expected between adjustment rate and volatility as explained by a recent study (Ahsan et al., 2015b).

2.4. Profitability

Researchers have shown contradictory results regarding profitability and leverage in their studies. Pecking order theory suggests that there is a negative relationship between profitability and leverage because when firms have large profits they prefer internal funds for financing their investments but trade-off theory claims that profitable being perceived as less risky may access external funds to finance their investments.

Several studies by Chinese researchers on China have shown a negative relationship between profitability and leverage (Chen, 2004, Tong and Green, 2005, Huang and Song, 2006) which supports pecking order theory. A recent study about leverage adjustment rate also explains negative relationship between profitability and target leverage (Tian et al., 2015).

2.5. Liquidity

Liquidity is another very important determinant of capital structure for firms. Capital structure theories have different arguments about the relationship between liquidity and leverage. The trade-off theory argues that there is a positive relationship between liquidity and leverage as firms with higher liquidity ratios should go for debt as these firms are perceived as less risky and may access cheap debt while, on the other hand, pecking order theory

believes that there is a negative relationship between liquidity and leverage because firm with higher liquidity ratios prefer to use internal funds (retained earnings) to finance their new investment projects. Studies have shown their findings which are consistent with the pecking order theory (Mazur, 2007) as well as trade-off theory (Qureshi et al., 2012, Ahsan et al., 2015a).

2.6. Growth Opportunities

(Myers, 1977) suggests that firms with high growth may hold more choices for future investment projects than low growth firms. Trade-off theory suggests that there is negative relationship between growth opportunities and leverage because firms holding future growth opportunities are like intangible assets and it can't be collateralized. Further, pecking order theory suggests that when firms expect high future growth, then they should use equity financing. Accordingly, both pecking order and trade-off theory explain negative relationship between growth or growth opportunities and leverage. (Deesomsak et al., 2004) have also shown a negative relationship between growth opportunities and leverage. (Chen, 2004) also provide evidence consistent with the above mentioned negative correlation of growth opportunities with leverage. (Wald, 1999) has shown that the USA is the only country where high growth is associated with lower debt/equity ratio. However, a recent study about leverage adjustment rate explains negative relationship between growth and target leverage.

2.7. Tangibility

Tangibility is also one of the important determinants of capital structure for firms. It can be defined as the asset collateralizing to get loan. According to (Myers and Majluf, 1984) issuing debt by this way, helps a firm to avoid associated costs. So, this finding suggests that tangibility has a positive correlation with leverage and leverage adjustment rate. Many researchers have shown in their studies that there is a positive relationship between tangibility and leverage (Wald, 1999, Jong et al., 2008). But some researchers also have shown a negative relationship between these variables (Mazur, 2007, Ahsan et al., 2015a).

(Chen, 2004, Huang and Song, 2006) have concluded through their empirical findings that tangibility and leverage have a positive relationship in Chinese firms. A recent study in China also shows positive relationship between leverage adjustment rate and tangibility (Tian et al., 2015).

2.8. Size

According to trade-off theory, firms bigger in size are expected to raise more debt due to their cheaper access to it. Therefore, trade-off theory expects a positive relationship between leverage and firm size. On the other hand, pecking order theory explains a negative relationship between firm size and leverage due high level of internal funds available with bigger firms. (Rajan and Zingales, 1995) found that size has positive relationship with the level of debt which supports trade-off theory. A recent study about leverage adjustment rate for Chinese firms explains a positive relationship between leverage and firm size (Tian et al., 2015).

2.9. Economic Development

Economic growth ascertains the health of an economy. During good economic period firms have more opportunities to make profits. According to pecking order hypothesis; more profit means reduced debt dependence. Therefore, pecking order theory predicts a negative relationship between economic growth and leverage. On the other, trade-off theory explains that firms with more profits may have access to cheaper debt therefore; a positive relationship is expected between economic growth and leverage. Researchers have found that there is a negative correlation between GDP or GDP growth and capital structure (Bayrakdaroğlu et al., 2013) in support with pecking order theory. Further, researchers have also find that during good economic conditions leverage adjustment rate of firms is higher than during bad economic conditions (Dang et al., 2014).

Table 1: Independent variables, their description and expected relationship with leverage

Variable name	Model name	Proxy	Effect on leverage (+/-)
Tax rate	TAX_{it}	Effective rate %	+
Non-debt tax shield	$NDTS_{it}$	Depreciation expenses/total assets	-
Volatility	VOL_{it}	Standard deviation of EBT/total equity	+/-
Profitability	$PROF_{it}$	Profit before tax/total equity	+/-
Liquidity	LIQ_{it}	Current assets/current liabilities	+/-
Growth Potential	GP_{it}	Tobin's Q(ratio of market to book value of assets)	+/-
Tangibility	$TANG_{it}$	Net fixed assets/total assets	+
Firm size	$SIZE_{it}$	ln(total assets)	+/-
Economic Growth	ED_t	% change of GDP	+
Inflation	INF_t	average of consumer price index and producer price index	-

2.10. Inflation Rate

Another most important macroeconomic factor which can influence the capital structure is inflation rate. Inflation rate measures the uncertainty in economy. Uncertainty makes business environment more complex. Therefore, a negative relationship is expected between inflation rate and leverage adjustment rate. Further, inflation rate make it easy to adjust book value of debt and also increases tax shield benefits. Therefore, a positive relationship is also expected between inflation rate and leverage adjustment rate. Many researchers have tried to find out the relationship between inflation rate and capital structure but their findings differ greatly. (Frank and Goyal, 2009) argue that there is no relationship between inflation and capital structure of a firm. (Bayrakdaroğlu et al., 2013) argue that there is a negative relationship between inflation and capital structure. But some researchers have found that there is a positive relationship between inflation rate and leverage (Bokpin, 2009).

Table 1 presents the explanatory variables along-with their proxy and expected relationship with leverage.

3. Data and Methodology

In this research article, annual data has been used from the financial statements of non-financial firms of China for the time period of 2003-2012. This time period exactly show the impact of financial crisis on the capital structure of firms in china. 2003-2007 is the period before the financial crisis and 2008-2012 is the period after financial crisis. Both time periods equally divided into 5 years which is representing a very significant amount of time for pre-post financial crisis analysis of firms. In total, we develop a balanced data of 8790 firm-year observations, 4395 firm-year observations for each period (before and financial crises).

Firm level data (Profitability, Size, Tangibility, Liquidity, Non-Debt Tax Shield and Volatility) has been accessed from RESSET and CSMAR while economic data (Economic Development, Tax Rate and Inflation) has been taken from EIU-Country Data.

Following other similar studies we develop dynamic panel data model to measure leverage adjustment rate and determinants of target leverage.

$$Debtratio^{*}_{it} = \beta X_{it} + \varepsilon_{it} \quad \ldots (1)$$

Where $Debtratio^{*}_{it}$ is the target capital structure or leverage ratio for the *i*th firm at time *t*, βX_{it} is the vector of firm and macroeconomic variables and ε_{it} is the error components for *i*th firm at time *t*. Further,

$$Debtratio_{it} - Debtratio_{i,t-1} = \delta\left(Debtratio^{*}_{it} - Debtratio_{i,t-1}\right) + \varepsilon_{it} \ldots\ldots (2)$$

or

$$Debtratio_{it} = (1-\delta)Debtratio_{i,t-1} + \delta Debtratio^{*}_{it} + \varepsilon_{it} \ldots\ldots (3)$$

Substituting equation 1 in equation 3

$$Debtratio_{it} = (1-\delta)Debtratio_{i,t-1} + \delta\beta X_{it} + \varepsilon_{it} \ldots\ldots (4)$$

Where $Debtratio_{it}$ is one of three debt ratios (STD_{it}: short-term debt ratio, calculated as short-term debt over total assets. LTD_{it}: long-term debt ratio, calculated as long term debt over total assets and TD_{it}: total debt ratio, calculated as total debt over total assets) used in the study for *i*th firm at time *t*. $Debtratio^{*}_{it}$ is one of three optimal debt ratios. δ is leverage adjustment parameter. $1-\delta$ is leverage adjustment rate during one economic period. ε_{it} is error term.

We use dynamic panel data technique also known as GMM-system to calculate leverage adjustment rate as used by other similar studies (Getzmann et al., 2014).

4. Analysis

4.1. Descriptive statistics

Table 2 presents the descriptive statistics for all the dependent and independent variables used in the study for pre and post financial crises separately. Pre total debt mean value (0.5954) and post total debt mean value (0.6319) explains that Chinese firms increased their debt dependence after the financial crises. Further, these firms reduced their tax payments as explained by pre and post mean value (0.2372, 0.2148) for tax respectively.

Table-2: Descriptive statistics

Pre Financial Crises (2003-2007)					
Variable	Obs.	Mean	Std. Dev.	Min.	Max.
STD_{it}	4395	0.4902	0.2898	-0.8824	2.0886
LTD_{it}	4395	0.1450	0.2310	-1.0920	0.8327
TD_{it}	4395	0.5954	0.5386	0.1184	6.5224
TAX_{it}	4395	0.2372	0.0913	0.0013	0.3300
$NDTS_{it}$	4395	0.0190	0.0264	-0.1154	0.0974
VOL_{it}	4395	0.1668	0.4876	0.0045	3.7556
$PROF_{it}$	4395	0.0824	0.2408	-1.2210	1.0744
LIQ_{it}	4395	1.3252	0.9461	0.0628	6.1702
GP_{it}	4395	1.3845	1.1843	0.1826	7.5345
$TANG_{it}$	4395	0.3173	0.1845	0.0031	0.7948
$SIZE_{it}$	4395	21.4573	1.1360	18.6090	25.4035
ED_t	4395	11.6516	1.5869	10.0250	14.1660
INF_t	4395	3.5950	0.7987	2.7750	4.8210
Post Financial Crises (2008-2012)					
STD_{it}	4395	0.4974	0.2921	-0.8824	2.0886
LTD_{it}	4395	0.1940	0.2378	-1.0920	0.8327
TD_{it}	4395	0.6319	0.6514	0.1184	6.5224
TAX_{it}	4395	0.2148	0.0569	0.0013	0.3300
$NDTS_{it}$	4395	0.0139	0.0268	-0.1154	0.0974
VOL_{it}	4395	0.1786	0.4872	0.0045	3.7556
$PROF_{it}$	4395	0.0902	0.2250	-1.2210	1.0744
LIQ_{it}	4395	1.3604	0.9858	0.0628	6.1702
GP_{it}	4395	1.4709	1.3463	0.1826	7.5345
$TANG_{it}$	4395	0.2797	0.1904	0.0031	0.7948
$SIZE_{it}$	4395	22.1091	1.3372	18.6090	25.4035
ED_t	4395	9.2420	0.9001	7.6520	10.4100
INF_t	4395	2.5625	2.7576	-1.7460	5.0710

Furthermore, we observe increased income volatility after financial crises as depicted by pre-post mean value (0.1668, 0.1786) of volatility respectively. Further, we observe decreased economic growth and inflation rate after the financial crises with a mean value of 11.6516 before crises and 9.2420 after financial crises for economic growth rate and with a mean value of 3.5950 before crises and 2.5625 after financial crises for inflation rate. But, we observe increased profitability and liquidity after the financial crises with a mean value of 0.0824 before crises and 0.0902 after financial crises for economic profitability and with a mean value of 1.3252 before crises and 1.3604 after financial crises for liquidity.

4.2. Leverage adjustment rate

Table 3 presents the results of dynamic panel data analysis (GMM-System) for short-term, long-term and total debt ratios, separately[2]. The estimated coefficients of the lagged leverage for all three debt ratios are significant (p=0.01) indicating the existence of target debt for non-financial firms in China.

Moreover, the results show that Chinese non-financial firms partially adjust their target debt before and after financial crises. The adjustment rate before financial crises towards *short-term target debt* is 34.16%, towards *long-term target debt* is 52.56%, and towards *total target debt* is 15.92%. Using 1/(1- δ) to determine the time frame to fully reach the target leverage, we find that on the average Chinese non-financial firms before financial crises fully reach their *short-term target debt* in 2.93 years, *long-term target debt* in 1.90 years, and *total target debt* in 6.28 years. The adjustment rate after financial crises towards *short-term target debt* is 59.09%, towards *long-term target debt* is 54.50%, and towards *total target debt* is 24.69%. Using 1/(1- δ) to determine the time frame to fully reach the target leverage, we find that on the average Chinese non-financial firms before financial crises fully reach their *short-term target debt* in 1.69 years, *long-term target debt* in 1.83 years, and *total target debt* in 4.05 years. These adjustment rates towards target debt ratios provide evidence about the existence of dynamic trade-off theory. We can conclude that Chinese non-financial firms do have target debt ratios and adjustment rate of these firms towards their target debt ratios is higher after the financial crises as compared to the adjustment rate before financial crises. The reason is increased profitability and liquidity ratios after the financial crises and more growth opportunities (table 2).

4.3. Determinants of target debt

In this section we discuss only those variables which have different impact before and after financial crises. Talking about short term target debt; the relationships of non-debt tax shield (NDTS), income volatility (VOL), profitability (PROF), tangibility (TANG) and firm size (SIZE) are not significant before crises but after crises their relationship with short term debt turns significant. Further, inflation (INF) and growth (GP) have significant relationship with short term debt before financial crises but after financial crises. Liquidity has significant negative relationship during both periods but its magnitude is higher for post financial crises period. The plausible reasons for increased adjustment rate towards short term debt during post financial crises are: significance of profitability with short term debt after financial crises and higher magnitude of liquidity during post financial crises period.

For long term debt ratio; tax rate (TAX) is insignificant negative before financial crises but turns significant negative after financial crises. Further, economic growth (EG) has negative insignificant relationship before financial crises that turns significant positive after financial crises and this seems the plausible reason of increased adjustment rate towards long term debt ratio during post financial crises period because other relationships are almost same for both the periods.

For total debt ratio; tax rate (TAX) is again insignificant negative before financial crises but turns significant negative after financial crises. Profitability (PROF) and growth (GP) have significant positive relationship but only before financial crises. Further, inflation (INF) has significant negative relationship with total debt only before financial crises period and that seems the plausible reason for lower adjustment rate towards total debt target for the period before financial crises.

[2]Dynamic panel data analysis automatically reduces the number of firm-year observations from 4,395 to 3,516 because it takes one-year lag of dependent variable (leverage) as independent variable.

Table 3: Leverage adjustment rate and its determinants

Pre Financial Crises (2003-2007)							**Post Financial Crises (2008-2012)**					
Variables	STD_{it}		LTD_{it}		TD_{it}		STD_{it}		LTD_{it}		TD_{it}	
	Coef.	**Prob.**	**Coef.**	**Prob.**	**Coef.**	**Prob.**	**Coef.**	**Prob.**	**Coef.**	**Prob.**	**Coef.**	**Prob.**
Adjustment Rate	**34.16%**		**52.56%**		**15.92%**		**59.09%**		**54.50%**		**24.69%**	
Debt ratio$_{i,t-1}$	0.6584	0.0000	0.4744	0.0000	0.8408	0.0000	0.4091	0.0000	0.4550	0.0000	0.7531	0.0000
TAX_{it}	-0.1808	0.0170	-0.0538	0.5540	-0.0316	0.8060	-0.1516	0.0900	-0.1059	0.0640	-0.1540	0.0430
$NDTS_{it}$	-0.0389	0.9490	-0.3229	0.3530	-0.4832	0.4670	-0.8638	0.0410	-0.2713	0.3200	-0.4963	0.1530
VOL_{it}	-0.0033	0.9630	-0.0498	0.1600	0.1508	0.0050	-0.0632	0.0220	-0.0389	0.1010	-0.0984	0.0910
$PROF_{it}$	-0.0564	0.1750	-0.2061	0.0000	0.0927	0.0860	-0.1234	0.0030	-0.1557	0.0000	-0.0213	0.6970
LIQ_{it}	-0.0910	0.0000	-0.0338	0.0080	-0.1585	0.0000	-0.1194	0.0000	-0.0347	0.0000	-0.1232	0.0000
GP_{it}	-0.0570	0.0020	-0.0212	0.1080	0.0824	0.0280	-0.0021	0.7870	-0.0062	0.2340	-0.0177	0.1060
$TANG_{it}$	-0.0026	0.9860	-0.0074	0.9370	0.0761	0.7510	-0.2780	0.0160	-0.0328	0.6350	-0.2296	0.4760
$SIZE_{it}$	-0.0007	0.9880	-0.1073	0.0000	-0.1002	0.0430	-0.0443	0.0470	-0.0848	0.0000	-0.1448	0.0060
ED_t	0.0110	0.1830	-0.0013	0.8200	-0.0343	0.0030	-0.0045	0.2890	-0.0079	0.0070	-0.0195	0.0060
INF_t	0.0273	0.0080	-0.0086	0.1690	-0.0444	0.0160	-0.0018	0.2140	-0.0045	0.0010	-0.0042	0.1220
Constant	0.1948	0.8440	-2.2344	0.0000	2.9059	0.0100	1.5672	0.0030	-1.8376	0.0000	3.6436	0.0020
Wald chi²	335.88	0.0000	195.09	0.0000	1249.52	0.0000	291.44	0.0000	130.85	0.0000	310.62	0.0000
AR(1)	-3.6532	0.0003	-6.0149	0.0000	-2.9303	0.0034	-3.3605	0.0008	-6.7794	0.0000	-2.8486	0.0044
AR(2)	-1.5354	0.1247	-0.3537	0.7235	-2.0432	0.0410	0.4266	0.6696	-0.0482	0.9615	-2.1434	0.0321
No. of obs.	3516		3516		3516		3516		3516		3516	
No. of firms	879		879		879		879		879		879	

Notes: The table presents the results from dynamic panel regressions (Arellano-Bover/Blundell Bond-estimator also known as GMM-System) for three leverage ratios used in this study. STD_{it} is defined as short term liabilities over total assets; LTD_{it} is defined as long term liabilities over total assets; TD_{it} is defined as total liabilities over total assets; TAX_{it} is defined as % effective tax rate; $NDTS_{it}$ is defined as depreciation expense over total assets; VOL_{it} is defined as standard deviation of EBT/total equity;, $PROF_{it}$ is defined EBT scaled by total equity; LIQ_{it} is defined as current assets over current liabilities; GP_{it} is defined as Tobin's Q(ratio of market to book value of assets); TAN_{it} is defined as net fixed assets over total assets; $SIZE_{it}$ is defined as natural logarithm of total assets; ED_{it} is defined as the yearly % change of GDP and INF_{it} is defined as average of consumer price index and producer price index. Wald chi^2 test ensures the joint significance of all the explanatory variables included in the model. AR(1) is Arellano-Bond test to verify the first order autocorrelation. AR(2) is Arellano-Bond test to verify the second order autocorrelation.

4.3. Robustness

To investigate the robustness; first of all we carried out Variance Inflation Factor (VIF) test to check the multicollinearity. Table 4 presents the results of Variance Inflation Factor (VIF) test for three debt ratios before and after financial crises separately. We find maximum VIF value 1.55 for growth (GP) before financial crises and 1.63 for economic growth (EG) after financial crises. The results explain that our data do not suffer from multicollinearity problem.

Table 3 also presents the results of some robustness tests carried out to make sure the validity of the methodology used in the study. First of all Wald test by rejecting (prob>chi^2=0.000) the null hypothesis (H_0: All coefficients of the explanatory variables are jointly equal to zero) validates the joint significance of all the explanatory variables included in the model. Further, Arellano-Bond test for first-order autocorrelation (AR-1) rejects the null hypothesis (H_0:No autocorrelation) but for second-order autocorrelation (AR-2) it accepts the null hypothesis (H_0:No autocorrelation) significantly suggesting that residuals do not face second-order autocorrelation. The test for second-order autocorrelation is more important because the consistency of GMM estimator depends upon it (Arellano and Bond, 1991). Moreover, the study uses robust standard errors adjusted for heteroskedasticity (White, 1980).

Table-4: Variance Inflation Factor Test

Variables	*Pre-Financial Crises (2003-2007)*			*Post-Financial Crises (2008-2012)*		
	STD	**LTD**	**TD**	**STD**	**LTD**	**TD**
TAX_{it}	1.04	1.04	1.04	1.03	1.03	1.03
$NDTS_{it}$	1.32	1.32	1.32	1.32	1.32	1.32
VOL_{it}	1.11	1.11	1.11	1.12	1.12	1.12
$PROF_{it}$	1.05	1.05	1.05	1.07	1.07	1.07
LIQ_{it}	1.26	1.26	1.26	1.27	1.27	1.27
GP_{it}	**1.55**	**1.55**	**1.55**	1.60	1.60	1.60
$TANG_{it}$	1.44	1.44	1.44	1.45	1.45	1.45
$SIZE_{it}$	1.35	1.35	1.35	1.52	1.52	1.52
ED_t	1.45	1.45	1.45	**1.63**	**1.63**	**1.63**
INF_t	1.33	1.33	1.33	1.61	1.61	1.61

5. Conclusion

We find plenty of capital structure adjustment studies carried out in developing and developed economies. But the studies covering impact of financial crises on leverage adjustment are quite a few. Such as a study carried out in US finds negative impact of crises on adjustment rate (Dang et al., 2014). In china empirical studies regarding leverage adjustment rate have not incorporated the impact of financial crises yet. This is the first study in authors' knowledge that investigates leverage adjustment rate of Chinese non-financial firms before and after the financial crises (2007-08).

The study uses a balanced panel of 8790 firm-year observations for the period from 2003 to 2012. The study divides the period into two parts (2003 to 2007 a period before the financial crises and 2007-2012 a period after the financial crises). While using dynamic panel data technique (GMM-System) the study finds out increased leverage adjustment rate after the financial crises. Before financial crises Chinese firms have adjustment rate between 15-53% annually but after the financial crises their adjustment rate towards target debt ratios is between 24-60% annually. The study explains increased liquidity as well profitability and decreased inflation rate as a plausible reason for increased leverage adjustment rate after the financial crises. Because liquidity and profitability by providing firms both the options (to go for cheaper debt or to use internal sources) make it easy for them to adjust quickly and reduced inflation rate lowers uncertainty.

5. References

AHSAN, T., MAN, W. & QURESHI, M. A. 2015a. Firm, industry and country level determinants of capital structure: evidence from Pakistan. *Working paper*.

AHSAN, T., MAN, W. & QURESHI, M. A. 2015b. How do they adjust their capital structure under erratic economic conditions and with limited financing options? An empirical study about target capital structure of Pakistani firms. *Working paper*.

ARELLANO, M. & BOND, S. 1991. Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations. *The Review of Economic Studies,* 58**,** 277-297.

BAYRAKDAROĞLU, A., EGE, İ. & YAZICI, N. 2013. A Panel Data Analysis of Capital Stucture Determinants: Empirical Results from Turkish Capital Market. *International Journal of Economics and Finance,* 5**,** 131-140.

BOKPIN, G. A. 2009. Macroeconomic development and capital structure decisions of firms. *Studies in Economics and Finance,* 26**,** 129-142.

BOOTH, L., AIVAZIAN, V., KUNT, A. D. & MAKSIMOVIC, V. 2001. Capital Structure in developng countries. *The Journal of Finance,* 56**,** 87-130.

BRADLEY, M., JARRELL, G. A. & KIM, E. H. 1984. On the Existence of an Optimal Capital Structure: Theory and Evidence. *The Journal of Finance,* 39**,** 857-878.

CHEN, J. J. 2004. Determinants of capital structure of chinese listed companies. *Journal of Business Research,* 57**,** 1341-1351.

DANG, V. A., KIM, M. & SHIN, Y. 2014. Asymmetric adjustment toward optimal capital structure: Evidence from a crisis. *International Review of Financial Analysis,* 33**,** 226-242.

DEANGELO, H. & MESULIS, R. W. 1980. Optimal capital structure under corporate and personal taxation. *Journal of Financial Economics,* 8**,** 3-29.

DEESOMSAK, R., PAUDYAL, K. & PESCETTO, G. 2004. The determinants of capital structure: evidence from the Asia Pacific region. *Journal of Multinational Financial Management,* 14**,** 387-405.

FRANK, M. Z. & GOYAL, V. K. 2009. Capital structure decisions: which factors are reliability important. *Financial Management,* 39**,** 1-37.

GETZMANN, A., LANG, S. & SPREMANN, K. 2014. Target Capital Structure and Adjustment Speed in Asia. *Asia-Pacific Journal of Financial Studies,* 43**,** 1-30.

HUANG, S. G. H. & SONG, F. M. 2006. The determinants of capital structure: Evidence from China. *China Economic Review,* 17**,** 14-36.

JONG, A. D., KABIR, R. & NGUYEN, T. T. 2008. Capital structure around the world: The roles of firm- and country-specific determinants. *Journal of Banking & Finance,* 32**,** 1954-1969.

MAZUR, K. 2007. The Determinants of Capital Structure Choice: Evidence from Polish Companies. *Int Adv Econ Res,* 13**,** 495-514.

MODIGLIANI, F. & MILLER, M. H. 1958. The Cost of Capital, Corporation Finance and the Theory of Investment. *The American Economic Review,* 48**,** 261-297.

MODIGLIANI, F. & MILLER, M. H. 1963. Corporate income taxes and the cost of capital: a correction. *American Economic Review,* 53**,** 433-443.

MYERS, S. C. 1977. DETERMINANTS OF CORPORATE BORROWING.

MYERS, S. C. & MAJLUF, N. S. 1984. Corporate financing and investment decisions when firms have information that investors do not have.

QURESHI, M. A., IMDADULLAH, M. & AHSAN, T. 2012. What determines leverage in Pakistan? A panel data analysis. *African Journal of Business Management,* 6**,** 978-985.

RAJAN, R. G. & ZINGALES, L. 1995. What Do We Know about Capital Structure? Some Evidence from International Data. *The Journal of Finance,* 50**,** 1421-1460.

SHEIKH, N. A. & QURESHI, M. A. 2014. Crowding-out or shying-away: impact of corporate income tax on capital structure choice of firms in Pakistan. *Applied Financial Economics.*

TIAN, L., HAN, L. & ZHANG, S. 2015. Business Life Cycle and Capital Structure: Evidence from Chinese Manufacturing Firms. *China & World Economy,* 23**,** 22-39.

TITMAN, S. & WESSELS, R. 1988. The Determinants of Capital Structure Choice. *The Journal of Finance,* 43**,** 1-19.

TONG, G. & GREEN, C. J. 2005. Pecking order or trade-off hypothesis? Evidence on the capital structure of Chinese companies. *Applied Economics,* 37**,** 2179-2189.

WALD, J. K. 1999. How firm characteristics affect capital structure: An internatioal comparison. *Journal of Financial Research,* 22**,** 161-187.

WHITE, H. 1980. A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity. *Econometrica,* 48**,** 817-838.

The IISTE is a pioneer in the Open-Access hosting service and academic event management. The aim of the firm is Accelerating Global Knowledge Sharing.

More information about the firm can be found on the homepage:
http://www.iiste.org

CALL FOR JOURNAL PAPERS

There are more than 30 peer-reviewed academic journals hosted under the hosting platform.

Prospective authors of journals can find the submission instruction on the following page: http://www.iiste.org/journals/ All the journals articles are available online to the readers all over the world without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself. Paper version of the journals is also available upon request of readers and authors.

MORE RESOURCES

Book publication information: http://www.iiste.org/book/

Academic conference: http://www.iiste.org/conference/upcoming-conferences-call-for-paper/

IISTE Knowledge Sharing Partners

EBSCO, Index Copernicus, Ulrich's Periodicals Directory, JournalTOCS, PKP Open Archives Harvester, Bielefeld Academic Search Engine, Elektronische Zeitschriftenbibliothek EZB, Open J-Gate, OCLC WorldCat, Universe Digtial Library , NewJour, Google Scholar