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How dynamic capital structure works in China?

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Abstract- *We analyze the capital structure decision for 615 Chinese listed firms covering a period from 2008 to 2013. We posit that capital structure decisions are inherently dynamic. We apply both the book total debt and market total debt to formula dynamic capital structure models. Using a system GMM estimator we find: (i) firms adjust deviations from an optimal targets with the different speeds for book and market debts; (ii) total debt leverage has changed in downward trend; (3) firm size and non-debt tax shield have become the most important determinants of debt leverage; (4) dividend is not used for tunnel cash from debt-holders to shareholders; (5) human recourse factors emerged with significant influence on capital structure decision. This extension allows us to establish new evidence of determinants of capital structure from a human source perspective.*

Keyword- *Capital Structure; China; GMM; Speed of Adjustment; Macroeconomic and Human Resources*

1. INTRODUCTION

Dynamic capital structure has attracted growing attention from scholars. A few of studies have reported dynamic capital structure models for firms (e.g. Qian et al., 2009[26]; Guney et al., 2011[16]; Ebrahim et al., 2014[11]). This implies that firms make adjustment on debt leverage in responding to deviations from an optimal capital structure. At the same time, studies are beginning to suggest that firm financial behavior may not only be affected by firm financial behavior, but also be correlated to country-specific and human resource factors, depending on the country's macroeconomic condition and employment issues (e.g. Kale, 2007[19], 2013[20]; Frank and Goyal, 2009[15]). However, there are only limited studies analyzing dynamic capital structure in regard to such factors. In this study, we contribute to this gap of research by modeling firm financial, macroeconomic, and human resource factors to capital structure decision. Our evidence comes from China whose economy development provides great opportunities for scholars to conduct analysis on firm financial behaviors.

To be specific, this study has two objectives. First, to formulate a dynamic capital structure, and thereby identify adjustment speed for firms. We analyze capital structure in observation of both book total debt and market total debt. We are particularly interested in whether firms may rebalance capital structure in different speeds referring to debt values. The second objective is to observe relationships between capital structure and macroeconomic, human resource factors, as well as firm-specific variables. The macroeconomic influence is identified by inflation and government debt to GDP (e.g. Frank and Goyal, 2009[15]; Chang et al., 2014[8]; Mokhova and Zinecker, 2014[24]). We define human resource impact to include employment size, employee productivity, and employment in industry. The inspirations of this effect are Kale et al. (2007[19], 2013[20]) and Beck et al. (2008).

We source our sample on 615 Chinese firms covering a period from 2008 – 2013, yielding 3,978 observations. All firms belong to A-share listed firms. We apply panel-data estimation, two-step system GMM to estimate dynamic capital structure and regression result on debt leverage (Arellano and Bond, 1991[3]; Arellano and Bover, 1995[4]; Blundell and Bond, 1998[7]). As a preview, the results present that firms do dynamic capital structure with leverage targets and adjust towards an optimal ratio. The estimated speeds are different for book debt and market debt, which are comparable with findings documented for other countries. The analysis of relationships between debt leverage and selected determinants state that capital structure is not only effected by traditional firm-specific variables but is also significantly influenced by human resource factors, while macroeconomic factors play less important role in the decision.

The remaining part of this paper is organized as follows. Section 2 presents literature review. In Section 3, we present data and methodology. Section 4 reports the main findings and discussions, and Section 5 provides our conclusions.

2. LITERATURE REVIEW

2.1 Dynamic capital structure

Studies suggest that firms adjust leverage deviation towards an optimal capital structure. The adjustment can be identified in different speeds. Accordingly, they attempt to explain firms' capital structure decision through formulating a dynamic capital structure (e.g. Qian et al., 2009[26]; Guney et al., 2011[16]; Ebrahim et al., 2014[11]). Given the change of debt leverage from year *t*-

1 to year *t*, studies document a relationship between current debt leverage and lagged debt leverage for dynamic capital structure. In this study, we estimate dynamic capital structure through incorporating lagged leverage into a dynamic panel-data model. The model is observed based on both book and market leverage, since the current condition of firms are likely to be effected by both book account value and market price. The measurement is total debt to total assets.

2.2 Determinants of capital structure

Based on the existing literature, we extract a list of factors that have been documented to explain firm capital structure decision. For the sake of clarity, we discuss these factors in two groups. In first group, we discuss firm-specific factors which are widely examined in prior studies. We proceed in second group with discussion of "additional factors". The additional factors are inspired by Kale et al. (2007[19], 2013[20]) and Beck et al. (2008)[5]. We expect capital structure decision to be rationally related to macroeconomic and human resource factors.

2.2.1 Firm-specific factors

Profitability: From a pecking order perspective, one expects that firms with higher profitability raise less debt from external source, since firms can fulfill the fund requirement by their profits (Myers and Majluf, 1984[25]). This conjecture is supported by most existing studies in China (e.g. Huang and Song, 2006[18]; Bhabra et al., 2008[6]; Chang et al., 2014[8]). In addition, Qian et al. (2009)[26][26] find that lagged profitability plays a moderately important role in leverage decision. In this study, we use both current profitability and lagged profitability measured by earnings before interest and tax (EBIT).

Firm size: prior studies have documented an ambiguous effect of firm size on debt leverage. From the pecking order theory, large firms are likely to use less debt because of asymmetric information,In other words, large firms normally provide more information to external investors and hence obtain equity with lower costs. Alternatively, under the trade-off theory, firms with greater size tend to use more technology and to be more diversified and thus show higher capacity to outsider lenders, and as such, they can obtain more debt (e.g. Fama and French, 2005[12]). This latter relationship is reliably agreed upon by most existing studies in China (e.g. Qian et al., 2009[26]; Guney et al., 2011[16]; Chang et al., 2014[8]). In this study, we measure firm size by logarithm of total assets.

Non-debt tax shield: this is another frequently investigated factor for leverage decision. Static trade-off theory predicts a negative relationship between non-debt tax and debt leverage due to firms' attempts to benefit from tax shield by using more debt (DeAngelo and Masulis, 1980[10]). Considering that amortization has similar tax shield benefit to assets deprecations, we observe the effect of non-debt tax shield calculated by depreciations plus amortization scaled by total assets.

Growth: growth explains the capacity of a firm's future development. Studies suggest that firms with high growth opportunity can obtain more debt, because high growth signals a positive perspective in markets (e.g. Frank and Goyal, 2009[15]). Alternatively, study uses change in book assets as a proxy form growth due to it directly increases financial deficit (Shyam-Sunder and Myers, 1999[29]). We observe both market growth opportunity and book asset growth for this study.

Dividend: Frank and Goyal (2009) [15] suggest that dividend has increased in economic importance and report that firms paying dividend are likely to use less debt. In contrast, Chen et al. (2009)[9] report a positive relationship between dividend payment and debt leverage suggesting that Chinese firms deliberately tunnel cash to shareholders by using funds financed from external lenders. Due to most shares in Chinese firms being untradeable, shareholders face difficulty in realizing their profits through markets. We thus observe dividend measured by dividend per share to see its effect on debt leverage.

Liquidity: liquidity reveals a positive signal of solvency of a firm, and as such, the firm can obtain more debt from external source. In particular, firms with high short-term debt tend to be influenced by liquidity easier. However, Guney et al. (2011)[16] report a negative relationship between debt leverage and liquidity measured by current ratio for Chinese firms which are highly financed by short-term debt. In this study, we observe both current ratio and quick ratio to identify the impact of solvency of firms. The latter is excluded inventories from current ratio. We also incorporate cash assets measured by cash from operation and cash and market securities into the analysis.

2.2.2 Additional factors

As documented in previous sections, the capital structure is mostly driven by finance-specific factors. The conjecture that firms' capital structure is affected by macroeconomic conditions and fiscal policy has emerged as a reasonable explanation and has attracted growing attention in recent years. Studies report that firms in places of high inflation have had more preference to raise debt to pursue greater interest tax shields (e.g. Frank and Goyal, 2009[15]). On the other hand, given that condition of aggregate debt, Mokhova and Zinecker (2014)[24] state firms' capital structure is also reasonably related to government debt to GDP. We thus incorporate inflation and government debt to GDP into the model.

Another remaining question is whether firms' capital structure decision are driven by underlying human source factors of firms, e.g. employee productivity which is positively influenced by debt leverage, due to employees rationally making trade-offs between personal loss of financial stress and cost of additional efforts (Kale et al. 2007[19]). In addition, employment size is once used by Beck et al. (2008)[5] to define firm size by the number of employees and suggest firms with greater employment size tend to raise more debt. However, this relationship is never

investigated in China where is well known with biggest population and employment size in the world.

Kale et al. (2007)[19] also documented that the relationship between employee productivity and leverage becomes weaker when outside employment opportunities are higher because employee can exit firms rather than remain in firms to bear the stress continually. This implies employment in industry has an underlying influence on firm capital structure, because outside employment opportunities are directly related to employment size in markets. Kale et al. (2013)[20] report that the bonding mechanism function between employee productivity and debt leverage is significantly influenced by labor market conditions.

Given the above discussion, we incorporate employee productivity, employment size of firms, and employment in industry into the regression model, and as such, our investigation extends the research line from financial variables to human resource factors in this field.

3. DATA AND METHODOLOGY

The firm-specific data analyzed in this study are Chinese A-share listed firms and obtained from Bloomberg database. The macroeconomic and human resource variables are collected from a variety of sources. Government debt to GDP and inflation are obtained from World Bank database. Employment size and employee productivity are calculated based on data from Bloomberg database. Employment in industry is taken from World Bank database. We define our sample is to exclude financial firms and utilities. After filtering, the sample consists 615 firms over a period of 2008 – 2013, yielding 2,319 observations.

To establish dynamic capital structure we apply dynamic panel-data model. We start the analysis with a basic model is written as

$$Y_{it} = \alpha_0 + \sum_{f=1} \gamma f X_{f,it} + \eta_t + \varepsilon_{it} \qquad (1)$$

where, i and t firm i and year t, Y_{it} is explained as debt leverage. α_0 is the constant; γf are unknown parameters; $X_{f,it}$ present the firm-specific variables, including EBIT$_t$ EBIT$_{t-1}$, firm size, non-debt tax shield, assets growth, market growth opportunities, dividend per share, cash, current ratio, quick ratio, and cash from operation. η_t are time-specific effects; μ_i is time-invariant unobservable firm-specific effects. The time-varying disturbance term ε_{it} is assumed to be serially uncorrelated with mean zero and variance σ^2.

We then look at the adjustment to formulate dynamic capital structure. Given a lagged debt parameter into the model (1), the model is written as,

$$Y_{it} = \alpha_0 + \alpha_1 Y_{i,t-1} + \sum_{f=1} \gamma f X_{f,it} + \eta_t + \varepsilon_{it} \qquad (2)$$

Where α_1 reports unknown parameters; $Y_{i,t-1}$ is debt leverage in year *t-1*.

We then consider macroeconomic determinants including inflation and government debt to GDP into model (2). The new model can be written,

$$Y_{it} = \alpha_0 + \alpha_1 Y_{i,t-1} + \sum_{f=1} \gamma f X_{f,it} + \sum_{j=1} \gamma j M_{j,it} + \eta_t + \varepsilon_{it} \qquad (3)$$

Where $M_{j,it}$ is a measure of macroeconomic variables; γj are unknown parameters.

The model (3) continually controls for the human resource factors including employment size, employee productivity, and employment in size and written as,

$$Y_{it} = \alpha_0 + \alpha_1 Y_{i,t-1} + \sum_{f=1} \gamma f X_{f,it} + \sum_{j=1} \gamma j M_{j,it} + \sum_{l=1} \gamma l M_{l,it} + \eta_t + \varepsilon_{it} \qquad (4)$$

Where H is vector of human resource factors; γj are unknown parameters.

We use system GMM estimator to control endogeneity and to define the partial adjustment model (e.g. Flannery and Hankins, 2013[14]; Ebrahim et al. 2014[11]). We also control industry-specific and year-specific effects, to avoid the influence of industry and time differences (e.g. Harris and Raviv, 1991[17]; Antoniou et al., 2008[2]; Frank and Goyal, 2009[15]; Ebrahim et al., 2014[11]). We apply Hansen *J-statistic* and Arellano-Bond statistics to check specification of over-identifying restrictions and correlation problem for the first-order and second serials.

4. RESULTS

4.1 Descriptive statistics

Panel A, Table 1 reports the descriptive statistics for all variables. Panel B, Table 1 presents average book debt yearly, which shows debt leverage has changed in a downward trend during 2008 – 2013 (also see Figure 1). On average, the book debt is 48.75%. This figure is higher than most of existing findings reported in China (e.g. Guney et al., 2011[16]; Qian et al., 2009[26]; Bhabra et al., 2008[6]; Huang and Song, 2006[18]). This finding points out that Chinese firms have lower debt leverage than other developed countries (e.g. Rajan and Zingales, 1995[27]; Margaritis and Psillaki, 2010[23]).

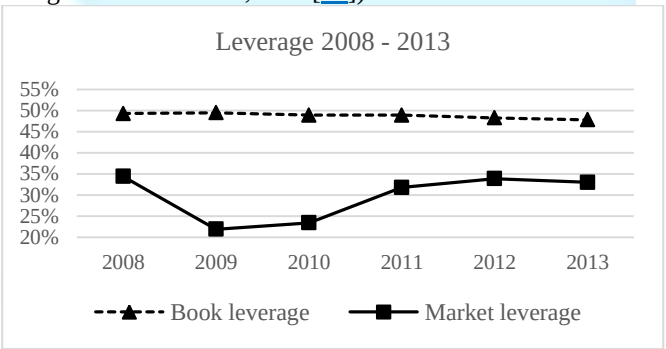

Fig. 1. Leverage 2008 – 2013

Panel C, Table 1 reports annual average market debt and the ratios of 2009 and 2010 decrease significantly suggesting the market price of firm assets significantly

responds to economic crisis during the period (also see Figure 1). The ratio has recovered since 2011 after experiencing the crisis. The average market debt is 29.72%, which is higher than findings from past studies (e.g. Huang and Song, 2006[18]; Bhabra et al., 2008[6]). In a comparison, the market debt exhibits lower ratio than book debt suggesting the asset value in market is higher than that is in book account.

4.2 Correlation matrix

Table 2 presents correlation matrix between leverage and the explanatory variables for the study. The signs of the correlation relationship between dependent variables and independent variables are generally consistent with the literature we documented in previous sections. To be specific, the results exhibit more general and significant correlations for market debt than that for book debt. This substantially shows that the independent variables have more power on market debt than they do in book debt. Furthermore, most of correlations are significant at 1% level implying the dependent variables and independent variables are generally and closely related.

Table 1 Descriptive statistics

Variable	Mean	Std. Dev.	Min	Max	No. of Obs
Panel A: descriptive statistics for the full sample					
BD	0.4875	0.2622	0.0071	6.7406	3960
MD	0.2972	0.1979	0.0021	0.9414	3960
$EBIT_{t}$	19.0756	1.5644	9.9506	25.9726	3649
$EBIT_{t-1}$	18.9619	1.5531	9.9506	26.0338	3635
SIZE	22.0284	1.2787	16.9394	28.4821	3960
NDTS	0.0277	0.0175	0.0000	0.1706	3960
GR-B	0.3008	4.1049	-0.6931	247.9692	3960
GR-M	2.3014	1.8008	0.6438	41.8859	3960
DIV	0.0923	0.1846	0.0000	5.8355	3960
CASH	20.0897	1.4000	9.7558	25.2148	3960
CRATIO	1.8559	3.9077	0.0385	204.7421	3960
QRATIO	1.3912	3.2364	0.0356	158.2450	3960
CFO	19.1278	1.6415	8.7703	26.4693	3058
INFLA	4.2165	3.3129	-0.6063	7.8047	3960
GOVD	23.7500	6.1111	17.0000	33.5000	3960
EMSIZE	7.8901	1.3590	1.0986	13.2228	3960
EMPROD	13.6815	1.0440	8.7514	20.5754	3960
EMIND	13.9094	1.0523	8.7554	20.6867	3960
Panel A: descriptive statistics for the book debt leverage by year					
2008	0.4926	0.2844	0.0183	4.7832	3960
2009	0.4944	0.3309	0.0178	6.7406	3960
2010	0.4889	0.2292	0.0168	3.1831	3960
2011	0.4890	0.3093	0.0071	6.6845	3960
2012	0.4823	0.1925	0.0314	0.9135	3960
2013	0.4777	0.1929	0.0446	0.9016	3960
Panel B: descriptive statistics for the market debt leverage by year					
2008	0.3438	0.1972	0.0060	0.8799	3960
2009	0.2188	0.1525	0.0027	0.8490	3960
2010	0.2341	0.1733	0.0030	0.9183	3960
2011	0.3179	0.2024	0.0021	0.9414	3960
2012	0.3385	0.2016	0.0108	0.8772	3960
2013	0.3300	0.2147	0.0067	0.9030	3960

Table 2: Correlation matrix of all variables

	BD	MD	EBIT $_t$	EBIT $_{t-1}$	SIZE	NDTS	GR-B	GR-M	DIV	CASH	CRATIO	QRATIO	CFO	INFLA	GOVD	EMSIZE	EMPROD	EMIND
BD	1																	
MD	0.59***	1																
EBIT $_t$	0.16***	0.27***	1															
EBIT $_{t-1}$	0.11***	0.28***	0.88***	1														
SIZE	0.18***	0.55***	0.81***	0.81***	1													
NDTS	-0.07***	-0.01	0.11***	0.12***	0.07***	1												
GR-B	0.03*	0.06***	0.02	-0.05***	0.02	-0.03	1											
GR-M	0.09***	-0.55***	-0.17***	-0.19***	-0.43***	-0.05***	-0.02	1										
DIV	-0.11***	-0.10***	0.37***	0.37***	0.25***	-0.01	-0.01	0.07***	1									
CASH	0.05***	0.38***	0.71***	0.71***	0.84***	-0.08***	0.02	-0.32***	0.29***	1								
CRATIO	-0.24***	-0.23***	-0.08***	-0.06***	-0.14***	-0.06***	-0.01	0.13***	0.02	-0.03	1							
QRATIO	-0.26***	-0.24***	-0.09***	-0.06***	-0.15***	-0.05***	-0.01	0.15***	0.02	-0.01	0.99***	1						
CFO	-0.01	0.03**	0.31***	0.32***	0.34***	0.17***	0.00	-0.04**	0.12***	0.24***	-0.02	-0.03	1					
INFLA	0.01	0.07***	-0.01	-0.03*	-0.06***	0.01	0.00	-0.07***	-0.03*	-0.05***	0.02	0.02	-0.01	1				
GOVD	-0.01	0.17***	0.11***	0.14***	0.16***	-0.05***	0.00	-0.20***	0.08***	0.14***	0.03*	0.03	0.00	0.18***	1			
EMSIZE	0.09***	0.35***	0.61***	0.63***	0.72***	0.28***	-0.08***	-0.32***	0.21***	0.61***	-0.13***	-0.13***	0.27***	-0.04***	0.09***	1		
EMPROD	0.19***	0.29***	0.24***	0.22***	0.32***	-0.30***	0.13***	-0.14***	0.08***	0.31***	-0.01	-0.03**	0.08***	0.02	0.09***	-0.30***	1	
EMIND	0.01	-0.09***	0.03	-0.03	-0.01	0.03	-0.02	0.12***	-0.02	0.01	0.03*	0.03*	0.01	0.46***	0.10***	-0.03*	0.03**	1

Notes: BD denotes book total debt, MD denotes market total debt, EBITt denotes logarithm of earnings before interest and tax in current year t, EBITt-1 denotes logarithm of earnings before interest and tax in t-1 year. SIZE denotes firm size, NDTS denotes non-debt tax shield. GR-B denotes book asset growth, GR-M denotes market growth opportunity. DIV denotes dividend per share, CASH denotes cash and marketable securities, CRATIO denotes current ratio, QRATIO denotes quick ratio, CFO denotes cash from operation. INFLA denotes inflation, GOVD denotes government debt to GDP, EMSIZE denotes employment size, EMPROD denotes employee productivity, EMIND denotes employment in industry.

4.3 Dynamic capital structure

Table 3 reports the results of dynamic panel-data, two-step system GMM. Panel B, Table 3 shows sample information and diagnose tests. Since the equations are estimated in first differences and it takes some lagged variables as instrumental variables for the regression automatically, the effective sample is finalized to be 2, 319 observations. All samples are controlled from time-invariant and industry-specific effects. The p-values for Hansen *J-statistic* are unaccepted, confirming the models are not over identified. Statistics of m_1 and m_2 report correlation for the first-order serial and no correlation for the second-order serial in the first-differenced residuals. This implies the error terms in the models are free from serial correlation problem.

Panel A, Table 3 reports regression analysis. The first three columns report the regression result for book debt. The coefficients of leverage$_{t-1}$ are statistically significant and similar in the three models. We infer that the estimated speeds are 36.3%, 36.3%, and 35.7%, respectively. Given the half-life of leverage shock with equation log(0.5)/log(1-λ), where λ is the estimated speed, the average half-life of the book debt is around 1.5 years. This result is similar to the finding of Guney et al. (2011)[16] who report an adjustment speed around 36%. However, this adjustment process is significantly higher than that presented for Chinese firms by Qian et al. (2009)[26]. They report a ratio of 18.5%, using the same method on data of 1999 – 2004.

In the context of results presented elsewhere from dynamic panel-data models, the adjustment speed of book debt is broadly faster than other countries. For instance, US firms are reported to have speeds of around 25%, yielding 2.4 years (Lemmon et al., 2008[20]), 27%, indicating 2.2 years (Frank and Goyal, 2009[15]), and 23% - 26%, presenting 2.7 – 2.3 years (Faulkender et al., 2012[13]). A recent study by Ebrahim et al. (2014)[11] shows Malaysia firm is around 28%, yielding 2.11 years.

The Columns 4 to 5, Table 3 report regression analysis for market debt. For market leverage, we observe lower coefficients for leverage$_{t-1}$ that book leverage in all models, although the figures of model 1 and 2 are higher than model 3. On average, the adjustment speed is around 52%, which indicates a half-life only 0.94 years. In comparison, the results state that adjustment of market leverage is faster than book leverage. This implies the two lagged variables are likely to be influenced by the different leverage shocks. We also observe that the speed reported in model 3 is slightly higher than model 1 and 2 suggesting the leverage shocks responds to the determinants differently.

Table 3: Regression results of dynamic panel-data

	BD			MD		
	(1)	(2)	(3)	(1)	(2)	(3)
Panel A: Regression result						
LEVERAGE *t-1*	0.637***	0.637***	0.643***	0.489***	0.489***	0.461***
	(8.24)	(8.24)	(10.20)	(4.68)	(4.68)	(5.27)
SPEED (%)	**36.3**	**36.3**	**35.7**	**51.1**	**51.1**	**53.9**
EBIT $_t$	0.006	0.006	-0.011	-0.025*	-0.025*	-0.018
	(0.39)	(0.39)	(-0.86)	(-1.81)	(-1.81)	(-1.45)
EBIT $_{t-1}$	-0.010	-0.010	-0.011	0.033*	0.033*	0.015
	(-1.08)	(-1.08)	(-1.50)	(1.76)	(1.76)	(1.09)
SIZE	0.085***	0.085***	0.069***	0.083**	0.083**	0.062*
	(3.73)	(3.73)	(3.21)	(2.45)	(2.45)	(1.91)
NDTS	-0.866*	-0.866*	-1.167**	-1.436*	-1.436*	-1.316*
	(-1.80)	(-1.80)	(-2.26)	(-1.89)	(-1.89)	(-1.75)
GR-B	-0.040*	-0.040*	-0.032	0.0147	0.0147	0.0253
	(-1.70)	(-1.70)	(-1.48)	(0.51)	(0.51)	(1.15)
GR-M	0.008*	0.008*	0.012***	-0.035*	-0.035*	-0.040***
	(1.87)	(1.87)	(3.09)	(-1.87)	(-1.87)	(-2.99)
	-0.025**	-0.025**	-0.023**	-0.055	-0.055	-0.0503

DIV	(-2.39)	(-2.39)	(-2.34)	(-0.98)	(-0.98)	(-0.93)
	-0.008	-0.008	-0.010	-0.031	-0.031	-0.0200
CASH	(-0.62)	(-0.62)	(-0.84)	(-1.06)	(-1.06)	(-0.69)
	-0.038**	-0.038**	-0.045**	-0.108***	-0.108***	-0.101***
CRATIO	(-2.07)	(-2.07)	(-2.20)	(-2.80)	(-2.80)	(-2.76)
	0.036*	0.036*	0.042*	0.093**	0.093**	0.086**
QRATIO	(1.81)	(1.81)	(1.90)	(2.02)	(2.02)	(2.10)
	-0.033***	-0.033***	-0.024***	-0.016*	-0.016*	-0.017**
CFO	(-2.95)	(-2.95)	(-2.51)	(-1.88)	(-1.88)	(-1.94)
		-0.001*	-0.002**		0.010***	0.010***
INFLA		(-1.68)	(-1.92)		(5.39)	(5.33)
		-0.000	0.000		0.001	0.001
GOVD		(-0.20)	(0.04)		(0.64)	(0.95)
			0.031**			0.0209
EMSIZE			(1.82)			(0.90)
			0.032**			0.024
EMPROD			(1.88)			(1.31)
			0.006***			-0.009***
EMIND			(2.66)			(-3.66)
_cons	-0.848**	-0.859**	-1.129***	-0.728	-0.919*	-0.449
	(-2.88)	(-3.04)	(-3.38)	(-1.50)	(-2.23)	(-0.88)
Panel B: Sample information and diagnose tests						
Number of firms	615	615	615	615	615	615
Observations	2,319	2,319	2,319	2,319	2,319	2,319
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
m_1-*statistic*(*p*)	0.000	0.000	0.000	0.002	0.002	0.000
m_2-*statistic*(*p*)	0.202	0.202	0.204	0.082	0.082	0.107
Hansen *J-statistic* (*p*)	0.210	0.210	0.300	0.820	0.820	0.692

a. *t* statistics in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.00$

BD denotes book total debt, MD denotes market total debt, $EBIT_t$ denotes logarithm of earnings before interest and tax in current year t, $EBIT_{t-1}$ denotes logarithm of earnings before interest and tax in t-1 year. SIZE denotes firm size, NDTS denotes non-debt tax shield. GR-B denotes book asset growth, GR-M denotes market growth opportunity. DIV denotes dividend per share, CASH denotes cash and marketable securities, CRATIO denotes current ratio, QRATIO denotes quick ratio, CFO denotes cash from operation. INFLA denotes inflation, GOVD denotes government debt to GDP, EMSIZE denotes employment size, EMPROD denotes employee productivity, EMIND denotes employment in industry.

4.4 Determinants of capital structure

4.4.1 Firm-specific factors

Panel A, Table 3 continually reports regression results for determinants of capital structure. EBIT is found to exert no impact on book leverage while it a significant positive effect on the market leverage. Similarly, $EBIT_{t-1}$ has no effect on book leverage but significantly and positively

associated with market leverage. This is consistent with Qian et al. (2009)[26] implying that profitability has a certain effect over the dynamics of borrowing and a moderately important determinant for Chinese firms. Meanwhile, this is significantly different from findings reported by past studies in China which pointed that capital structure decision mainly relies on profitability.

Firm size is positively associated with both the book and market leverages, while there is little change in the magnitudes of coefficients. At the same time, the firm size has become the most important determinant of capital structure instead of profitability. This is a remarkable change in capital structure decision of Chinese listed firms compared to past decades. Non-debt tax shield has a negative effect on both book and market leverages with the greatest signs among all variables. Meanwhile, it is found that non-debt tax is the third important determinant by following firm size and liquidity. The result indicates that tax also has significant impact on capital structure of domestic firms, while An (2012) suggests that the tax plays important role in capital structure decision of foreign investment firms after 2008. It might be concluded that the new Tax Law effected on 1st January 2008 has significant impact on financial behavior of both domestic and foreign firms.

A negative association of book asset growth is only identified for book leverage in model 1 and model 2. However, the market growth opportunity has a positive effect on book leverage, while it exerts a stronger negative effect on market leverage. This latter effect of growth may be due to the reverse influence of market price. Dividend has small and statistically significant effect on book leverage. This denies the finding reported by Chen et al. (2009)[9] who suggest that firms tunnel cash from debtholders to shareholders by dividend before 2008. One of reasons is that China completed the second split share structure reform at the end of 2007, which reduces the tunnel problem of firms (Liu and Tian, 2012)[21].

It is interesting to note effect of liquidity. The cash measured by cash and market securities have no statistically significant influence on both book and market leverages. The current ratio and cash from operation are found to exert negative effect, while quick ratio is a positive effect on the both book and market leverages. This finding suggests that different contents of liquidity have exerted different effect on capital structure decision, due to current ratio includes inventories of firms while quick ratio is obtained from excluding the inventories from current ratio. Furthermore, this implies that an increase in cash from operation might ease firms' pressure in borrowing from external sources, while inventories might push firms to borrow more.

4.4.1 Additional factors

The estimated coefficients of inflation have a negative but negligibly small impact on book leverage. This finding states that firms are unlikely to raise more debt when inflation is perceived to be high. In contrast, inflation presents a more powerful account of market leverage than of book leverage with a reverse relationship. The latter is consistent with a finding reported by Frank and Goyal (2009)[15] and Chang et al. (2014)[8] indicating market leverage increases when inflation is high. One explanation of this might be that firms tend to avoid potential financial deficit by keeping less debt in account rather than to raise more debt in pursuing interest shield, when inflation is high. Meanwhile, given that market leverage is more likely to be affected by market condition, inflation increases price of assets and consequently affect market leverage positively.

However, the results show no evidence for the impact of government debt to GDP in either book or market leverages. This means that debt decision of Chinese firms are free from influence of aggregate debt, although most of the firms are state-owned. This statistically insignificant impact may be due to the fact that financial markets are undeveloped in China and aggregate debt cannot cast influence into firm debt immediately.

Employment size has a statistically significant and positive effect on book leverage. This is similar to a finding reported by Beck et al. (2008)[5] who suggests that firms with smaller employment size have more constraints to raise external debt, particularly to obtain bank finance. On the other hand, Sapienza (2004)[28] reports that state-owned banks preferred to provide credits for firms with large labor force. Given that most debt resources are offered by state banks in China, we might conclude that employment size plays important role in debt financing, particularly for obtaining bank loans in China.

Employee productivity exerts a positive and significant effect on book leverage. This shows evidence that the relationship between debt leverage and employee productivity can be correlated, in that high employee productivity creates more cash flow for firms and thus reduces the requirement of external fund of firms. In addition, high employee productivity signals a good prospective to public, and as such, they can obtain more debt leverage from creditors.

Lastly, employment in industry is estimated to have a significant but quantitatively small positive impact. This finding confirms our expectation that employment in industry has an underlying effect on capital structure decision. However, we should also note that the influence is limited.

5. CONCLUSION

This study has inquired into the dynamic capital structure and its determinants for 615 Chinese listed firms covering a period of 2008 – 2013. To this end, dynamical panel-data capital structure models are estimated and a number of specification tests conducted. Our results show that firms' current debt leverages are statistically significantly affected by lagged leverages, indicating firms adjust deviations of debt-equity ratio towards to an optimal capital structure. Our observation also shows that the

adjustment speed towards the target book leverage is estimated slower than that towards the target market leverage.

The estimation results report that firm size and quick ratio are positively related to firms' book and market debt leverages, while non-debt tax shield, dividend, current ratio, cash from operation are negatively associated with firms' book and market debt leverages. On the other hand, both current profitability and lagged profitability have no effect on either book or debt leverage. However, current profitability has negative impact on market leverage while it is positively related to book leverage. Market growth opportunity has a statistically significant and positive effect on book leverage, while it is negatively associated with market leverage in a significant way.

For the macroeconomic factors, our results reveal that inflation has a significant but relatively small contribution to debt decision, while there is no evidence for the effect of government debt on GDP. This is much different from findings reported from developed countries suggesting Chinese firms have no strong preference for macroeconomic condition in leverage decision marking. Lastly, we are able to shed light on the determinants of capital structure by introducing human resource factors. To be specific, employment size, employee productivity, and employment in industry have statistically significant and positive effects on book leverage, while there is only tiny negative effect of employment in industry on market leverage. This extension allows us to establish new evidence of determinants of capital structure from a human source perspective.

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