The Capital Structure Through the Trade-Off Theory: Evidence from Chinese Firm

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Abstract. For a long time, studying financial structure has been a crucial and essential issue in the finance industry. The major goal of this study is to use the Trade-Off Theory to identify the capital structure of Chinese firms. This paper analyzes the determinants of capital structure of Chinese Firms through the existence of dynamic and non existence which is an adjustment to target leverage ratio. This validation leads to test two complementary successive models, the first is a static, while the second is a dynamic model that incorporates transaction costs variable to see how we can talk about a speed adjustment allowing firms to get closer to the target ratio. The results of the first model show that the profitability and asset structure are the main explanatory variables of the level of leverage of Chinese firms. While for the dynamic model, the most remarkable result is manifested at the level of the adjustment costs that are relatively high which engendered a slow adjustment towards the optimal ratio. This paper assesses 20 Chinese top listed firms in the stock exchange data between 2010 to 2021. Panel data analysis was examined and auto-correlation using the reviews and model developed. Findings show the positive correlation between capital structure and debt financing with its variable. Low but positive correlation is in line with trade-off theory and leverage level. This research is significant to managers, and shareholders since it helps them in making viable investment decision and the right mix of capital for effective operations of the firm.

Keywords: Capital structure · Trade-off theory · Agency and agency conflicts · Bancruptcy cost · Modigliani and Miller Theory

1 Introduction

1.1 Background

For a long time, studying financial structure has been a crucial and essential issue in the finance industry. This is a densely populated financial literature that focuses on capital structure factors. Problems with an organization's financial behavior, on the other hand, continue to attract attention to contemporary theoretical frameworks, as well as empirical study, as proposed by Frank Murray and Vidhan Goyal [1].

Due to increased growth of SMEs, the need to providing sufficient capital to aid in meeting sustinability and providing right avenues for growth should be the rationale of

every government. Therefore these research strives to assess capital structure through the trade-off theory deriving its basis from Chinese firms.From the postulated theorem by the MM in 1958, that is Modigliani and Miller [2], a financial rule has ever since been populated. That is, literature focuses on inapplicability of the financial structure in making real firm decision and this have been adjusted with time. Neoclassical financial theories have created relaxation on the simplification of MM to facilitate development in financial theory, an aspect termed "compromise". Through consideration of system of taxes and cost of insolvency or bankruptcy, suggestions of an optimal debt ratio (target ratio) have been postulated. The Static Trade-off Hypothesis is a theory that is presently being researched in the area of conciliation (STT). Like Bukalska and Elbieta, several research have verified the relevance of numerous components utilized under the STT to describe how finance acts Bukalska, Elżbieta [3].

1.2 Research Objectives

These research aims at attaining the following objectives: to evaluate the capital structure of Chinese-based firms with the Trade-Off Theory, to determine trade-off model related to bankruptcy cost, to assess trade-off model related to agency cost, agency conflicts between management and shareholders and to assess the determinants of capital structure identified by the trade-off theory: an empirical validation.

1.3 Justification

Evidence from the STT model is deemed to have a mixed reaction relatively towards their target debt ratio. The need to assess capital structure in terms of equity and debt has played a key role in assessing how firms work towards the maximization of its returns. According to Chung, Chune Young, Chang Liu, and Kainan Wang [4], target debt ratio is deemed to happen at a snail pace, which is slow since it is deemed to be a key determinant of the firm's performance. A considerable portion of evidence based on the target model has been cruised. Therefore, even if the samples are generated through the simulation approach with no target behaviour, such an assumption may not hold. Therefore, the application of these models creates an entire overview on how the capital structure of an organization operates towards the maximization of its returns.

1.4 Research Gap

Most research has focused on the positive relationship between capital structure determinants and debt but there is less focus on its actual determinants and its positivity or negativity. This research therefore addresses various issues in capital structure and its determinants.

    The research is significant for policymakers and company management in making leverage decisions and for investors to invest in the company.

2   Literature Review

2.1   Capital Structure Through the Trade-Off Theory As evidenced from Chinese based Firms

The capital structure of a company is crucial. The need to make a finance choice is an essential issue in an organization since it reveals a company's leverage capabilities and its debt-to-equity ratio. According to empirical findings, POT's forecast is thought to have a negative link with a firm's profitability and leverage. According to Fama and French, a successful corporation will obtain less leverage, whereas a less lucrative firm would borrow more. Other proponents argue that changes in the value of debt and equity of a company directly impact the company's stock prices. According to Frank and Goyal [1], noted that when dent in a company change, then it plays a key role in assessing the POT since firm's level of cash flow always affects the firm's level of financing and this creates a deficit which implies the financial level of leverage.

POT is likewise based on a negative association between a firm's leverage and its past profitability, according to Bajaj, Yukti, Smita Kashiramka, and Shveta Singh [5]. Based on the study performed in 378 US-based organizations, some of the costs, including transaction, information and control costs, are key considerations in an organization. From the study perfumed by Agyei, James, Shaorong Sun, and Eugene Abrokwah [6] discovered a negative association between profit and the firm's leverage when they investigated the pecking order notion. Allen further postulate that firms have a higher priority when it comes to creating and establishing a debt capacity when its operations are profitable and given that when there is information asymmetry and the appreciation in the equity market, firms tend to avoid using equity form of capitalization and prefer using the debt since it is less sensitive to such information difference. From the study, it was also observed that debt needed is desired for investment and for the retained earnings.

In contrast to earlier research, TOT predicts a positive link between debt and corporate profitability. The debt with the POT is also expected to have a negative link with investment opportunity conflicts. Sham-Sunder and Myers proposed that as evidenced in the pecking order theory, a financial deficit addresses the issuing dents and a firm does not give sufficient and sustainable guarantee to the internally generated cash flow. The firm will then change its approach the debt financing as a form of business financing. According to Sham-Sunder and Myer 1999 Frank and Goyal [1]; Fama and French [7]. Akingunola, Richard Oreoluwa, Luqman Samuel Olawale, and Joshua Damilare Olaniyan [8] propose that firm's ability to issue equity creates some aspects of negativity biased of the model that Shyam-Sunder and Myers postulated.

The dynamic trade-off hypothesis was developed based on data from US-based enterprises given by Fama and French [7]. Jaworski, Jacek, Leszek Czerwonka, and Magdalena Mądra-Sawicka [9] and there was a mixed level outcome on the target leverage rate is as presented by Zhou and Xie [10]. In the first study undertaken, He, Wei, and NyoNyo A. Kyaw [11] the explanatory study on structure of capital models in the developing states was not conclusive. The author provides that third world countries are affected by the same variables to that of the developed nations. Therefore, the need to understanding firm's capital structure is key in the long run. According to Guo [12],

using the data from 1994 to 2003 with a sample of 1200 Chinese listed companies, the results indicate that firms size and its assets are negatively related to profitability, managerial shareholding, and growth opportunities in the company.

Therefore, from the previous studies that employed the dynamic trade-off models in assessing a firm's capital structure in Chinese firms, the results indicate 18.5% inconsistency. This study also indicates that the speed of more than 40% of publicly listed companies have an increased level of capitalization. The research also suggested that state ownership impacts target capital structure, with a larger amount of debt being shown to have a faster rate when it comes to American-based enterprises listed on the stock exchange.

2.2   Trade-Off Model and Bankruptcy Cost

Taxes and their relationships with leverage or debt financing are considered in the trade-off theory of capital structure. The dynamic approach of trade-off theory determines the leverage ratio and debt financing. One of its key features is that with the target, the firm capitalization has varied societal needs. Therefore, bankruptcy affects the leverage and capital structure of the firm.

2.3   Trade-Off Model and Agency Cost

Debt was in great use before existence of subsidies at the tax and interest payment which indicates a positive correlation with bankruptcy costs Jarallah, Shaif, Ali Salman Saleh, and Ruhul Salim [13]. This has made the proponents postulate that there need to be important capital structure determinants other than bankruptcy cost. Considering the subject matter, there are two aspects of conflicts in the firm's management and agency: the shareholders and management and creditors and shareholders.

2.4   Agency Conflicts Between Management and Shareholders

Conflicts of interest between management and shareholders are most often caused by a conflict of interest between shareholders and managers who do not control the whole company. Managers do not have complete managerial authority in a company. They do not control the subsidiary outright, thus there are external shareholders, and the subsidiary's principal goal is to maximize its own activity rather than the firm's worth. The greater the gap between the management's interests and those of the shareholders, the less ownership the manager has.

Additionally, from work done by Martinez, Lisana B., Valeria Scherger, and M. Belén Guercio [14], the disciplinary role of debt is suggested where the management are vested with the responsibility of managing and controlling debt finances in a company Managers are not needed to behave to so serve the interest of other shareholders or investors. In an instance where the company is nearly liquidation, directors in most cases may not choose to liquidate to protect their reputation and also other management and personal consideration. The debt can serve as a disciplining device by giving the creditors the power to force the company into liquidation. Therefore, the need to have better relationships and conflict reduction is key for management and business sustainability.

2.5 Determinants of Capital Structure Identified by the Trade-Off Theory: An Empirical Validation

2.5.1 Company Size (CS)

The company's size determines the level of capitalization that the company needs. This is one of the key variables that determines the company management's borrowing decisions. Borrowing decision by firms management is hugely dependent on the firm's size. From the perspective of theory, there are various methodologies to assessing firm size and leverage level. Trade-off theory states that a firm that is big in its operations tends to employ more external financing through debt at a lower cost. Large firms have consistent and diversified cash flow. According to this notion, the company uses more external finances than small businesses. According to Pecking Order Theory, big businesses have access to more internal finance than small firms, and due to information asymmetry, there is a reduced flow of information to investors at higher level enterprises, resulting in lower use of external funds. There is a negative relationship between debt financing and firm size.

$$\text{Indicator} = \text{Company Size} : \text{Log (total assets)} \tag{1}$$

2.5.2 Growth Opportunities (GO)

The link between development potential and the viability of corporate loans is unclear. Firms with higher growth opportunities tend to use liabilities to expand their capacity and implement new and effective projects. Therefore, there is a positive correlation between the level of debts and the firm's growth opportunities. Contrary to this, firms with a higher growth opportunity tend to have a floating cash flow compared to fixed asset value and have a high level of variation in information. Small firms tend to have low capability of growth and therefore their debt capability has a negative correlation with growth opportunities.

$$\text{Measurement indicator} = \text{GO} : \% \text{ change in sales} \tag{2}$$

2.5.3 Profitability (PR)

The key aspect in a business is firms' level of profitability. Here, in the UK, assessing how profitable a firm is is one of the key approaches to assessing its financial strength. Debt level affects the level of profit since interest is paid out of the firm's level of profitability. Tax-oriented approaches provide that high level of profitability makes the firm utilize external debts to gain tax shield and effective tax benefits. On the contrary, high level of is mainly as a use of internal funding to aid in investment and utilization of external sources through floatation and issue of shares. Therefore, it has a positive correlation as postulated by Chang, Xin, Yunling Chen, and Sudipto Dasgupta [15].

$$\text{Measurement indicator} = \text{PR} : \text{Operating income/total assets} \tag{3}$$

2.5.4 Company Risk (CR)

Company risk is a risk which mostly expresses the company's likelihood of bankruptcy, insolvency and financial bankruptcy. A volatility in the company's revenue increases the possibility of the firm having financial difficulty. This may make the firm fail because it's not meeting its obligations, hence making it borrow from other related firms. Too much borrowing decreases the capacity of borrowing and increases the firm's cost. As a result, there should be a negative connection between the amount borrowed and the company's borrowing risk. According to research, debt levels and a company's risk variable negatively association. Other research have revealed that these findings contradict pecking order ideas and trade-off theories.

$$\text{Measurement indicator} = CR : \text{EBIT Standard Deviation} \qquad (4)$$

2.5.5 Market Capitalization

This ratio is displayed in two separate viewpoints on the impact of a company's liquidity ratio on its debt level. According to the trade-off hypothesis, enterprises with a high liquidity ratio will have no problems honoring their commitments since they may access external money at a reduced cost. However, certain points of view imply that a conflict of interest between the management and the shareholders causes the company to utilize outside capital. According to the first idea, debt levels and liquidity ratios positively connect. When addressing finance demands, the pecking order hypothesis frequently confirms that corporations prefer to employ internal resources. Internal financial resources should be employed mainly to improve liquidity and profit margins. The debt level and liquidity ratio are always assumed to have a negative connection.

$$\text{Measurement indicator} = \text{Recurrent assets/short term liabilities} \qquad (5)$$

3 Methodology

3.1 Research Design

This is the research methodology section. It includes the sample and sampling techniques and approach to data collection and a guide on its analysis.

3.2 Data Collection and Data Processing

Our sample will consist of 20 Chinese listed firms listed in the Shanghai Stock exchange belonging to industrial, commercial and service sectors. Institutions like banks and other financial-based will be excluded from the analysis since their financial policies and features are different from other sectors. Data main source will be BVMT. The information used accounting data (balance sheets, states of result, amortization schedules and states of cash flows). The study period runs from 2011 to 2020.

3.3   Model

In the study of firm's capital structure, the key approach is based on the firm's static approach. There are also other models whose main focus is on the dynamic approach as presented by Guo, Liang, et al. [16]. This seems to introduce a complementary approach towards determining the model on capital structure of the firm.

A comparative approach is set to estimate the two models which shows the time effect and industrial effect of the model. The correlation analysis and regression is key in assessing such relationship. The two models employ dynamic and static models. Since the model states the determinants of capital structure in the industries stated, the panel data were analyzed using the views model as a statistical utilization model to assess the relationship. The panel follows the following formulas in its cross-sectional analysis:

$$Yit = \alpha it + \beta Xit + \varepsilon it \tag{6}$$

where: εit shows the error terms.

The panel data analysis was used as the analysis method since this is the effective method. Integration in terms of stationery were also determined. With the model selection, an appropriate correlational tests were done and the results presented in the results and findings section.

3.4   Results

This section of the have a look at is cover the correlation matrix, cross-sectional dependency and unit root assessments outcomes at the variables used with inside the have a look at. Moreover, this segment additionally covers the outcomes of assessments for identity of suitable model, initial take a look at and resistant general errors take a look at.

Table 1 below indicates the descriptive statistics of the data and its findings indicates the various measures of dispersion which include the standard deviation, the mean, median and also the skewness of the selected data. The results is as shown in the Table 1 below:

The level of deviation and measures of dispersion varies depending on the form of variables and its key measures from a sample of 20 selected companies.

3.4.1   Correlation

Table 2 below indicates the correlation matrix between the variables. This matrix shows the level of positive or negative correlation between the set data. The figures with bracket () indicates a negative correlation and those others have a positive correlation.

Table 1. Descriptive statistics

	DEBTS	EQUITY Million	MARKETCAP	PRICE (USD)	PROFITABILITY	REVENUE ($M)
Mean	6,120 M	1,560 M	85,500 M	18.29	300M	90,436.30
Median	93.5285 M	109 M	35,200 M	6.97	9.570 M	91,572.00
Maximum	111,000 M	17,600 M	468,000 M	100.06	4,650 M	283,728.00
Minimum	1.131702 M	1.008,642 M	7,220 M	0.72	−3,190 M	233.07
Std. Dev.	24,800M	4,180	114,000	26.40	1,370 M	71,486.21
Skewness	4.12	3.15	2.16	1.90	0.88	0.87
Kurtosis	17.98	12.18	7.48	5.79	8.05	3.75
Jarque-Bera	243.35	103.20	32.36	18.46	23.84	3.00
Probability	-	-	-	0.00	0.00	0.22
Sum	122,000 M	31,100 M	1,710,000 M	365.86	6,010 M	1.808,726 M
Observations	20	20	20	20	20	20

Table 2. Correlation matrix

	DEBTS	EQUITY	MARKETCAP	PRICE (USD)	PROFITABILITY	REVENUE ($M)
DEBTS	1.00	(0.04)	0.08	(0.06)	0.17	0.31
EQUITY	(0.04)	1.00	(0.25)	(0.19)	0.03	(0.40)
MARKETCAP	0.08	(0.25)	1.00	0.63	0.11	0.24
PRICE (USD)	(0.06)	(0.19)	0.63	1.00	(0.06)	0.26
PROFITABILITY	0.17	0.03	0.11	(0.06)	1.00	0.34
REVENUE ($M)	0.31	(0.40)	0.24	0.26	0.34	1.00

There is a positive correlation between debts and debts, debt and market capitalization, profitability and revenue. There is a negative correlation between debt and equity, and price. In terms of equity, it has a positive correlation with equity and profitability whereas negative correlation with debt, market capitalization, price and revenue, similarity to others its positive and negative correlation depends on the level of viability and correlation set between the data variables.

3.4.2 Variance Cointegration

Cointegration tests analyze non-stationary time series—processes that have variances and means that vary over time. In other words, the method allows you to estimate the long-run parameters or equilibrium in systems with unit root variables. From the test, the following Table 3 are the findings:

Table 3. Variance cointegration

Variance Decomposition of DEBTS:

Period	S.E.	DEBTS	EQUITY	MARKETCAP	PROFITABILITY	REVENUE ($M)
1	9.21E + 08	100.0000	0.000000	0.000000	0.000000	0.000000
2	1.14E + 09	79.33420	6.950668	8.687239	4.316351	0.711538
3	1.45E + 09	73.63534	16.28334	6.761504	2.862151	0.457662
4	2.44E + 09	73.95379	20.85150	2.570399	2.313611	0.310703
5	3.51E + 09	70.00572	27.02883	1.648620	1.162145	0.154689
6	6.85E + 09	69.39947	29.31563	0.475837	0.713574	0.095489
7	1.14E + 10	69.05538	30.04535	0.359676	0.481903	0.057691
8	2.18E + 10	68.99351	30.45146	0.130881	0.377201	0.046950
9	3.89E + 10	69.08829	30.30012	0.152667	0.410522	0.048402
10	7.19E + 10	68.94311	30.55495	0.108890	0.350992	0.042061

Variance Decomposition of EQUITY

Period	S.E.	DEBTS	EQUITY	MARKETCAP	PROFITABILITY	REVENUE ($M)
1	2.30E + 09	66.79875	33.20125	0.000000	0.000000	0.000000
2	2.99E + 09	64.23566	29.65801	4.254409	1.666052	0.185861
3	6.38E + 09	65.83907	32.66562	1.050200	0.400808	0.044308
4	1.10E + 10	69.16950	28.97773	0.542242	1.173357	0.137173
5	1.97E + 10	68.03736	31.31847	0.208373	0.390484	0.045320
6	3.72E + 10	69.21481	29.94610	0.140656	0.621884	0.076552
7	6.57E + 10	68.75058	30.71033	0.146254	0.351618	0.041218
8	1.24E + 11	69.07452	30.35405	0.100373	0.419705	0.051353
9	2.22E + 11	68.96672	30.49411	0.129390	0.366656	0.043128
10	4.11E + 11	69.00279	30.47578	0.104542	0.372142	0.044752

Variance Decomposition of MARKETCAP

Period	S.E.	DEBTS	EQUITY	MARKETCAP	PROFITABILITY	REVENUE ($M)
1	1.53E + 11	20.74780	0.213212	79.03898	0.000000	0.000000
2	1.60E + 11	21.25494	0.399211	77.09350	1.117353	0.134997
3	1.71E + 11	23.32613	0.438334	75.11726	0.998242	0.120026
4	1.75E + 11	24.01245	0.722206	74.16837	0.979782	0.117191
5	1.87E + 11	29.26917	4.473997	65.00218	1.107343	0.147306
6	1.95E + 11	30.84189	6.827886	61.17763	1.016896	0.135698
7	2.65E + 11	48.23846	17.98475	33.01662	0.668721	0.091457
8	3.67E + 11	58.65019	23.28108	17.37946	0.615594	0.073674
9	6.51E + 11	65.48305	28.61269	5.517103	0.343934	0.043227

(*continued*)

Table 3. (*continued*)

Variance Decomposition of DEBTS:

Period	S.E.	DEBTS	EQUITY	MARKETCAP	PROFITABILITY	REVENUE ($M)
10	1.13E + 12	68.03078	29.45378	1.981633	0.477297	0.056501

Variance Decomposition of PROFITABILITY

Period	S.E.	DEBTS	EQUITY	MARKETCAP	PROFITABILITY	REVENUE($M)
1	5.44E + 08	1.615122	87.97470	0.006867	10.40331	0.000000
2	6.28E + 08	21.50842	66.88348	0.231426	9.961714	1.414956
3	8.85E + 08	39.04670	54.72279	0.483184	5.019940	0.727383
4	1.86E + 09	61.80125	36.51675	0.374316	1.142865	0.164819
5	3.04E + 09	66.68867	31.99039	0.360733	0.851773	0.108437
6	5.80E + 09	67.70168	31.81139	0.120158	0.325221	0.041549
7	1.05E + 10	68.89798	30.38397	0.156665	0.501237	0.060145
8	1.91E + 10	68.72337	30.79998	0.114493	0.323816	0.038340
9	3.53E + 10	69.05890	30.36954	0.110817	0.411283	0.049463
10	6.39E + 10	68.94042	30.54494	0.118024	0.354711	0.041903

Variance Decomposition of REVENUE ($M)

Period	S.E.	DEBTS	EQUITY	MARKETCAP	PROFITABILITY	REVENUE ($M)
1	12553.35	30.00439	22.11432	14.13851	27.30751	6.435264
2	19471.58	46.19495	20.25509	9.995270	19.12861	4.426073
3	26459.13	55.51330	19.34042	6.327854	15.48073	3.337687
4	32226.74	59.31467	21.00711	4.747159	12.30310	2.627974
5	40830.02	62.39260	22.81479	4.501424	8.470230	1.820958
6	47064.73	62.20977	24.26321	5.728732	6.402508	1.395779
7	55789.33	61.59829	27.14439	5.633212	4.630659	0.993445
8	58263.63	58.92410	27.81378	7.026733	5.249007	0.986382
9	67044.20	56.49458	30.81852	6.394356	5.408632	0.883916
10	72924.35	56.89449	27.07249	6.313341	8.518240	1.201441

Cholesky Ordering: DEBTS EQUITY MARKETCAP PROFITABILITY REVENUE__$M_	

3.4.3 Regression

This shows the value of relationship between the dependent and independent variables. The following are the results in Table 4:

There is a positive correlation between debt and other variables with the r value of 0.37.

Table 4. SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.3716
R Square	0.13808656
Adjusted R Square	-0.169722787
Standard Error	26771173789
Observations	20

ANOVA

	df	SS	MS	F	Significance F
Regression	5	1.6076E + 21	3.22E + 20	0.44906	0.807409769
Residual	14	1.0034E + 22	7.17E + 20		
Total	19	1.1164E + 22			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	-5,367,788,557.24	12,399,362,594.33	-0.43	0.67	-31,961,776,388.22	21,226,199,273.75	31,961,388.22	21,226,199,273.75
Equity	0.58	1.66	0.35	0.73	-2.99	4.14	2.99	4.14
Revenue ($M)	128,210.77	104,596.30	1.23	0.24	-96,125.99	352,547.53	96,125.99	352,547.53
Market Cap	0.03	0.07	0.47	0.65	-0.12	0.19	0.12	0.19
Price (USD)	-215,219,030.83	311,131,605.87	-0.69	0.50	-882,529,957.29	452,091,895.62	-882,529,957.29	452,091,895.62
Profitability	0.18	5.02	0.04	0.97	-10.58	10.95	-10.58	10.95

4 Conclusion

One of the key determinants of firm's capital structure includes profitability, revenue, market capitalization and the equity proportion. The key to determining the relationship is based on the model and correlation tests performed from the assessment. There is a positive relationship with the R value standing at 0.37 and that all the P values are positive and more than 0.05, therefore, null hypothesis are accepted. This also shows that tangible assets enhance borrowing for the 20 accessed firms in different industries since it offers a guarantee to the firm. The profitability may not be a true reflection on firm's performance that is why it has a negative correlation. From the various models, profitability and firms risk in terms of debt can also affect the firm's capital structure. Market capitalization also plays a key role and therefore it requires effective utilization in the firm towards meeting its long term sustainability as a business. Therefore, a firm's capital structure is backed up by the increased need in borrowing.

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