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The Effect of Firm-Specific Variables and
Macroeconomic Condition on Capital Structure

Evidence of Non-Linear Behaviors

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Abstract

This paper models the dynamics of capital structure listed on the NYSE and NASDAQ during 1995 to 2010. The subsamples classified by given leverage level and specified periods of time are tested. The main contribution is that macroeconomic conditions and firm characteristics are incorporated regressed for non-linearity test. We provide the evidence of non-linear patterns among low leverage and high leverage firms. These two groups are found to have contrast behaviors toward stock market, one of macroeconomic variables. With more financial flexibilities, the sensitivities of firm-specific variables are found statistically insignificant for low leverage firms. Besides, firm-specific variables drop sensitivities for high leverage firms in economic downturns. Our results support the hypothesis that low leverage firms have higher agency cost between managers and shareholders, and the fact that expected bankruptcy cost is lower in booms.

Keywords: Capital structure, Non-linear behaviors, Business cycles.

Content

1. Introduction

1.1 Background

Capital structure is one of the most crucial decision makings of firms and thus heated issues in corporate finance studies. Modigiani and Miller (1958) propose an irrelevance theory in the perfect capital market. M&M I claims the value of firm is same regardless what the capital structure is like. However, M&M II relaxed the perfect market assumption, suggesting that with tax benefit, debt using increases the value of firm. This argument definitely provokes countless interests of capital structure research.

Without doubt, pecking order (Myers and Majluf, 1984) and trade-off theory (Kraus and Litzenberger, 1973) are the two most widely discussed and tested theories. Pecking order is based on the fact of adverse selection cost, presenting a priority from internal funds to external financing. Trade-off theory obtains optimal leverage level by balancing the benefits and costs of debt using. Many articles, such as Fama & French (2000), Bancel & Mitto (2004), Frank & Goyal(2007), test the determinants of capital structure and then conclude the partial explanatory ability of either the two theories.

Besides determinants of capital structure, recent studies also have variety of perspectives. Korajczyk and Levy (2002) investigates the effect of macroeconomic condition on leverage level. Leary and Robert (2003) study the existence of target ratio and rebalancing model. Roberts (2005) Flannery and Rangan (2004) model the partial adjustment of capital structure. Mackay and Phillips (2002) provide the evidence of industry equilibrium model of financial structure. These articles broaden the horizons of empirical capital structure studies.

There are some inconsistent findings. For example, Chen and Zhao (2005) control the adjustment cost and find out that it fails to explain the negative relation between profitability and leverage level. Baker and Wurgler (2002) do not find

evidence of leverage reversion, which is contrast to the finding of Leary and Robert (2003).

With different samples, models and point of views, the researches of capital structure are enriched. Although there are still debates, capital structure seems to catch people's attention continually.

1.2 Problem Discussion

Our research is inspired by Korajczyk and Levy (2002). The paper proposes that both macroeconomic conditions and firm specific factors drive variations on financing decision. They also demonstrate that firms should adjust their capital structure more by smaller volume in expansion than in depression. The subsamples are classified as financial constrained and unconstrained firms in their article. However, they neglect the existence of non-linearity of dependent variable in the determinants of capital structure, which is documented by Harris and Scaramozzino (2005). They prove the existence of non-linear behavior in the determinants of capital structure between low leverage firms and high leverage firms, using conditional quantile regression. This triggers our interest to see that besides firm-specific variables, how macroeconomic conditions affect the leverage level Moreover, we are also curious about the pattern of capital structure excluding large macroeconomic flotation. Hence, the subsamples are classified by the given leverage level as well as different business phases. In light of business cycle's effect and non-linear patterns, different subsamples are supposed to have varied sensitivities of determinants according to their characteristics.

1.3 Purpose

The purpose of the paper is to examine the impacts of both macroeconomic variables and firm-specific variables on capital structure decision making among several subsamples. The comparisons among the subsamples, their economic interpretations and linkages with theory and prior studies are the main investigations

of this paper.

1.4 Structure of the paper

In chapter 2, the main theories of capital structured are illustrated. Chapter 3 reviews relevant literature. Chapter 4 presents the methodology. We discuss predictions of variables in chapter 5. Results and discussions are analyzed in chapter 6. Finally, the whole investigation is concluded in chapter 7.

2. Theoretical Background[1]

2.1 Irrelevance theory

In 1958, Franco Modigliani and Merton Miller (M&M) published a landmark paper, "The cost of capital, Corporation Finance and the Theory of Investment". In the paper, they characterize an ideal capital market, which is defined by a set of five assumptions. Market participants face no transaction costs or taxes, which means the frictionless capital structure; all market participants share homogeneous expectations about the prospects of investments; there is no atomistic competition; the firm's assets, operations and strategies are fixes and known to all investor and the firm's financing is stable and fixed once chosen.

Under the above assumptions, they developed two controversial propositions on the effects of corporate financing decisions, which are the market value of a firm is constant regardless of the amount of leverage (i.e., debt relative to equity) that firm uses to finance its assets and the expected return on a firm's equity is an increasing function of the firm's leverage. They challenged the traditional notion that a firm's value can be increased by using debt. In other words, the value of a firm is unaffected by the capital structure in the absence of taxes, bankruptcy costs, agency costs and asymmetric information. According to this theory, it does not matter if the firm's

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[1] Ogden J P.Connor. Advanced Corporate Finance: Policies and Strategies.Page30-170

capital is financed by debt or equity and the firm's dividend policy is irrelevance to capital structure either.

2.2 Trade-off theory

With the relaxation of assumptions of the ideal capital market, the presence of bankruptcy cost and favorable tax treatment of interest payment led to the development of static trade off framework. Kraus and Litzenberger (1973) argued that firms will seek to maintain an optimal capital structure by balancing the value of tax shields on interests and the cost of bankruptcy or financial distress, which is traditional trade-off theory. However, Miller (1977) developed other alternative offsetting factor, personal taxes, to take full advantage of interest deductibility and yielded an equilibrium involving corporate and personal tax rates in corporate debt.

Furthermore, under the agency theoretical models, Stulz (1988) developed a model of optimal capital structure that focuses on the benefits of reducing potential free cash flow problems and other potential conflicts between managers and shareholders. Corporate managers have the incentive to waste free cash flow and bad investment. The issue of debt limits the free cash flow available to managers and thus mitigates the manager-shareholder agency conflict.

2.3 Model based on asymmetric information signaling & agency costs

Since the shareholders cannot observe neither the firm's true cash flows nor management's investment decisions whereas management do, the information asymmetry occurs between them. Besides, the principal-agent problems also do favor of management since they are incentive to overinvest. Managers always turn to equity funding by claiming the insufficient cash flow to invest profitable items and thus leads to adverse results, which shareholders refuse to provide fund even under real situation. In that case, overinvestment and underinvestment problems come up.

Stulz (1990) developed a theory of optimal capital structure that incorporates both principal-agent and information asymmetry problems. He argues that both overinvestment and underinvestment problems can be mitigated if the firm is financed with mixture of debt and equity. The issue of debt reduces the overinvestment cost because of the control of free cash flow while the equity fund can increase the control of shareholders and cut down the underinvestment cost. Therefore, an optimal capital structure exists towards to managerial discretion.

2.4 Pecking order theory

Another pioneering finding addressed by Myers and Majluf (1984) and Myers (1984) is Pecking Order Hypothesis. It has been recognized that managers know more about the true value of the firm and the firm's riskiness than less informed shareholders and outside investors, according to asymmetric information. Firms may be forced to forgo projects with positive net present value if it is costly for express the true value. To avoid the underinvestment problem, managers prefer to finance the new project by those who are not undervalued by the market, such as internal funds or riskless debt. Therefore, this affects the choice between internal and external financing.

Based on the idea of asymmetric information between managers and investors, he pointed out that managers prefer internal financing (i.e., equity financing via retained earnings) over external financing (i.e., funds raised via debt or equity). Second, if company has to finance externally, it would issue the security with the least risk. It ranks internal equity at the top of the pecking order, followed by debt and then hybrids of debt-equity, with external finance at the bottom of the pecking order.

3. Literature Review

Although capital structure theories have been proposed, many of the empirical studies are aimed at providing support for a particular theory. These empirical studies,

such as Bancel & Mitto (2004), Frank & Goyal(2007), focus on trade-off theory and pecking order to explain the factors of financing decisions making. Almost every related article reaches the conclusion that either trade-off theory or pecking order can only partially capture the capital structure in the real world.

In this part, we review previous studies from three main perspectives, firm-specific variables, macroeconomic conditions, and non-linear behavior, which are highly related to our research.

3.1 Firm-specific variables

Most researches are consistent with elements of both tradeoff and pecking order theories. Bancel & Mitto (2004) surveyed managers of firms in seventeen European countries on their capital structure and found that financial flexibility, credit rating and tax advantage of debt are the most important factors influencing the debt policy while the earnings per share dilution is the most concern in issuing equity. They also pointed out that level of interest rate and the share price are important considerations in selecting the timing of debt and equity issues respectively. Hedging consideration is the primary factor influencing the selection of the maturity of debt or when raising capital abroad.

Fama & French (2000) tested the dividend and leverage predictions of tradeoff and pecking order models and followed Fama & Macbeth's (1973) approach to study the determinants of leverage (and dividends). The exogenous driving variables in their leverage model are profitability of assets, investment opportunities, non-debt tax shields, volatility and the target payout ratio is endogenous. According to their research, firms with more profits are less levered, which is consistent with the pecking order model but contradicts the tradeoff model.

However, confirming the trade-off theory, firms with more investments have less market leverage. Korajczyka & Levy (2003) followed Titman & Wessels (1988), Hovakimian, Opler, and Titman (2001), and Fama & French (2000) when testing firm-specific variables on target leverage. They assumed profitability of firm, the

extent of non-interest tax shields, the level of taxes paid, the level of intangible/tangible assets and market-to-book ratio have negative effects on target leverage while firm size has the positive effect.

The fact that deviations from target leverage explain issue choice is consistent with the tradeoff theory while the negative relation between profitability and target leverage is consistent with the pecking order theory. Frank & Goyal(2007) examines the relative importance of many factors in leverage decision of publicly traded American firms from 1950 to 2003 and got the same results. These factors they used are median industry leverage(positive effect on the leverage), market-to-book ratio(-),tangibility(+),profits(-),log of assets(+)and expected inflation(+).While industry subsumes a number of smaller effects.

From the existing literature, we extract a long list of factors claimed to have some influence on corporate leverage in firm specific aspect. This list includes measures of profitability, size, growth opportunity, industry, collateral and convexity of taxation.

3.2 Macroeconomic condition

Besides firm characteristics, several articles proved macroeconomic conditions significantly influence the dynamic target capital structure. Taggart (1985) argues that the real value of deduction on debt is higher when expected inflation is higher. Consequently, tradeoff theory predicts that expected inflation has a positive effect on leverage. Frank & Goyal (2007) find the same result of the positive relation between the expected inflation and debt-to-equity level. Korajczyk, Lucas, and McDonald (1992) provide evidence of clustering equity issuance. Firms often issue equity in good times, as their own price of equity has an abnormal increase, and thus decrease the leverage level. Choe, Masulis, and Nanda (1993) claim that counter-cyclical adverse selection costs lead to general increase in equity issues in expansionary phases of the business cycle. They suggest that firms face lower selection cost when they have more promising investment opportunities and less uncertainty of assets in

place. Bayless and Chaplinsky (1996) argue that firms seek to exploit the opportunities to raise capital in favorable terms during good time. Levy (2001) explains the counter-cyclical leverage patterns for relatively financially unconstrained firms accessing public capital market. Macroeconomic condition is used as proxy for managers' wealth. Managers are more likely to issue debt when their compensation is lower.

Korajczyk and Levy (2003) show the counter-cyclicality of leverage for financially unconstrained firms versus the pro-cyclicality of leverage for constrained firms. In addition, they find evidence that financially unconstrained firms time their equity issuance. Hackbarth, Miao, and Morellec (2004) get the same conclusion and demonstrate that firms should adjust their capital structure more by smaller volume in expansion than in depression. Chen (2009) presents a mechanism for "credit contagion" and market timing for debt issuing. Erel et al (2011) find that for noninvestment-grade firms, the raise of capital is pro-cyclical while it is counter-cyclical for investment grade firms.

Empirically, macroeconomic conditions also provide some explanations of pecking order theory as well as tradeoff theory. Macro-variables' negative relation to leverage for financially unconstrained firms seems to support pecking order; unconstrained firms tend to use more internal funds as they have more investment opportunities in good time. The equity issue in booms due to counter-cyclical adverse selection cost also agrees with the prediction in pecking order. On the other hand, if we only look within the good time, pro-cyclical leverage tendency during economic expansion is consistent with the tradeoff story. For unconstrained firms, debt is more attractive possibly because bankruptcy cost decreases and firm wants to have more tax shield as the market goes up continually. Firms lever up when the expected inflation increases, since the effective tax benefits get higher at the same time (Frank and Goyal, 2007). This finding apparently supports the tradeoff theory.

The effect of macroeconomic conditions on capital structure can be seen as two dimensions. The first one is firms' changing demand for types and amount of financing source over business cycle. The adverse selection costs resulted from

information asymmetry between firms and investors are higher in recession. Hence, firms choose to issue less information-sensitive securities, for example, shifting from equity to convertibles and from convertibles to debt (Baker, 2009). The other perspective is the change of capital supply. Capital supply has shortage and investors demand for more safe securities in recession. Holmstrom & Tirole (1997) present the recession creates a "credit crunch" for lower rated firms. The "flight to quality" model by Caballero and Krishnamurthy (2008) illustrates that investors become more adverse to risk in downturns, and thus they purchase more safe securities. The finding by Erel et al (2011) that investment-grade firms have more public bond issuances in downturns is consistent with the "flight to quality" argument. It also responses the survey of Graham & Harvey (2001) which shows one of crucial goals of Chief Financial Officers is to maintain finance flexibility in order to avoid from shrinking business in economic downturn, as well as the argument by Kisgen &Hovakimian (2009) that firms target their bond ratings.

3.3 Non-linear behavior

There is empirical evidence of non-linearity pattern of leverage among different quantiles of UK firms. Fattouh, Harris and Scaramozzino (2005) documented the existence of linearity in the determinants of capital structure. The main finding is that size of firm is positively related to debt-to-equity ratio for low leverage firms while negatively related for high leverage firms. Additionally, asset tangibility has a positive impact for low quantiles, but not significant for high quantiles. The debt ceiling is pointed out to be the potential rationale for the non-linearity pattern of capital structure decision making.

Holding other firm characteristic constant, low leverage firms have more financial flexibilities and sever free cash flow problem. High leverage firms have higher pressure of solvency, more tax benefit of debt, severer debt-overhang problem. These factors could be the rationales for the non-linearity pattern of determinants of capital structure.

The determinants used in Fattoul et al (2005) are all firm-specific variables. Macroeconomic variables and firm-specific variables are incorporated in our studies, and more implications are expected.

4. Methodology

4.1 Model

Following the above researches, we use OLS to regress panel data. The regression can be written as:

Lev $_{it}=\alpha+\beta$'$x_{fit-1}+\gamma$'$x_{jt}+\varepsilon_{it}$

Lev $_{it:}$ leverage level of firm i at time period t

α: constant

x_{fit}: firm-specific variables f of firm i at time period t.

$x_{et:}$ macroeconomic variables j at time period t.

β: vector of coefficients of firm-specific variables.

γ: vector of coefficients of macroeconomic variables.

ε_{it}: error term

It is reasonable to use cross-sectional effect since there could be unobservable idiosyncratic factor affecting capital structure. Cross-sectional fixed effect or random effect of each firm is used as dummy variable according to the result of test of fixed effect and random effect. It is reasonable to Note that the value of one macroeconomic variable is same for all firms at one specific time period t.

4.2 Data specification and source

The yearly data of firm specific variables, stock market return and Consumer Price Index (CPI) are from DataStream. For two other macroeconomic indicators, we obtain the yearly data from Board of Governors of the Federal Reserve. The

expansion/recession time periods are defined by National Bureau of Economic Research (NBER).

All series are deflated to real value in 1994 dollars with the CPI inflation series. We choose firms listed on New York Stock Exchange and NASDAQ and then exclude the financial industry, since their capital structures have different natures and regulatory requirements. The firms should exist during the whole period of time from January 1994 to December 2010 and be still active now in order to be included in the sample. This time span captures two business cycles, entitling us to test the impact of macroeconomic conditions and to test the subsamples within specific business phase. After dropping the missing data, the full sample includes 960 firms, distributed in 33 industries classified by DataStream.

4.3 Variables selection

Explanatory variables

We follow most of previous studies, such as Korajczyka & Levy (2003) and Frank& Goyal(2007), to choose explanatory variables and their transformations.

Firm specific variables

All the firm-specific variables are one period lagged.

1. Size: The proxy of size of firm is log of total asset.

2. Collateral: Property, plant and equipment scaled by total asset.

3. Profitability: profit margin of the firm.

4. Convexity of taxation: net deferred tax asset.

5. Growth opportunity: market-to-book ratio

6. Influence of industry: median leverage level of industry

Macroeconomic variables

All the macroeconomic variables are current value (i.e. not lagged)

1. Condition of product market: 1 year aggregate domestic non-financial business profit.

2. Condition of stock market: 1 year average return on NYSE index and NASDAQ

index.

3. Condition of credit market: Average yield of difference between Baa and Aaa Moody's rated bond.

Explained variable

Book leverage: book value of short-term debt plus long-term debt over total asset.

Book leverage versus market leverage

Market value is volatile and hard to predict, in general. Hence, the change of market leverage may have different cause from that of book leverage. For example, change of book leverage mainly means change of book value of capital structure (issue/ repurchase of equity, issue/ pay down of debt) and directly reflects capital structure decision making. However, if the firm does not alter the book value of capital structure, the market leverage may still have great change due to the fluctuation of market value of the firm. If we measure the change of market leverage, it is difficult to distinguish the effect of fluctuation from the effect of change in capital structure. As a result, the interpretation of the explanatory variables might be quite different between book leverage and market leverage as explained variables. In order to capture the linkage between capital structure decision making and the change of leverage level, the study is mainly focused on book leverage, despite whether the decision making is influenced by market value or not. Actually, with taking macroeconomic condition and market-to-book value as explanatory variables, the decision making affected by market value can be captured and interpreted to a large extent.

4.4 Subsample sorting

Low leverage firms versus high leverage firms

Our test of non-linearity behavior is mainly inspired by Fattouh et al (2005). Different from their methodology, which is quantile regression, we quantilze the firms' leverage levels relative to the industry which they belong to. This method of data sorting is motivated by the evidence that industry leverage median is also a significant

factor. Furthermore, the subsample will have similar proportion of each industry to that of the whole sample by such sorting. A firm's average leverage is computed over whole period of time, and the order is ranked within each industry. The subsample of low leverage firms and high leverage firms is first quantile and last quantile, respectively. Note that the firm which has most volatile leverage level (i.e. highest variance of leverage level during the time span) in its industry is excluded from any subsample in order to prevent instability.

Good time versus bad time

The full period of time covers two business cycles. Sorting the subsamples according to the business phases excludes the big business fluctuations and keeps only relatively small fluctuation within one phase. This entitles us to test whether macroeconomic indicators are still influential to capital structure. During 1995 to 2010, there are two recessions identified by NBER, March 2001 to November 2001, and December 2007 to June 2009. The stock market went down from 1999 and to the downturn in 2002. Our subsample, named bad time, covers these two main recessions. Subsample of bad time is from 1999 to 2002 and from 2007 to 2010. Subsample of good time is from 1995 to 1998 and from 2003 to 2006, capturing the expansions.

5. Prediction of the Variables

5.1 Firm-specific variables

As the theoretical background and literature review presents, there are some firm-specific variables seemed to be reliable determinants. Below are some predictions of the sign of the variables included in our model.

Profitability: Pecking order theory predicts profitability has negative impact since the firm should use internal funds firstly, which is supported by Korajczyka & Levy (2003) and Frank& Goyal(2007),while trade-off theory predicts positive sign because of increase of free cash flow.

Investment opportunities: Pecking order theory predicts investment opportunities is positively related to leverage level since the firm needs more funds and debt is prior to equity. Nevertheless, with limit of debt capacity, the equity financing will be employed after debt financing. Trade-off theory predicts negative impact because deadweight cost of debt will lead to underinvestment problem. As investment opportunities increase, firms prefer equity financing to prevent underinvestment problem. Korajczyka & Levy (2003) also prove the negative effect of market-to-book ratio on debt level

Collateral: higher collateral means higher liquidation value and lower incentive of asset substitution. Positive influence is predicted by trade-off theory since the conflict between shareholders and debt holders are less; tax benefit should be achieved. Frank &Goyal(2007) examines the relationship by the amount of tangible assets and found the positive effect.

Convexity of tax: When the firm has less deferred tax asset, the need of debt tax benefit will increase, and thus trade-off theory predicts a negative sign. From empirical aspect, Frank & Goyal(2007) got the same result.

5.2 Macroeconomic variables

There are some studies, such as Korajczyka & Levyb(2003), discussing about the contrast pattern for financial unconstrained versus financial constrained firms toward business cycle. However, different macroeconomic indicators seem to have competitive impacts on leverage; two indicators may have offset effect on the change of leverage. This competition will be discussed below. Furthermore, pecking order theory and trade-off theory have different predictions of the factors.

Controlling other factors constant, when product market goes up, leading to more retained earnings of firms, the leverage will decrease according to pecking order, since firms should use internal funds as first priority. Nevertheless, if good market also implies more investment opportunities, the leverage will not necessarily decrease since the need of funds increases and debt is prior to equity financing. Trade-off

theory has no obvious prediction, either. Due to free cash flow problem and the decrease of default risk, good product market is predicted to have positive impact on leverage level. However, the cost of underinvestment problem increases in the good time, equity financing becomes more attractive, thus decreases the leverage level.

Credit spread is a measure of cost of debt (Rd), and indicates the credit market supply at that time. Intuitively, controlling other factors unchanged, the firm will use less debt if the credit spread goes up.

If the product market has negative impact on leverage level, and credit spread also influences leverage level negatively, there exist two competitive forces. In general, the credit spread is lower in booms and higher in contractions. Thus, high aggregate profit leads to lower debt level, while lower credit spread leads to higher debt level in a good time. Moreover, the complexity increases if the factor of stock market is taken in consideration, since aggregate profit and stock return not always go toward same direction.

6. Results and Discussions

Compared with high leverage firms, low leverage firms have generally more financial flexibility and thus are less sensitive towards firm-specific variables.

The coefficients of firm-specific variables of the full sample (all firms, whole time of period) are consistent with prior studies (statistically significant and have same sign). Both 1 year aggregate domestic non-financial business profits (1YADNFBP) and Baa-Aaa yield spread have negative impact on leverage level. This is to say, different macroeconomic indicators have competitive forces as above predicted.

Below is further analysis of all the variables. The significance is referred to be at 10% level of confidence or lower.

6.1 Profitability

For the whole period of time, the coefficient of full sample is significantly

negative, but insignificant in both subsample A and B. The same result is found in good time, while the significance disappears for the three samples in bad time. Consistent with most of the previous studies, negative effect on capital structure of profitability is thought to support pecking order and be consistence with the finding from Fama& French (2000), Korajczk & Levy (2003) and Frank & Goyal (2007). For high leverage firms, profitability is found weakly significant (p-value 0.109). It might be linked with the solvency. High leverage firms have bigger pressure to pay down debt; lower profitability may push them to lever down.

6.2 Size

We get similar result to prior studies; size is positively related to leverage level. Firms with larger size are seen to have less information asymmetry and thus have higher debt capacity. In the downturn, interestingly, size starts to have significant positive influence on low leverage firms while becomes insignificant for high leverage firms. In general, low leverage firms have more spare debt capacity, and it can be inferred that the adverse selection cost becomes relatively dominant only in bad time.

6.3 Collateral

Proxied by PP&E, collateral is found positively related to leverage level, which is the same finding as Frank& Goyal (2007) did. For high leverage firms, PP&E is not significant except in good times. Debt ceiling is a reasonable explanation. Given the firms are highly levered; more collaterals do not affect the usage of debt. Besides, the decrease of expected bankruptcy cost might increase the debt capacity of high leverage firms, causing the collateral to become significant in expansion.

6.4 Convexity of taxation

As the firms have less deferred tax asset, or more deferred tax liability, the need to exploit tax benefit of debt increases. This factor has significantly negative influence on leverage level. However, when under worse macroeconomic condition, taxation drops the importance. The cost of bankruptcy can be a main rationale for the behavior. In the recession, bankruptcy risk increases, the tax benefit becomes less attractive to firms.

6.5 Growth opportunity

Indeed, market-to-book ratio is a controversial indicator since it could be interpreted as future investment opportunity or market misevaluation. Adam & Goyal (2008) prove the best proxy for growth option is MB ratio. Actually, even if there exist firm's timing of equity issue with advantage taking of market misevaluation, the impact of MB ratio on leverage level is also negative. It is found insignificant for low leverage firms in all sub-period samples. With less deadweight cost, leverage level of low leverage firms are rarely influenced by MB ratio. MB ratio can be thus proved as an efficient proxy for future investment opportunity simultaneously. Since there is no positive effect in any subsamples, the finding of growth option is relatively in favor of trade-off theory.

6.6 Median of industry level

For the full samples in different periods of time (full sample, subsample C and F), Median of industry level affects leverage level positively. Campello(2001) provides evidence of the interaction between business cycle and capital structure in both firm and industry level. He claims that leverage level affects the sensitivity of sales toward macroeconomic shocks. Because of competitive position in the industry, capital structure is influenced by that of industry level. Note that although this variable is also included in six other subsamples, it has not much to infer since low/high leverage

firms are ranked in their own industry.

6.7 Overall condition of market

The overall condition of product market demand and business profit, proxied by 1 year domestic non-financial business profits, is negatively related to leverage level for all the samples. Since both the pecking order and trade-off theories have self-offset impacts as above discussed, and the negative influence has different implications in the two theories, the indicator cannot be fully explained by either theory. Use of internal funds supports pecking order theory while use of equity financing is favor of trade-off theory.

6.8 Stock market return

Stock market return has insignificant influence on leverage level, but the story does not end here. The non-linearity test highlights the contrast impacts of stock market return. For sample B (low leverage firms, whole period of time), stock market return is positively related to leverage level while negatively related for subsample B (high leverage firms, whole period of time). The agency cost model established by Levy (2001) can explain this behavior. Lower leverage firm has higher agency cost between shareholders and manager because of lack of debt discipline. As the stock market goes up, the agency cost increases due to the value increase of stock and stock option owned by managers. The usage of debt can mitigate such agency problem. In contrast, higher leverage firms have lower agency cost between shareholders and managers. The stock market return has negative influence on leverage level. This could be the issue of equity in good time or debt pay down (note that some debts have restriction of new equity issue). To sum up, the agency cost can be a plausible reason for the contrast behavior of the different groups toward the trend of stock market.

6.9 Credit spread

Credit spread reflects the direct cost of debt. It is found significantly negative for all the subsamples except for high leverage firms in expansion. The solvency problem is less in good time; this could cause the drop of sensitivity of credit spread.

6.10 Cross-sectional effect

All the subsamples have zero for p-value in the fixed effect test. Some subsamples pass the Hausman test for random effect while others do not. In order to unify the regressions, the full sample and the eight subsamples are regressed included firm as cross-sectional fixed effect.

7. Conclusion

In this study we examine the effects of firm specific and macroeconomic variables on 960 frims' leverage ratios in New York Stock Exchange and NASDAQ markets between 1995 and 2010. The sample is divided on the basis of leverage level and business cycles.

We find that both firm specific and macroeconomic variables have same effects on full sample's debt ratio as previous researches found. Confirming the trade-off theory, firms with more investments have less market leverage. Profitability, convexity of taxation and market-to-book ratio all show significantly negative effects on leverage ratio while size and collateral have the negative influence. This supports the premise of Korajczk & Levy (2003) and Frank& Goyal (2007) findings. Besides, our result on the effects of overall economic condition shows significantly negative, which is consistent with the pecking order theory since firms would generate more retained earnings of firms when market goes up, resulting in preference in using internal funds for financing choices. Moreover, credit spread, a measure of cost of debt, shows significantly negative effect on leverage ratio. Stock market is found to

have highly non-linear patterns among low-leverage and high-leverage firms.

Our results on non-linearity leverage subsamples give us new aspects towards variables' effects on debt. Compared with low leverage firms, variables of high leverage firms show more sensitive and significant influence on leverage changes. The coefficients sign of high leverage firms keep the same as full sample expect the insignificant effect of collateral level. We suppose the high underlying bankrupt cost of high-debt firms would be one reason. As for low leverage firms, they tend to have more financial flexibility and thus leads to insignificance effects of firm specific variables. On the other hand, the impacts of stock market return become differently significant between two subsamples. Levy's (2001) agency cost model supports our finding, which stock market return to debt ratio is positively related for low leverage firms while negatively related for high leverage firms.

When we take business cycle into consideration, more differences can be found. In general, all variables included firm specific and macroeconomic variables show significant relationship to leverage in good time and variables of both high leverage and low leverage firms become less sensitive in bad times. For high leverage firms, PP&E is not significant except in good times. In booming economy, more collateral shows positive signal to market even under the high bankrupt cost, which allows more available debts. In addition, the tax benefit becomes less attractive to firms in the recession and thus increases the bankruptcy risk and decreases the debt capacity, according to trade-off theory.

Our results also contribute to raise a number of interesting issues that can be addressed in future work. As macroeconomic conditions have obvious influence on capital decision choices, and it would be interesting to study not only the influence on capital structure but deeper the extent of structure change, such as the issuance of equity or bond. Besides, this paper examines the sensitivities of determinants of capital structure, given the firms are highly or lowly levered. That is to say, we do not distinguish the high/low leverage firms' deviations from their so-called optimal leverage and leave it for the future studies.

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Appendix

Graph 1: Historical Macroeconomic Indicators

The three indicators are included in the regression as the macroeconomic variables.

All the values are annualized.
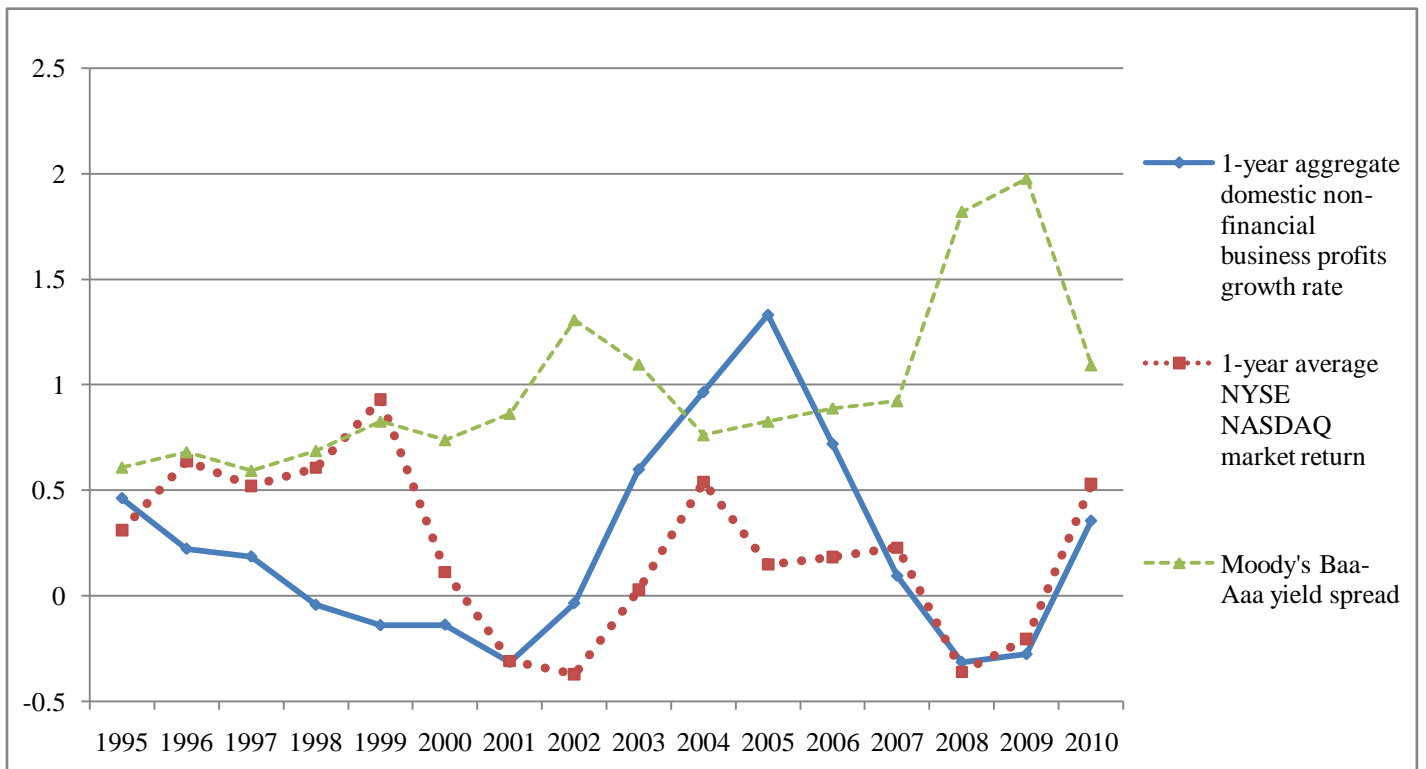
Table 1: Data Description: Leverage level of industry

Each leverage level is computed as average value during the specified span of time. 1st Q and 4th Q refer to ascending first quantile and last quantile, respectively. The number of firms is totaled 960, equal to the summation of number of firms of each industry.

Industry	1995-1998, 2003-2006			1995-2010			1999-2002, 2007-2010			Number of Firms
	1st Q	Median	4th Q	1st Q	Median	4th Q	1st Q	Median	4th Q	
Aerospace & Defense	0.081	0.231	0.415	0.061	0.219	0.426	0.040	0.206	0.441	19
Alternative Energy	0.003	0.100	0.713	0.007	0.108	0.534	0.011	0.115	0.354	4
Automobile & Parts	0.026	0.212	0.461	0.029	0.230	0.496	0.031	0.248	0.531	16
Beverage	0.107	0.283	0.536	0.102	0.272	0.543	0.098	0.260	0.550	7
Chemicals	0.054	0.252	0.435	0.061	0.257	0.437	0.068	0.262	0.440	43
Construction & Materials	0.056	0.220	0.387	0.054	0.232	0.402	0.052	0.244	0.415	36
Electricity	0.292	0.365	0.514	0.291	0.375	0.508	0.291	0.384	0.501	37
Electronic & Electrical Equipment	0.001	0.104	0.393	0.001	0.122	0.407	0.002	0.141	0.420	69
Fixed Line Telecommunication	0.223	0.416	0.795	0.248	0.441	0.808	0.273	0.467	0.821	6
Food & Drugs Retailers	0.043	0.204	0.484	0.048	0.210	0.487	0.052	0.217	0.490	15
Food Producers	0.026	0.221	0.449	0.029	0.238	0.465	0.032	0.254	0.481	31
Forestry & Paper	0.161	0.279	0.550	0.192	0.302	0.604	0.224	0.325	0.659	4
Gas, Water & Multiutilities	0.283	0.364	0.498	0.282	0.369	0.513	0.281	0.374	0.527	34
General Industries	0.129	0.287	0.537	0.146	0.299	0.545	0.162	0.310	0.552	21
General Retailers	0.008	0.174	0.367	0.010	0.179	0.378	0.013	0.184	0.390	43
Health Care Equipment & Service	0.007	0.150	0.442	0.009	0.173	0.510	0.011	0.196	0.578	43

Table 1 (continued)

Industry	1995-1998, 2003-2006			1995-2010			1999-2002, 2007-2010			Number of Firms
	1st Q	Median	4th Q	1st Q	Median	4th Q	1st Q	Median	4th Q	
Household Good & Home Construction	0.041	0.250	0.484	0.046	0.266	0.511	0.052	0.281	0.538	39
Industrial Engineering	0.054	0.214	0.428	0.065	0.231	0.444	0.076	0.248	0.459	55
Industrial Metals & Mining	0.018	0.183	0.460	0.021	0.186	0.463	0.024	0.188	0.467	16
Industrial Transportation	0.060	0.255	0.410	0.061	0.261	0.415	0.063	0.268	0.421	19
Leisure Goods	0.003	0.124	0.315	0.002	0.144	0.328	0.001	0.164	0.340	17
Media	0.078	0.267	0.822	0.093	0.276	0.822	0.108	0.285	0.821	25
Mining	0.048	0.227	0.403	0.048	0.232	0.431	0.048	0.237	0.459	6
Mobile Telecommunication	0.143	0.227	0.340	0.124	0.213	0.325	0.104	0.200	0.309	3
Oil & Gas Producers	0.008	0.236	0.490	0.010	0.226	0.507	0.013	0.215	0.524	40
Oil Equipment & Services	0.043	0.234	0.438	0.037	0.239	0.444	0.031	0.244	0.451	30
Personal Goods	0.042	0.163	0.459	0.034	0.166	0.482	0.027	0.169	0.504	29
Pharmaceutical & Biotechnology	0.003	0.112	0.510	0.002	0.132	0.588	0.001	0.151	0.665	40
Software & Computer Service	0.000	0.013	0.205	0.000	0.024	0.252	0.000	0.036	0.300	20
Support Services	0.005	0.119	0.391	0.005	0.135	0.396	0.006	0.152	0.401	45
Technology Hardware & Equipment	0.000	0.062	0.295	0.000	0.060	0.304	0.000	0.059	0.314	95
Tobacco	0.244	0.430	0.520	0.240	0.385	0.485	0.236	0.340	0.451	4
Travel and Leisure	0.066	0.290	0.633	0.078	0.316	0.663	0.089	0.343	0.692	45

Table 2: Model of Leverage

The table presents the coefficients and t-statistics (in parentheses) of the full sample and eight subsamples. The three panels are classified as three frames of time. Coefficients with significance at 5% and 10% level of confidence are marked with ** and *, respectively. Details of abbreviations of variables are below the table 4. All the regressions include firm as cross-sectional fixed effect.

Panel A: 1995-2010

Explanatory Variable	Low Leverage Firms Subsample A	All Firms Full Sample	High Leverage Firms Subsample B
1YADNFBP	-0.044 **	-0.058 **	-0.062 **
	(-7.262)	(-10.963)	(-4.914)
1YSMR	0.017 **	0.005	-0.019 *
	(3.190)	(1.125)	(-1.729)
Baa-Aaa	-0.014 **	-0.025 **	-0.037 **
	(-3.505)	(-7.230)	(-4.462)
Total Asset	0.003	0.015 **	0.031 **
	(1.482)	(7.948)	(6.691)
PROFIT Margin	-7.75E-05	-8.90E-05 **	0.002
	(-0.239)	(-3.562)	(1.603)
PP&E	0.174 **	0.084 **	0.038
	(9.678)	(5.749)	(1.265)
DFTAX	-0.033	-0.207 **	-0.304 **
	(-0.753)	(-6.289)	(-3.707)
Market to Book	-0.001	-0.004 **	-0.025 **
	(-1.075)	(-8.807)	(-11.459)
INDMED	0.200 **	0.579 **	0.821 **
	(6.189)	(20.653)	(12.195)

Table 2 (Continued)

Panel B: 1995-1998, 2003-2006

Explanatory Variable	Low Leverage Firms Subsample D	All Firms Subsample C	High Leverage Firms Subsample E
1YADNFBP	-0.040 **	-0.065 **	-0.071 **
	(-2.939)	(-5.766)	(-2.859)
1YSMR	0.0162	0.033 *	0.0143
	(0.779)	(1.918)	(0.374)
Baa-Aaa	-0.0817 **	-0.077 **	-0.038
	(-4.730)	(-5.362)	(-1.214)
Total Asset	0.001	0.0267 **	0.054 **
	(0.309)	(8.693)	(8.248)
PROFIT Margin	-8.69E-06	-0.002 **	-0.001
	(-0.023)	(-15.967)	(-0.734)
PP&E	0.229 **	0.080 **	0.086 **
	(8.905)	(4.022)	(2.324)
DFTAX	-0.127 **	-0.377 **	-0.317 **
	(-1.977)	(-7.671)	(-2.771)
Market to Book	-0.000	-0.008 **	-0.024 **
	(-0.224)	(-8.757)	(-8.187)
INDMED	0.310 **	0.569 **	0.798 **
	(5.978)	(13.339)	(8.422)

Table 2 (Continued)

Panel C: 1999-2002, 2007-2010

Explanatory Variable	Low Leverage Firms	All Firms	High Leverage Firms
	Subsample G	Subsample F	Subsample H
1YADNFBP	-0.027 **	-0.042 **	-0.073 **
	(-2.9157)	(-4.944)	(-3.258)
1YSMR	0.0077	-0.004	-0.023
	(1.0867)	(-0.663)	(-1.370)
Baa-Aaa	-0.0107 **	-0.012 **	-0.020 *
	(-2.4237)	(-2.874)	(-1.878)
Total Asset	0.014 **	0.005 *	-0.006
	(3.964)	(1.688)	(-0.690)
PROFIT Margin	-0.001	-1.95E-05	0.004
	(-0.371)	(-0.749)	(0.980)
PP&E	0.111	0.044 *	-0.071
	(4.191)	(1.903)	(-1.304)
DFTAX	0.031	-0.054	-0.093
	(0.498)	(-1.149)	(-0.739)
Market to Book	-0.000	-0.002 **	-0.033 **
	(-0.670)	(-4.878)	(-8.316)
INDMED	0.204 **	0.566**	0.809 **
	(4.454)	(13.234)	(7.401)

Table 3: Test of Fixed Effect of Panel Data

The figure is the result of fixed effect of the full sample. The eight subsamples all have zero for p-value.

Full sample	Statistic	d.f.	Prob
Cross-section F	17.432	-959.144	0.000
Cross-section Chi-square	11839.030	959	0.000

Table 4: Cross Correlations of Variables

The table is cross correlation test of the nine variables included in the regression.

	1YADNFBP	1YSMR	Baa-Aaa	TA	PROFIT	PP&E	DFTAX	MB	INDMED
1YADNFBP	1.000								
1YSMR	0.354	1.000							
Baa-Aaa	-0.281	-0.250	1.000						
TA	0.025	-0.092	0.195	1.000					
PROFIT	-0.004	0.013	-0.008	0.024	1.000				
PP&E	-0.008	0.031	-0.054	0.189	0.015	1.000			
DFTAX	-0.010	0.001	-0.050	0.263	0.007	0.428	1.000		
MB	-0.008	-0.016	-0.042	-0.187	-0.016	-0.121	-0.071	1.000	
INDMED	-0.033	-0.040	0.035	0.258	0.014	0.494	0.352	-0.146	1.000

List of Abbreviations:

1YADNFBP : One-year aggregate domestic non-financial business profits growth rate.

1YSMR : One-year stock market return, computed as average return of NYSE and NASDAQ index

Baa-Aaa : Annualized yield spread of Baa and Aaa bond of Moody's.

TA : Logarithm of total asset.

Profit : Profit margin.

DFTAX : Net deferred tax assets.

MB : Market-to-book ratio

INDMED : Median leverage level of industry.