II. Literature Review

Beginning from Modigliani and Miller (1958)'s irrelevance proposition, capital structure puzzle has drawn a lot of attention. How do firms choose their capital structure? Do firms have target leverage? What are the determinants of firm capital structure decisions? Numerous researches study in these questions, however, until now, the results are still ambiguous. Static trade-off, pecking order and market timing are three capital structure hypotheses used most frequently. In this subsection, we describe the context of each hypothesis and the relative literatures.

2.1 Static Trade-off Theory

Under static trade-off theory, managers are believed to seek optimal capital structure, which could maximize firm value. This optimal leverage is determined by the balance of the benefits and costs of debts[1]. As shown in Figure 1, at the optimal leverage, the benefit of the last dollar of debt just offsets the cost. Random events would bump them away from it, but managers would manage to let them gradually move back toward it (holding firms' assets and investment plans constant). Therefore, if the optimal leverage is stable, we would see mean-reverting behavior.

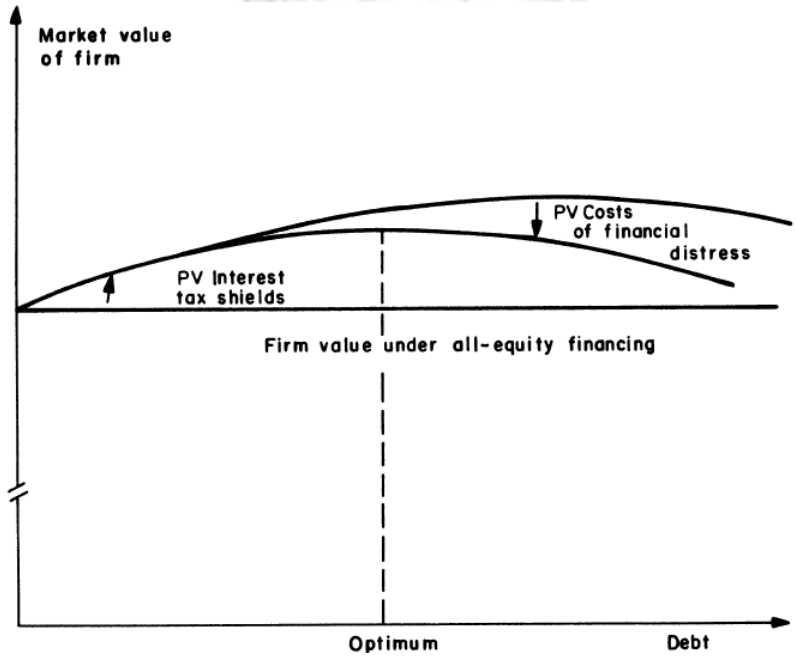

Figure 1. The optimal capital structure

[1] The benefits of debt include, for example, the tax deductibility of interest and the reduction of free cash flow problems. The costs of debt include potential bankruptcy costs and agency conflicts between stockholders and bondholders.

Myers (1984) shows that adjustment costs, debt and taxes, and costs of financial distress are three important factors which would influence firm financial behavior under static trade-off theory. First, if there were no adjustment cost, firms' observed leverage should be their target one. However, there must be some costs, and therefore, firms will not immediately adjust toward their optimum when they are away from it. Second, given significant differences in effective marginal tax rates, we would expect to find a strong tax effect in any cross-sectional test. Finally, according to the costs of financial distress, risky firms ought to borrow less and firms hold tangible assets-in-place having active second-hand markets will borrow less. The simple form of target adjustment model is:

$$\Delta D_{i,t} = a + b_{TA}\left(D^{*}_{i,t} - D_{i,t-1}\right) + e_{i,t}$$

where $\Delta D_{i,t}$ is the change of leverage ratio for firm i at time t, and $D^{*}_{i,t}$ is the target debt level for firm i at time t. Under static trade-off theory, we expect $b_{TA}>0$ which indicates firms do adjust toward the target, but also $b_{TA}<1$ which implies positive adjustment cost. What might bother us is that the target leverage is unobservable. Therefore, some firm characteristics related to the costs and benefits of debt are used to estimate it.

Jalilvand and Harris (1984) allow for adjustment coefficients to vary by firms and related them to the costs and benefits of deviation from targets. In a survey of CFOs, Graham and Harvey (2001) report that 37% of their respondents have a flexible target, 34% have a somewhat tight target or range and 10% have a strict target. Gaud et al. (2005) analyze 104 Swiss firms for the period 1991-2000, and find that there exists a target debt-equity ratio in Swiss firms, but the adjustment process is very slow.

Besides for static trade-off model, recent empirical studies are focus on the dynamic adjustment model. Fischer et al. (1989) develop a dynamic, inventory-adjustment model of capital structure. Leary and Roberts (2005) use a first-order, continuous time autoregressive specification to examine dynamic partial adjustment model, and the result support the assumption of a continuous adjustment process. He also shows that the adjustment speed varies dramatically across industries, and this implies the adjustment costs vary significantly.

Many papers have reported the adjustment processes in different countries. We summarize their results in Table 1.

Table 1. Previous Empirical Results of Adjustment Speed

By	Country	Adjustment speed
Shyam-Sunder and Myers (1999)	USA	41%
Miguel and Pindado (2001)	Spain	21%
Ozkan (2001)	UK	43%
Gaud et al. (2005)	Switzerland	27%
Flanney and Rangan (2006)	USA	About 30%

2.2 Pecking Order Theory

The pecking order theory is basically concerned about how information asymmetry affects firm's investment and financing decisions. Since managers have more information than outside investors, and they are supposed to stand on the "existing" investors' side, "new" outside investors would ask price discount when firms issue securities, and this will make external financing more expensive. Thus, when firms require new fund, they will use internal finance first, then safe securities, and take equity as a last resort. Here "safe" means "not affected by revelation of managers' inside information". In practice, this may refers to investment-grade debt, or hybrid securities. As a result, variation in a firm's leverage is driven not by the tradeoff model's costs and benefits of debt, but rather by the firm's net cash flows (cash earnings minus investment outlays).

Pecking order phenomenon is first found by Donaldson (1961). He studies a sample of large American firms and observes that "Management strongly favored internal generation as a source of new funds even to the exclusion of external funds except for occasional unavoidable 'bulges' in the need for funds.[2]" And Myers and Majluf (1984) further point out that this financing behavior is stemmed from information asymmetry. Their analysis find two key points in this theory, one is the cost of relying on external financing[3], and the other is the advantage of debt over equity issues. The simple pecking order hypothesis is tested by:

$$\Delta D_{i,t} = a + b_{po} DEF_{i,t} + e_{i,t}$$

[2] Brealey and Myers find that for all non-financial firms over the decade 1973-1982, internally generated cash covered, on average, 62% of capital expenditure, including investment in inventory and other current assets. The bulk of required external financing came from borrowing. Net new stock issues were never more than 6% of external financing.

[3] Myers and Majluf (1984) figure out that the cost of relying on external financing includes administrative and underwriting costs, underpricing of new securities and the possibility that the firm will choose not to issue, and will therefore pass up a positive-NPV investment. The last cost will be avoided if firms can retain enough internally-generated cash to cover its positive-NPV opportunities.

where $DEF_{i,t}$ is financial distress, defined as the sum of cash divides, investment expenditure, the change of working capital and minus internal cash flow, b_{po} is the pecking order coefficient. And we expect a=0 and b_{po}=1. If we can find that firms are heavily rely on internal finance and debt, firms clearly follow the pecking order.

Pecking Order Theory vs. Static Trade-off Theory

Since there are two kinds of equity, internal and external, one at the top of the pecking and one at the bottom, there is no well-defined target leverage in pecking order theory. Each firm's observed leverage reflects its cumulative requirements for external finance.

Shyam-Sunder and Myers (1999) test static trade-off theory against pecking order models by using 157 American firms from 1971 to 1989. The pecking order is an excellent first-order descriptor of firm financing behavior for their sample, but the simple target adjustment model also seems to perform well. They also test two models jointly, and the results suggest greater confidence in the pecking order than in the target adjustment model. Chirinko and Singha (2000) question the interpretation of Shyam-Sunder and Myers (1999) regression test. They point out that if contrary to the pecking order, firms follow a policy of using debt and equity in fixed proportions, then Shyam-Sunder and Myers regression will identify this ratio. As a result, finding a pecking order coefficient near one would not disprove the trade-off theory. Fama and French (2002) test the pecking order and trade-off model. They find that profitable firms are less levered (confirming the pecking order), firms with more investment have less market leverage (confirming trade-off), and short-term variation in investment and earnings is mostly absorbed by debt (confirming the pecking order). Frank and Goyal (2003) also examine a number of implications of the pecking order in the context of Shyam-Sunder and Myers (1999) regression tests. A broader sample of publicly traded American firms for 1971 to 1998 is used. They claim that if the pecking order theory is correct, financing deficit ought to wipe out the effects of other variables. Otherwise, the financing deficit is simply one factor among many firms tradeoff, then is left as a generalized version of the trade-off theory. And they find that financing deficit does not wipe out the effects of conventional variables. Gaud et al. (2005) find that both the pecking order and trade-off theories are at work in explaining the capital structure of Swiss firms.

2.3 Market Timing Theory

It is also well known that firms are apparently try to issue stock issues when stock price are high, and repurchase stock when their market value are low. The critical assumption is simply that managers believe that they can time the market and they really try to do it.

In Marsh's study (1982), British firms' choices to issue new debt and new equity can be explained by past stock price movement. In Graham and Harvey (2001)'s survey, CFOs admit that they try to time the equity market, and two-third of those that have considered issuing common stock report that "the amount by which our stock is undervalued or overvalued" was an important consideration. More recently, Baker and Wurgler (2002) find that capital structure is the cumulative outcome of past attempts to time the equity market. Welch (2004) also finds that equity price shocks have a lasting effect on corporate capital structure as well. If firms tend to issue equity following increases in their stock prices and repurchase shares following stock price declines, which is the opposite of what one might expect if firms tended to rebalance their capital structures towards a target.

Market Timing Theory vs. Static Trade-off Theory

In market timing theory, capital structure evolves as the cumulative outcome of past attempts to time the equity market. This fact is embarrassing both to static trade-off and pecking order theories. According to static trade-off theory, when firm value rises, its leverage ratio falls, and the firm ought to issue debt to rebalance, not issue stocks. And under pecking order theory, there is no reason to believe that manager's information is systematically more favorable when stock prices are high. Moreover, there doesn't exist optimal leverage in market timing theory.

Baker and Wurgler (2002) examine the market timing theory versus static trade-off theory. Their idea is that since the trade-off theory with adjustment costs allows capital structure to respond slowly to market-to-book ratio at time t, the past and temporary fluctuations capture in weighted average market-to-book ratio (***EFWA***)[4] at time t should no longer matter. In other words, we should observe that the coefficient of ***EFWA*** variable is zero. If not, we would document that historical market valuations have large and very persistent effects on capital structure. According to Baker and Wurgler (2002), fluctuations in market valuations have large effects on capital structure that persist for at least a decade, and historically high market valuations are associated with lower leverage in the cross section.

[4] External weighted finance average market-to-book ratio is used by Baker and Wurgler (2002) to measure the market timing opportunities perceived by managers. We will show the formula in next section.