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**The capital structure
of Chinese listed firms: does manufacturing
industry membership matter?**

By

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Abstract

It is commonly believed that firms with greater borrowing capacity should borrow more in light of the benefits of tax shield effects and the lower costs of debt-capital in comparison to equity. We hypothesize that Chinese listed manufacturing firms should borrow substantially more than firms in other industries because of manufacturing's potentially higher borrowing capacity in a rapid economic growth environment. However, we find no evidence to support this hypothesis or indeed that industry membership has an influence on the leverage levels across all sectors of Chinese listed companies. These findings cast doubt on how appropriate it is to use standard western corporate financial theories to model business behaviour in Chinese corporations. We comment on why this might be the case.

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1. Introduction, background literature and hypothesis

In a seminal paper published over 50 years ago Modigliani and Miller (1958) argued that in perfect capital markets the capital structure does not affect a firm's total market value. Since this paper capital structure, and the influence that capital market 'imperfection' have on this structure, has become one of the most researched topics in finance. This paper examines whether or not the capital structure predictions of the theoretical models developed through studying the experiences of Western economies are also applicable to the market economy that is now rapidly emerging in China.

As China moves ever closer to a market economy conventional capital structure theories suggests that if Chinese listed companies are 'economically rational' they will adjust their debt-to-equity mixes to maximize shareholder value (Sheel, 1994). This optimal mix has however, been found to differ from industry to industry (Kim, 1997) and also from country to country (Wald, 1999). Capital structure trade-off theory also indicates that 'market imperfections', such as the tax shield benefits, will have a significant influence on capital structures; specifically that firms will increase their leverage to take advantage of these benefits. To take advantage of tax shields firms will need to have good earnings potential and the tangible assets to back up any borrowing. These two associated elements are commonly called debt capacity.

Although the Chinese corporate bond market is relatively limited in scale (Hale, 2007) it has seen significant levels of growth since the mid 2000's. For example, in the year-on-year issuing

of new corporate bonds and financing bills as at November 2005 was 162.5 billion RMB (Huaipeng, 2006). In this paper we examine whether or not there is any evidence to the effect that the capital structures of listed Chinese companies in any way reflect the ‘economically rational’ structures that Western trade-off theory would indicate they should adopt. If debt capacity varies on an industry-by-industry basis, we would expect industry membership to have an influence on

Chinese listed firms’ capital structures if trade-off theory holds; this is what this paper tests for.

A number of studies in the capital structure literature argue that both industry-related and country-related factors can partly explain differences in leverage levels. For example, Remmers *et al* (1974) found that industry-related factors were significant in Japan and France but not in the United States (US), the Netherlands and Norway. Kester (1986), confirmed that Japanese heavy manufacturing firms have significantly higher leverage, as measured on a book value basis, than US firms. Sekely & Collins (1988) provides empirical evidence, based on 677 firms in 9 industries in 23 countries, to suggest that country level effects are possibly more important than industry level effects. They put these differences down to cultural influences. In a more recent study Jong *et al* (2008) also report country-influence on firms leverage level. The data set this latter study used was impressive; 12,000 firms across 42 countries; including China. The results found in the literature however are not totally unequivocal. Kayo & Kimura (2010), for example, found relatively low level of country-influence relative to firm-specific factors. There are also further studies, for example, MacKay & Phillips (2005) which suggest that, in the US at least, financial structures are determined at firm level rather than industry level.

Although the evidence in respect to industry-based leverage effects is somewhat equivocal we argue in this paper that there is a strong case to expect that if Western capital structure models are applicable to Chinese firms then we would expect to find some evidence of industry-based leverage effects. The literature in relation to the impact of rapid economic growth on Chinese firms' capital structures decision is very limited. In particular, we can find virtually no research that attempts to examine industry-related differences in Chinese firms' capital structures. This issue is of particular interest here and timely because all evidence indicates that China will soon be the biggest economy in the world, and will be an economy dominated by the manufacturing sector.

Any industry-based leverage effects could, we would argue, be potentially a function of the level of debt capacity. Woodruff (2007), using USA data covering 2001-2005, identified debt capacity as being potentially a function of four factors: the proportion of property, plant and equipment in total assets, industry group (because of asset specificity), sales variability, and the depreciation method used. He found that both: the proportion of property, plant, and equipment to assets and also the industry classification were statistically significant variables in explaining the debt capacity. Higher debt capacity was particularly pronounced in respect to the (non-high technology) manufacturing sector. This is possibly not surprising as firms in this sector produce similar products and services, and utilize assets that have similar asset specificity risk (Espahbodi et al., 2002).

It is argued in this paper that if Western market structure theories are applicable to China then *theoretically* one of the key drivers of industry related leverage differences is expected to be the ability of firms to take advantages of tax shields. In order to do this a firm will need to have borrowing capacity and need to pay corporate tax. Such conditions are most likely to be found in growing and profitable industries where there is high debt capacity (as found in China). Profitable firms in these high debt capacity industries should be able to borrow more easily than firms in industries with, for example, a high proportion of intangible assets and unstable earnings streams. On this basis we test the hypothesis that:

1. Variations in the leverage levels in profitable Chinese listed companies will be being industry dependent; and
2. High debt capacity will result in leverage levels being higher in the Chinese manufacturing industry than in other industries.

Some degree of caution needs to be adopted in relation to the potential significance of industry-based leverage effects. Miao (2005) casts some doubt on the existence of a high leverage effect in high growth industries (as is found in the Chinese manufacturing sector). Chen (2004) supports this argument on the supposition that high growth industries normally have high value of low collateral value intangible assets. Although Chinese manufacturing firms are in a high growth sector the high level of intangible assets argument does not apply in the current study. Of the 822 listed Chinese companies we identified in this paper (see data section below) a significant number of firms had no intangible assets on their balance sheets and of those which did, these represented over 5% of total assets for only approximately 30% of firms.

An issue which might be of greater significance in relation to Chinese firms is that of high volatility levels in profit levels. Most empirical studies confirm the negative correlation between profitability and leverage (Titman and Wessels (1988), Wald (1999)). However, it will also be necessary to consider that high earnings volatility could be associated with the risk that earnings could drop below debt service levels. This may mean that an inverse relationship between volatility and leverage is to be expected.

A further significant factor relates to the ability of Chinese listed companies to issue corporate debt. Hale (2007) found evidence which suggested that China's bond market is limited in both scale and scope. Although the bond market is round 27% of GDP most of these were issued by the government and government owned banks. Only 6% of bonds were issued by nonfinancial enterprises and total corporate debt accounted for only about 3% of China's stock market capitalisation. This can be compared to a typical ratio of 100% -200% found in many developed markets. Hale also found that corporate debt accounted for only 1.4% of the total finance needs of Chinese corporations. This compared to the approximately 85% financed by the banks and the 14% financed through equity. No information was however provided in respect to how debt finance was distributed throughout Chinese industry and the question of the relationship between industry membership and capital structure was not addressed.

Despite these issues, Huaipeng (2006) identified that the bond market was growing rapidly. For example, debt issuance was growing by about 75% year-on-year by November 2005. Whether

or not the industry participation in this rapidly developing market is more of a function of the ability or willingness to sell corporate bonds rather than of the growth in industry debt capacity is open to question.

We believe that the factors outlined above mean that the relevance of Western-based corporate structure theory to China is not clear cut. We aim to contribute to the literature in this paper by examining the nature of Chinese industry-related differences in leverage. In particular, Chinese manufacturing industry which produces a robust environment with high levels of debt capacity (see Table 1 below) compared with manufacturing industry in other countries. The structure of the remaining sections of the paper is as follows: Section 2 presents our sampling procedures and the dataset used. Section 3 then reports the findings of an investigation into the earnings volatility among industries and across Chinese firms. Section 4 undertakes a comparative study of leverage differences between Chinese manufacturing and non-manufacturing firms using different measures of leverage on both a cross-section and time-series basis. Finally Section 5 discusses the findings and concludes the paper.

2. Data Description

The sample was drawn from Shanghai Stock Exchange ‘A’ share index on November 25th 2008 from the *Reuters 3000 Xtra* global financial database. At this point in time there were 852 companies that had been listed on a continuous basis from 2002 to 2007. These are shown on a sector basis in Table 1.

Sector	*Total Listed	Av Size **	Debt Borrowing Capacity ***		
			Mean	St Dev	Sample
Total	852	15.25	0.48	0.23	588
Manufacturing	461	4.84	0.45	0.19	308
Agriculture	24	1.98	0.42	0.11	17
Conglomerates	44	8.43	0.50	0.22	28
Construction	41	14.13	0.32	0.21	19
Utilities	39	15.84	0.76	0.13	34
Finance	21	1507.1	0.25	0.23	2
I.T.	55	5.05	0.30	0.16	32
Mining/Oil	19	101.1	0.56	0.15	18
Real Estate	29	7.73	0.23	0.24	24
Wholesale/Retail	43	3.73	0.50	0.25	36
Others	76	2.83	0.65	0.22	59
* As at November 25 th 2008.					
** Average size measured by Total Assets (in units of 1 billion Yuan as at 2007).					
*** $FA^1/(TA)$ as at November 25 th 2008.					

Unsurprisingly, given China’s export orientation, manufacturing companies dominate market listings in terms of firm numbers; they represent 54% of the total. The next biggest sector is I.T.

¹ Fixed assets exclude intangibles. Database used for identifying tangible assets: RESSET Financial Research Database: <http://www.resset.cn/en>, Beijing Gildata RESSET data tech co. ltd.

Services representing around 6.5% of the total. The significance of this sector possibly reflects the importance of I.T. support during the growth stage of economic development. It can also be noted that there was significant between-sector variation in firm size, as measured by total assets. The finance sector stands out in this respect as does, to a lesser extent, the mining/oil sector. It can also be noted that there were also some significant within-industry size differences. For example, the coefficient of variation in relation to size for manufacturing firms was 2.72 and the respective figure for the mining/oil sector was 2.07.

We follow standard practice and exclude the finance industry from our analysis given the nature of the asset base and also the sector's highly regulated nature. In addition, given that this paper has identified tax shield benefits as potentially a key driver of capital structure variation, we exclude from the sample firms that are not in a position to take advantage of such benefits and also those that are highly unlikely to take advantage of such benefits. As a consequence firms with negative pre-tax profits are excluded. Further exclusions made on this basis are: firms that historically have made no use of long-term debt (LTD) finance, firms that have negative equity, firms where the annual EBIT growth exhibits excessive volatility (growth changes by 10 fold or more) and finally some obvious outliers where current liabilities exceed half of total liabilities *and* interest paid is more than LTD.

It was found that there were a significant number of firms with negative equity in the dataset. These were generally firms that had made substantial losses and as a consequence were financed through short term loans (mainly bank loans). These are excluded from the sample as it was highly unlikely that they would be in a position to be able to raise LTD finance. In addition,

firms that made no pre-tax profits are excluded as they face no incentive to use a tax shield. It was also decided to exclude firms that showed excessive volatility in annual EBIT growth as it was considered that such firms are unlikely to consider increasing their leverage. This is because wide swings in profits would create uncertainty in respect to their ability to pay future interest and also, excessive volatility would make it difficult to sell bonds to investors. The final exclusion is more data related; the sample excludes firms where it is likely that there is a significant part of the interest paid related to short-term borrowing costs. It is because the data-set used does not enable the identification of separate short-term loan and long-term loan interest payments. This means that where there are significant short-term loans, the use of such data would introduce a significant upwards bias in estimates of long-term borrowing costs. This problem cannot be eliminated, but in order to minimise it we identify firms with high current liabilities relative to total liabilities, as these are likely to have significant short term loans (such as bank loans). We assume that if these firms were also paying large interest payments relative to their LTD, then a substantial proportion of these payments are unlikely to relate to the LTD. These firms are therefore excluded from the sample.

Table 1 shows that as well as there being significant industry-related differences in firm size there are also significant industry-related differences in estimated debt borrowing capacity². Possibly a little surprisingly, the debt capacity of manufacturing is marginally lower than the sample average. The coefficient of variation for manufacturing (0.42) is however lower than that for the sample average (0.49). This suggests a lower between-firm capacity variation in the manufacturing sector than across the sample as a whole. The finding that the standard deviation

² The Debt Capacity is measured by the ratio of Tangible Fixed Assets/Total Assets on the assumption that firms with higher fixed assets as collateral are easier to borrow money.

is much lower than the mean for all the industries with the exception of finance and real estate is indicative of strong industry-related determinants of debt capacity. If debt borrowing capacity was more dependent on firm-related rather than industry-related factors the expectation would be that there would be both a high standard deviation relative to the mean in each industry and also little between-industry variation in mean debt borrowing capacity levels.

The debt borrowing capacity estimated indicates that if tradeoff capital structure model is applicable to listed Chinese companies then the expectation would be that they are likely to be significant industry-related variations on leverage levels. It is not clear from the estimated capacity however that leverage would be higher in the manufacturing sector.

3. Earnings across industries

The existence of Industry-related variations in leverage that arise as a consequence of firms maximising tax shield benefits will depend not only on there being industry-related debt borrowing capacity differences but it will also depend on firms in those individual industries have adequate earnings capacity.

The sample used in this paper already adjusts for earnings capacity by excluding firms with a negative average EBIT over the period 2002-2007. It also makes further adjustments by excluding firms where the equity is negative and where the EBIT showed excessive volatility. Table 2 below examines the earnings of the remaining sample on an industry basis to identify if there are any industry-related differences in earnings capacity that might have an influence on a firm's ability to maximise tax shield benefits. The table reports on an industry basis the mean Earnings before Interest and Tax (EBIT) and the corresponding standard deviation, coefficient of

variation and ranges. In addition, to control for differences in firm size, the mean EBIT relative to the average industry firm size is estimated.

Sector	Sample*	Mean EBIT**	Mean EBIT/Av size***	Standard deviation of EBIT			
				Mean	CoVar	max	min
Total	471	8.99	0.59	4.38	0.49	573.27	0.01
Manufacturing	281	3.18	0.66	2.24	0.70	62.58	0.04
Agriculture	15	1.2	0.61	0.48	0.40	1.80	0.12
Conglomerates	27	1.04	0.12	5.38	5.17	121.19	0.01
Construction	18	1.35	0.10	1.93	1.43	18.5	0.07
Utilities	32	8.32	0.53	3.42	0.41	28.18	0.05
I.T.	27	4.09	0.81	1.62	0.40	24.72	0.05
Mining/Oil	18	45.09	0.45	49.0	1.09	573.27	0.12
Real Estate	22	2.46	0.32	1.80	0.73	9.13	0.13
Wholesale/Retail	31	2.18	0.58	1.29	0.59	5.85	0.10

* As at November 25th 2008.
**6 year Mean EBIT(in units of 100 million Yuan). Not inflation adjusted. Over the full period the CPI fell by 1%.
***6 year Mean EBIT(in units of 100 million Yuan)/ Average size measured by Total Assets (in units of 1 billion Yuan as at 2007).

From Table 2 it can be identified that average EBIT varies substantially across different industry. The highest one is mining/oil industry at 45.09 and the lowest is the agriculture industry at 1.2. The predominant industry, manufacturing, is approximately mid-range at 3.18. If the EBIT is adjusted to control for approximate average firm size then the range is seen to be smaller but differences are still significant. It is interesting to note that using this second measurement as a basis manufacturing industry would appear to be one of the more profitable industries. This second measure will also give an indication of the ability of individual industries to service any *potential* future debt issued. Both EBIT and profitability are important in this respect. EBIT impacts directly on interest payments whilst profitability indicates how efficiently the industry

use assets to generate EBIT. Higher efficiency will benefit both equity holders and bondholders/lenders as the firms use their cash to finance the assets to generate returns to them. The measure developed suggests quite wide industry variation, with manufacturing, I.T. and agriculture being in a better position to issue debt than construction, conglomerates and real estate.

The other significant feature of Table 2 is the standard deviation on the EBIT. This shows that there is very high variation within some industries. For example, the coefficient of variation in respect to conglomerates is over 5 and for manufacturing a relative high standard deviation is associated with a wide range in the EBIT values. The importance of this to industry leverage levels is that high volatility may potentially act as a disincentive to the issuance of corporate debt in some industries given the need to service debt interest. This appears to be a potential issue for most industries with the possible exceptions of: I.T., utilities and agriculture.

The combined effect of industry-related variations in debt borrowing capacity (reported in Section 2) and industry related variations in EBIT (reported above) would indicate that industry-related differences in leverage would be expected to be found if Chinese listed companies are making efficient use of tax shields. Despite the observation that in many industries a considerable element of intra-industry variation has been found in respect to both variables, some industries do stand out as showing greater tax shield potential. For example, both utilities and oil/mining show relatively high debt capacity uniformly across their respective industries (as shown by the low standard deviation) and both these industries show relatively high average EBIT

levels, and in the case of utilities at least, these appear to be relatively uniform across the industry

4. Industry-related leverage effects over time

We undertake a series of tests to identify whether or not the leverage levels found in the 'base case' of manufacturing firms are statistically significantly different from the leverage of firms found in other industries.

Although the manufacturing sector did not show the highest debt borrowing capacity, the mean EBIT levels were high relative to average firm size and the EBIT standard deviation was relatively low. It might be expected that this, combined with lower perceived default risk resulting from the fact that the Chinese economic boom has been based mainly on the manufacturing industry, may have potentially made borrowing easier for manufacturers relative to some other industries. We would therefore expect that Chinese manufacturing firms should borrow significantly more than, for example, construction and real estate, where there are substantially lower levels of debt borrowing capacity.

Tables 3 and 4 report the results from a series of tests that compare the leverage levels on a year-by-year basis over the period 2002-2007. The two tables are based on two alternative measures of the leverage widely found in the empirical literature (LTD/E and LTD/TA). This approach is taken so that comparisons can be made to check the robustness of results.

Our preferred measure is however, LTD/TA given that it shows greater stability as fluctuations in the value of E may result in significant changes in the measure of leverage even when there is little or no change in borrowing. It can be noted that in the empirical literature a number of different definitions of the numerator are found. These differences essentially relate to whether to use the market value or the book value of debt. For example, De Miguel and Pindado (2001) use market value whilst Titman and Wessels (1988) use book value. We argue that the use of market value is inappropriate for this particular study because any tax shield effect of borrowing is determined by the amount of interest payable on the debt and not the market value.

**Table 3a:
A Comparison of Manufacturing Company Mean Leverage Ratios With Other Sectors
(Leverage: Long Term Debt/ Shareholder Equity)**

The mean leverage ratio of manufacturing sector companies was compared against those of companies from other sectors over the period 2002-2007. The F-values relate to comparison-of-mean tests where the degrees of freedom use the Satterthwaite approximation++.

The mean manufacturing leverage ratio was found to be higher than those of other sectors in half of cases. This does not appear to be related to debt capacity as, for example, construction and real estate have a lower debt capacity than manufacturing. The statistical significance of the sector-related differences found was limited. This was in part due relative wide within-industry leverage variations within some sectors.

Sector	2007		2006		2005	
	Mean Leverage	F-value	Mean	F-value	Mean Leverage	F-value
Manufacturing	.336642		.308208		.338320	
Agriculture	.225437	1.769	.154422	2.440	.186951	5.426**
Conglomerates	.381739	.109	.331129	.075	.609183	1.473
Construction	.583831	2.622	.490796	1.871	.492179	.422
Utility	.690254	5.471**	.769285	9.622***	.651940	4.607**
IT	.148905	9.811***	.162804	3.406*	.131458	16.071***
Mining/Oil	.313814	.048	.219160	.048	.462887	.500
Real Estate	.572961	3.940*	.573074	3.521*	.498476	2.276
Wholesale/Retail	.197878	7.629**	.257764	7.629**	.199217	3.036*

*** Significant at 1% ** Significant at 5% * Significant at 10% ++ $df = [(s_1^2 + s_2^2) / ((s_1^2 / (n_1 - 1)) + [(s_2^2) / (n_2 - 1)])]$

Table 3b:
A Comparison of Manufacturing Company Mean Leverage Ratios With Other Sectors
(Leverage: Long Term Debt/ Shareholder Equity)

The mean leverage ratio of manufacturing sector companies was compared against those of companies from other sectors over the period 2002-2007. The F-values relate to comparison-of-mean tests where the degrees of freedom use the Satterthwaite approximation++.

It can be noted that leverage is trending upwards over time. This is especially apparent in industries such as utilities which increase from 0.33 in 2002 to 0.69 in 2007.

Sector	2004		2003		2002	
	Mean Leverage	F-value	Mean	F-value	Mean Leverage	F-value
Manufacturing	.294640		.251568		.228043	
Agriculture	.210568	2.067	.270360	.032	.193841	.274
Conglomerates	.389120	.676	.363858	.789	.124994	11.036***
Construction	.339496	.137	.256977	.004	.368607	3.132
Utility	.595692	9.017***	.521569	9.537***	.335355	3.505*
IT	.176052	2.891*	.259514	.005	.179249	.352
Mining/Oil	.375408	.507	.357654	.700	.280623	.204
Real Estate	.501638	1.494	.284792	.184	.316168	.574
Wholesale/Retail	.247528	.624	.299023	.151	.224738	.001

*** Significant at 1% ** Significant at 5% * Significant at 10% ++ $df = [(s_1^2 + s_2^2) / ((s_1^2 / (n_1 - 1)) + (s_2^2 / (n_2 - 1)))]$

Table 4a:
A Comparison of Manufacturing Company Mean Leverage Ratios With Other Sectors
(Leverage: Long Term Debt/ Total Assets)

The mean leverage ratio of manufacturing sector companies was compared against those of companies from other sectors over the period 2002-2007. The F-values relate to comparison-of-mean tests where the degrees of freedom use the Satterthwaite approximation++.

This second definition of leverage produces significant differences from what was found in Table 3 in terms of the estimated values of the leverage ratios. However, there is little difference in terms of the relative leverage of the manufacturing sector and other sectors. This indicates that the results of the modelling procedures used are robust from the perspective of the definition of the leverage. The statistical significance of the between-sector differences using the second definition was found to show some evidence of greater consistency over time. This was probably due to this definition being less sensitive to changes in the value of the denominator.

Sector	2007		2006		2005	
	Mean Leverage	F-value	Mean	F-value	Mean Leverage	F-value
Manufacturing	0.108469		.100405		.104082	
Agriculture	.0862335	.947	.051372	4.159*	.0772156	2.043
Conglomerates	.113184	.026	.103517	.022	.0810773	1.843
Construction	.100921	.070	.103919	.016	.106152	.007
Utility	.190174	8.099***	.204046	11.804***	.219286	13.381***
IT	.0482224	15.711***	.0461988	18.172***	.0544567	9.823***
Mining/Oil	.125496	.327	.101314	.003	.126055	.776
Real Estate	.172785	6.371**	.174583	4.810**	.139458	4.312**
Wholesale/Retail	.0665653	6.850**	.0743468	2.823*	.049636	17.370***

*** Significant at 1% ** Significant at 5% * Significant at 10% ++ $df = [(s^2_{I+s_2}) / ((s_1^2)/(n_1-1) + [(s_2^2)/(n_2-1)])]$

Table 4b:
A Comparison of Manufacturing Company Mean Leverage Ratios With Other Sectors
(Leverage: Long Term Debt/ Total Assets)

The mean leverage ratio of manufacturing sector companies was compared against those of companies from other sectors over the period 2002-2007. The F-values relate to comparison-of-mean tests where the degrees of freedom use the Satterthwaite approximation++.

Sector	2004		2003		2002	
	Mean Leverage	F-value	Mean	F-value	Mean Leverage	F-value
Manufacturing	.103551		0.0981872		.0918071	
Agriculture	.0925805	.288	0.0992590	.001	.0862697	.044
Conglomerates	.113253	.120	.105175	.078	.0533332	11.988***
Construction	.112648	.065	0.0763482	.985	.0997964	.231
Utility	.212571	18.473***	.207466	18.639***	.161130	8.111***
IT	.056703	6.485***	0.0710230	1.225	.0516833	4.928**
Mining/Oil	.138931	1.421	.144109	1.661	.134375	.708
Real Estate	.141897	2.061	.127464	.714	.126436	.870
Wholesale/Retail	.0735496	6.333**	0.0739997	2.760*	.058989	3.983*

*** Significant at 1% ** Significant at 5% * Significant at 10% ++ $df = [(s^2_1 + s^2_2) / ((s_1^2)/(n_1 - 1) + [(s_2^2)/(n_2 - 1)])]$

It should be noted that the debt capacity estimates in Table 1 and the leverage estimates in Tables 3 and 4 are not directly comparable due to the nature of the calculations. It is therefore necessary to make comparisons on a relative basis. Table 4 (our preferred measure) indicates that there has been a marginal increase in mean leverage levels over time as the economy has expanded, although the effect is not uniform across all sectors. It is possibly a little surprising that this increase has not been greater given the need for increasing capital in a rapidly expanding economy would normally be accompanied by increasing levels of debt issuance (Hale, 2007).

The results in both tables show a positive relationship between debt borrowing capacity and mean leverage in the utilities sector. However, rather surprisingly low debt borrowing capacity industries such as construction and real estate exhibit relatively high levels of leverage in both

Tables 3 and 4. The lack of a uniform positive relationship between these two measures would imply that, in general for Chinese listed companies, the benefits associated with tax shields do not strongly influence the capital structure.

There are a number of industries where the mean leverage level was consistently higher than manufacturing. These were: conglomerates, construction, utilities and real estate. This suggests that our initial expectation of higher leverage levels in manufacturing has not been met. It should be noted, however, that the F-test results show that it is only in the utilities sector, and to a lesser extent the I.T. sector, where the difference from manufacturing is statistically significant on a consistent basis over time. This general lack of significance is possibly, in part, due to high within-sector dispersion in some industries³. This general lack of statistical significance across both tables would possibly suggest that in some cases intra-industry leverage variation is possibly more important than inter-industry variation.

As a caveat it can be argued that the low levels of significance of the F-tests in Table 3 may be partly because leverage measured in terms of LTD/E is very sensitive to the level of E. So, for example, a fall in the value of E may result a significant increase in leverage even when there is no change in borrowing. Table 4 measures leverage in terms of LTD/Total Assets (TA). The results from Table 4 indicate that there are a number of sectors where the differences in leverage from the manufacturing sector are statistically significant over time on a consistent basis. This gives marginally more support to the (rather weak) argument that inter-industry leverage effects exist in the Chinese case.

³ Although it is not reported in the tables above, we have looked at the variation of leverage within each industry. The variation within the manufacturing sector was quite small. For example, for 2007 the coefficient of variation in respect to the LTD/E measure was 0.107. The variation in relation to the some other sectors tended to be significantly higher. For example, for 2007, in the utilities sector the coefficient of variation was 0.174.

5. Discussion and concluding remarks

In this paper, we examine whether or not industry-related differences can be found in Chinese listed firm's leverage levels and whether or not higher leverage levels are found in the 'engine' of Chinese economic development, namely manufacturing industry. It can be concluded without equivocation that leverage is *generally* not higher in the manufacturing sector. There has also been little evidence found to suggest that industry-related differences are *unequivocally* related to variation in debt capacity across industrial sectors. This finding can be compared, for example, with Tse (2002) who identified that industry debt capacity factors are an important determinant in explaining leverage levels of firms in the UK. We conclude that it is highly questionable as to whether or not Western capital structure theories are applicable to Chinese listed firms. The lack of a clear relationship between debt capacity and leverage suggests that the companies used in the sample do not take advantage of tax shield effects as tradeoff theory would suggest. This conclusion is supported by evidence of relative low leverage levels across Chinese industry (Hale, 2007). Chinese firms are not maximising shareholder value by increasing debt levels to the point where marginal tax shield benefits offset the present value of possible financial distress costs.

We finish with some thoughts on why no *clear* and *unequivocal* industry-related leverage differences were found in this study.

Underdeveloped corporate bond markets

It has been well documented that the majority of Chinese firms use short-term bank borrowing to in preference to long-term debt (Hale, 2007). The reason for this may just be that the corporate bond market has not developed to a degree that enables listed companies to issue the debt needed to create optimal capital structures.

The need to promote the development of the corporate bond market is fully accepted by the Chinese monetary authorities. For example, the governor Peoples bank of China in 2005, stated “China’s underdeveloped corporate bond market has distorted the financing structure in the economy, which poses a threat to financial stability, as well as to social and economic development.” (Zhou 2006). He went on to list a series of mistakes committed during the late 1980s and mid-1990s that had impeded the development of the corporate bond market. These ranged from a lack of a credit ranging system to the targeting of retail rather than institutional investors and a lack of investor education. It may possibly be the case in the long run that, as the corporate debt market develops, Western capital structure models will more fully applicable to Chinese firms. However, there may also be cultural/political issues that place limits on the extent of such development.

Cultural/political factors

Cultural factors were identified by Sekely & Collins (1988), amongst others, as having a significant influence on industry-related leverage variations between countries. If there is a cultural aversion to borrowing it would be expected that all industry sectors should exhibit

similar low level of leverage relative to their developed country peers. This is essentially what is found in China.

The Chinese do not like to borrow. The tendency to save and not borrow was highlighted by Zhou, the governor of the People's Bank of China⁴. He identified that China's 2007 domestic savings rate of almost half of gross domestic product was far too high⁵ and indicated that it was a function of social and cultural factors. He said: "... change ... may be a slow process, especially when you want to change national traditions, cultural impacts, family structures and demographics". It is difficult to say with confidence that the behaviour and attitudes of a country's individuals to saving and borrowing will also be reflected in the attitudes and behaviour of company managers in that same country. However, we believe that using such a hypothesis to explain of the unwillingness of Chinese firms to use higher leverage merits further investigation.

Political policy is also possibly a significant factor. The Chinese government is heavily involved in listed companies' management, which is a type of business model unseen in most market economies. This hybrid of market forces and state involvement will potentially mean that the objective of adjusting leverage levels to maximising shareholder value assumed in Western capital structure theory is not appropriate in the Chinese context.

Individual firm factors

There are a number of papers identifying that firm factors can be more significant than industry factors in determining leverage; for example, MacKay & Phillips (2005). Other papers can be

⁴ From: <http://www.reuters.com/article/companyNewsAndPR/idUSPEK23112320090210> (access date: 12/11/2010).

⁵ This can be compared with the USA savings rate. This has declined from an average of 11 % of national income during the period 1960 to 1979 to as little as 1% in 2005. Source: OECD National Accounts, Volume II, various years.

cited that found substantial between-industry differences in the amount of within-industry leverage variability; for example, Almazan & Molina (2005). Similar variability was found in the current study. For example, the 2007 leverage coefficient of variation was 10% in the manufacturing industry and was 17% in the utilities sector. Such variability could be another plausible reason for the limited significance of the industry-related leverage effects found in the current study.

There is some evidence to suggest that industry based cultural factors can account for part of the differences of within-industry leverage variability; for example, Hogan & Hutson (2005). Another possibly significant factor that might explain this phenomenon is the lack of within-industry commonality in the leverage-influencing-characteristics of debt and earning capacity. From Table 1 above it can be identified that the within-industry coefficient of variation values for debt capacity were relatively low and ranged from 0.17 to 1.04. However, Table 2 shows that the within-industry earnings variation was significantly greater and ranged from 0.4 to 5.17. With such non-uniformity in the earnings used for debt servicing, it is possibly not a surprise that industry factors have limited explanatory power in the Chinese case.

It remains unclear whether the capital structures found in this study are simply elements of the characteristics found in the growth stage of a developing country's development or whether there is something unique and different in the ways in which Chinese businesses operate. We will need to wait possibly a decade or more whilst the Chinese economy matures before any definitive answer can be given to this question.

References

- Almazan, A. & Molina, C. (2005), *Journal of Economics and Management Strategy*, Vol. 14:2, pp. 263-297.
- Chen, J. (2004), Determinants of capital structure of Chinese-listed companies, *Journal of Business Research*, Vol. 57, pp. 1341-1351.
- De Miguel, A and K. Pindado (2001), ‘Determinants of capital structure: new evidence from Spanish panel data’, *Journal of Corporate Finance*, Vol. 7, pp. 77- 99.
- Espahbodi, H., Espahbodi, P., Rezaee, Z. and Tehranian, H. (2002), ‘‘Stock price reaction and value relevance of recognition versus disclosure: the case of stock-based compensation’’, *Journal of Accounting and Economics*, Vol. 33, pp. 343-73.
- Hale, G. (2007), ‘Prospects for China’s Corporate Bond Market’. Federal Reserve Bank of San Francisco Economic Letter.
- Hogan, T. & Hutson, E. (2005), Capital Structure in new technology-based firms; evidence from the Irish software sector, *Global Finance Journal*, Vol. 15, pp. 369 – 387.
- Huaipeng, M. (2006), The development of China’s bond market, BIS Papers No 26.
- Jong, A., Kabir, R. & Nguyen, T. (2008), Capital structure around the world: the role of firm- and country-specific determinants, *Journal of Banking & Finance*, Vol. 32, pp. 1954-1969.
- Kester W. (1986), Capital and ownership structure: a comparison of United States and Japanese manufacturing corporations. *Financial Management*, Vol.15, pp. 5-16.
- Kim W.G. (1997), The determinants of capital structure choice in the US restaurant industry, *Tourism Economics* 3 (1997) (4), pp. 329–340.
- MacKay, P., Phillips, G. (2005), How does industry affect firm financial structure? *The Review of Financial Studies*, Vol. 18:4, pp. 1433- 1466.
- Miao, J. (2005), Optimal capital structure and industry dynamics, *Journal of Finance*, Vol. LX:6, pp. 2621-2659.
- Modigliani F, Miller M. (1958), The cost of capital, corporation finance and the theory of investment. *American Economic Review*, Vol. 48, pp. 261-297.
- Remmers L, Stonehill A, Wright R, Beekhuisen T. (1974), Industry and size as debt ratio determinants in manufacturing internationally. *Financial Management*, Vol. 3, pp. 24-32.

Sekely, W. & Collins, J. (1988), Cultural influences on international capital structure, *Journal of International Business Studies*, Vol. 19:1, pp. 87-100.

Sheel A., (1994), Determinants of capital structure choice and empirics on leverage behavior: a comparative analysis of hotel and manufacturing firms, *Hospitality Research Journal* **17** (1994) (3), pp. 3–16.

Titman, S. and R. Wessels (1988), ‘The determinants of capital structure choice’, *Journal of Finance*, Vol. XUII, pp. 1-19.

Tse, C. B. (2002), Top Gearing, *Financial Management*, Chartered Institute of Management Accountants, March. pp. 36-37.

Wald, J., (1999), How firm characteristics affect capital structure: an international comparison, *Journal of Financial Research* **22** (1999) (2), pp. 161–187.

Woodruff, S., (2007), Factors explaining debt capacity, *Management Research News*, Vol. 30 No. 4, pp.240-251.

Zhou, X. (2006), China’s corporate bond market development: lessons learned, *BIS Papers* No 26.