Capital Structure Choice and the New High-Tech Firm

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Abstract

This paper examines the capital structure choices of high tech firms in the last decade and how these choices relate to current capital structure theory. This theory includes the Static Trade Off Theory and the Pecking Order Theory; the former holds that firms make funding choices as a function of the firm’s overall weighted average cost of capital and seek primarily to minimize this cost of capital; the latter suggests that managers are loath to issue new equity, derive funds first from internal sources such as earnings, second from debt and finally from equity and equity-type issues. We find that high tech firms in the 1990s support, in some ways, the Static Trade Off suggestion that firms with strong and riskier growth options hold more cash that other firms and are more likely to draw initial funding from the equity markets. We find also that the market conditions of the 1990s allowed newer, smaller and riskier firms greater access to equity markets than ever before as a means of building large cash reserves. To account for this, we propose an extension of existing Pecking Order Theory and introduce a “Pecking Order Scale”. By viewing the key factors that influence capital structure choice as a continuum or scale from all equity on the left to all debt on the right, we are able to portray the capital structure choice of the firm based on individual firm, industry and overall market factors.

Introduction

The financial manager of a firm has three primary responsibilities: The capital budgeting decisions (where to invest), the capital structure decisions (where to get the money), and the working capital decisions (managing the day to day cash flow of the business). This paper is concerned primarily with capital structure decisions, but recognizes that these three responsibilities frequently impact one-another. We recognize that the budgeting decisions often compromise the capital structure choices; similarly, the history of a firm’s working capital decisions impacts costs of capital, capital structure selection and capital budgeting options. Acknowledging these relationships in this study, we consider the nuances of the capital structure choices for new high tech firms.

This paper examines the capital structure choices of high tech firms in the last decade and how these choices do and do not support extant theories of capital structure. Section 1 provides a definition of capital structure and a brief summary of the prevailing theories. In Section 2, high technology firms are discussed and their financing choices during the last decade are examined. Section 3 considers forces that impact capital structure decisions and links these forces to the capital budgeting decision. In Section 4, we propose an extension of the Pecking Order Theory and introduce the concept of a “Pecking Order Scale.” The paper closes with a summary and encouragement for subsequent research.

Section 1

The capital structure decisions of a firm are reflected in the long-term debt and equity accounts on the right side of the balance sheet. Whether the firm should issue debt (borrow) or equity (sell stock) has long been the subject of debate. There currently are two prevailing theories concerning this mix of long-term debt and equity. These are the Static Trade Off Theory and the Pecking Order Theory. Simply stated, Static Trade Off asserts that there is an optimum mix of debt and equity that minimizes the firm’s overall...
costs of capital; the theory addresses the trade off between the tax shield benefits of debt and debt’s expected costs of financial distress and bankruptcy. This theory is traced to the work of Franco Modigliani and Merton Miller (M & M, 1958, 1963), with successive relaxations and empirical applications of the original author’s assumptions in subsequent work. The Pecking Order Theory holds that financial managers follow a set pattern or pecking order in financing. That order is internally generated funds (operating cash flows) first, debt second and equity last. The Pecking Order Theory is supported by Stewart Myers (1984) based upon his analysis of a comprehensive survey by Gordon Donaldson (1961) of how corporations actually structured their financing. This work is extended by Myers and Majluf (1984), and many others since.

Since the mid 1980s, there has been a rich series of papers lending support to one theory or the other (see, for example, Jensen, 1986, Stulz, 1988, Ghosh and Cai, 1999, Opler et. al., 1999, Fama & French 1999). The purpose of this paper is not to review all the previous literature. However, it is important to recognize that most authors addressed only one topic or another within the capital structure realm as they examined the empirical evidence. Examples of such topics are the elimination of taxes (M&M, 1963), risk (Kim, 1978), agency costs (Miller, 1977 and Jensen, 1986) and information asymmetries (Ross, 1977). Additionally, most literature refers only to public firms that have been in business for a number of years, with little specific consideration of newer firms. (A wealth of capital structure literature is reviewed by Harris and Raviv, 1991).

Section 2

High Technology firms, for purposes of this paper, include firms in the computer, software, internet-related, bio-technology, fuel-cell technology and telecommunications businesses. There was an unprecedented flow of venture capital to these firms over the last ten years. The general public jumped on board in a fever pitch and the high-tech companies pumped out initial public offerings, seasoned issues and tracking stocks at a record pace; convertible debentures, according to Lacy (1999) often followed these stock offerings. Much of this activity appeared to be contrary to the Pecking Order Theory, as successive stock issues regularly preceded any borrowing. The activity is contrary also to Jenson’s (1986) Pecking Order supportive theory of Free Cash Flow, where shareholder wealth is sacrificed with funds provisions to managers with no clear positive-valued investment options available. Recent patterns counter, as well, Asquith and Mullins (1986), who find negative stock price reactions to issuance of secondary issues; positive market responses to all these recent security issues did not jibe with existing theory. This activity did not directly support the Pecking Order Theory, but neither did firm behavior and market responses appear to fully support the Static Trade Off Theory; many of the more mature technology firms, such as IBM and Microsoft, accumulated costly cash, despite shareholder aversion to this practice. Actually, the use of accumulated cash to finance projects and acquisitions lends some support to the Pecking Order Theory, while the use of equity-financing by many less “mature” firms runs counter to the theory.

Since the financing activity of high technology firms provides unequivocal support to neither the Static Trade Off nor the Pecking Order theories, some people might argue that it supports the work of Miller (1977). He states that while there may be a macroeconomic optimal capital structure, structure at the micro-level or firm level is irrelevant. However, we believe that other forces are at work here. One of the most obvious is the unusually optimistic and exuberant nature of the stock market, especially in the second half of the 1990s, culminating in the incredible valuations of many technology firms in 1999. However, even before the “bubble” of the late 1990s, Balakrishnan and Fox (1993) found that specific factors related to the firm itself, such as research and development, growth opportunities, risk, advertising and promotion and depreciation, account for over 52% of the variance in capital structure of firms from the industry norm.

The two theories of capital structure, Pecking Order and Static Trade Off, have appeal in describing capital structure choice in environments ruled by the desires of management and the minimization of capital costs, respectively. A conflict develops when management is seeking to maximize shareholder wealth on the one hand, and is trying to maintain control and ensure longevity of employment, on the other. We believe that two ideas can be helpful in resolving the conflicts between the capital structure theories. The first is that the broader the theory, the broader its applicability. The second idea ties in with the first, and is that capital structure theory is better studied in conjunction with investment theory as budgeting and funding choices are usually linked in actual corporate decisions.
In an ideal world, the first idea holds that capital structure theory should help to describe capital structure choice for businesses in most market conditions. Ideally, it should not be prisoner to a set of unrealistic assumptions, such as those concerned with tax, agency cost or financial distress issues. It should include the start up capital structure decision, because the factors influencing the capital structure decisions when starting a business are essentially the same as the factors influencing a project decision. These are factors such as the nature, size and scope of the planned project (or company) and the availability of internal funds, including the financial support of family and friends in a new business.

The second idea is that capital structure theory should be considered alongside capital budgeting theory. The marriage of capital structure and investment choice has intuitive appeal independent of the claims of seminal works in capital structure theory. The capital structure choice is often considered concurrently with the investment decision. Certainly, there are times when capital structure decisions are made independently of a specific project, but capital budgeting choices generally entail capital structure deliberation.

Section 3

To facilitate discussion, we consider the factors influencing capital structure choice as it relates to three general areas: The market, the industry and the firm.

Market factors include those issues that influence the market as a whole, and all industries and all firms to some degree. These include most macroeconomic factors, such as government controls, state of the economy, employment, and so forth. They also include such things as the availability of venture capital and the attitudes of the market concerning secondary stock offerings, as well as attitudes about certain industries and certain firms. In the 1990s, for example, equity financing was abundant to the degree that firms like CMGI sprang up with the sole business purpose of developing technology startups to the point of IPO. CMGI reached a market capitalization in 1999 of over $50 billion. In 2000, the equity market dried up and exuberance turned to fear. CMGI was forced to withdraw its planned IPOs of Alta Vista and other companies. By year-end, CMGI’s market cap had dropped to under $2 billion. Did the industry and the firms within it change, or were there simply market forces at work?

Industry factors are those issues that affect specific industries and the firms within them. Is the industry new, such as Internet or biotech, or mature and established, such as steel and energy? Is the industry growing, stable or declining? Is it capital intensive? Are there barriers to entry? Is the level of risk moderate or high? As has been illustrated, the love affair of the market with high technology in the 1990s went sour in 2000 and that had a huge impact on the entire industry. At the same time, a lot of money fleeing technology stocks rediscovered the “old economy” firms and gave them a needed boost.

Finally, individual firm factors are those issues that are firm specific. Individual firm factors are influenced by both market forces and industry forces. The three most critical factors at the firm level are risk, size and scope of the business plan and the need for speed. New high tech companies are high-risk enterprises in a high-risk industry. Even mature firms such as IBM, Microsoft and Intel face the huge risk of remaining on the cutting edge of technology or getting left behind. Perhaps this is why these firms hold huge hoards of cash. This risk factor is increased by the nature of business today that essentially forces high tech companies to be large enough (size) to compete globally (scope). Finally, in technology, speed is of the essence. Technology is changing so fast that companies must get to market very quickly. High tech firms do not conduct test markets, start small, and then allow revenues to fund growth. They are not afforded that luxury.

We propose an extension of existing Pecking Order Theory in the next section to describe capital structure choice for these new high tech firms. We consider market, industry and firm forces and the manner with which these forces help to describe this new theoretical framework.

Section 4

Based on observations of new high tech firms in the 1990s, we postulate that a modified Pecking Order Theory applies in many cases. High tech firms seem to prefer equity first and debt, and even internal funding, last. But we also believe that the current Pecking Order Theory does accurately apply to many other companies. For example, Shyam-Sunder and Myers (1999) propose an extension of the Pecking Order Theory to explain that changes in debt ratios are driven by the need for external funds and not by an
optimal capital structure. In their paper, they suggest “a broader pecking order hypothesis would accommodate some equity issues.”

To reach that broader pecking order hypothesis, we propose that Pecking Order should be viewed as a scale or a continuum, with current theory simply called “Debt Preference”, and this new pecking order, as demonstrated by new high tech firms, called “Equity Preference”. The market factors, the industry factors and the firm factors that influence the capital structure choice can be located on this scale and the firm itself can then be plotted. With such a scale, Pecking Order Theory can be used to determine the capital structure preference position of firms based upon the nuances of the firm, its industry and the market. The following illustrates such a scale graphically:

**Proposed Pecking Order Scale**

Equity First               Debt First
Debt last              Equity Last

“The far left of this scale is what we call “Equity Preference”, and is represented by the high tech firms, while the far right represents the current Pecking Order, which we now call “Debt Preference”, and is represented by the “old economy” firms. A firm’s placement on this scale is dictated by the three forces stated earlier, market conditions, industry forces and the state of the firm itself. An examination of each is helpful in understanding the concept of the Pecking Order Scale.

We held earlier that capital structure is influenced by a number of factors; among these are market forces. Following is our proposed scale with a few examples of market forces as they impact the choice of equity versus debt:

**Proposed Pecking Order Scale: Market Factors**

Equity First               Debt First
Debt last              Equity Last

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Interest Rates</td>
<td>Low Interest Rates</td>
</tr>
<tr>
<td>Scarce Financial Resources</td>
<td>Capital very available</td>
</tr>
<tr>
<td>High stock prices</td>
<td>Low stock prices</td>
</tr>
</tbody>
</table>

“Equity preference” remains at the far left and “debt preference” remains at the far right of the scale. Market forces that tend to influence capital structure choice toward equity are listed to the left, while forces that tend toward debt preference are listed on the right. The economic conditions of the 1990s certainly seemed to favor equity financing. Equity values, for example were at relatively high historic levels. Of course, individual industries and individual firms may vary considerably from this model, as industry and firm-specific factors can carry more weight than the market forces (see Balakrishnan and Fox, 1993). Additionally, it is expected that market factors in the US often lie within the middle area of the scale, since fiscal and monetary policies purportedly avoid extremes. In other countries absent US policies favoring this “balance,” market factors may play a different role.

Industry forces are important as capital structure is influenced by industry factors such as the relative age of the industry and whether the industry is growing, stable or declining. Risk levels associated with the
industry, its capital intensity, its barriers to entry and how it is perceived and treated by the capital market are also key to portraying capital structure patterns within the industry. The degree of regulation and competition (see Filbeck and Gorman, 1999) also influence debt use. For example, regulated industries use relatively high levels of debt given their government “guarantees.” The following scale portrays industry factors as they influence capital structure choice:

**Proposed Pecking Order Scale: Industry Factors**

<table>
<thead>
<tr>
<th>Equity First</th>
<th>Debt First</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Equity Preference”</td>
<td>“Debt Preference”</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Industry</td>
<td>Mature Industry</td>
</tr>
<tr>
<td>Growing</td>
<td>Declining</td>
</tr>
<tr>
<td>High Risk</td>
<td>Low Risk</td>
</tr>
</tbody>
</table>

Industries on the far left of this modified Pecking Order Scale are the new, cutting edge technologies mentioned earlier. Entry into these industries requires large amounts of capital and is high risk. These industries usually require equity and therefore are placed at the far left.

Industries on the far right are the so-called “old economy” industries such as steel, food and autos. Utilities are likely located farthest to the right. These industries are mature and relatively low risk. Niches can be carved out, if there are low or no entry barriers, and speed, while not unimportant, is not of the essence.

Industries in the middle would have characteristics that are “moderate”. Examples would be pharmaceuticals, cosmetics, retailing and entertainment. Additionally, this middle area includes industries in transition. An example would be telecommunications, which moved from the far right of being considered a utility, toward the left as technology became critical. Other industries in transition would include defense firms, in a once vibrant but now declining industry moving from the left toward the right.

Finally, the characteristics of individual firms can be placed on the proposed Pecking Order Scale. The most critical factors at the firm level that influence capital structure choice are risk, size and scope of the enterprise and the need for speed. There are other important factors, such as the availability of internal funds and the perception of the marketplace, i.e. debt rating, concerning the specific firm (see Cleary 1999). Following is our proposed scale with examples of company forces as they impact the choice of equity versus debt:

**Proposed Pecking Order Scale: Company Factors**

<table>
<thead>
<tr>
<th>Equity First</th>
<th>Debt First</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Equity Preference”</td>
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<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Company</td>
<td>Existing Company</td>
</tr>
<tr>
<td>Large Scale vs. available capital</td>
<td>Capital very available</td>
</tr>
<tr>
<td>High Risk</td>
<td>Low Risk</td>
</tr>
<tr>
<td>Speed is critical</td>
<td>Time is not critical</td>
</tr>
</tbody>
</table>
Firms on the left are those that demonstrate the characteristics of the new high tech firm. For example, one could choose any of the hundreds of “dot.com” companies of the 1990s. Additionally, the far left will usually include virtually all start up companies, regardless of the industry.

Firms in the far right are typically the so-called “old economy” stocks. However, as noted earlier, there are mature and profitable high tech firms like IBM who would fall toward the right, even though the industry itself falls to the left.

Firms in the middle generally face moderate risk, have some maturity and are usually profitable. This would include the established firms in the industries such as retailing and pharmaceuticals that would fall into the moderate industry category. Additionally, firms in transition fall into the middle range. They might be firms moving from their entrepreneurial, start-up phase toward a mature phase. Or, they might be moving in the other direction, as has much of the telecommunications industry. Firms in transition support Shyam-Sunder and Myers’ (1999) “time series hypothesis.”

When all the elements are put together, the proposed Pecking Order Scale includes many of the factors that influence the capital structure choice. These include the market factors, the industry factors and the individual firm factors. The following illustration shows these operating in tandem.

**Proposed Pecking Order Scale**

![Proposed Pecking Order Scale](image)

- **Characteristics**
  - Market
    - Growing
    - Positive business environment
  - Industry
    - Growing
    - Higher Risk
  - Company
    - New Firm
    - High Risk
    - Speed is critical

- **Characteristics**
  - Market
    - Stagnant
    - Neutral environment
  - Industry
    - Stable/Declining
    - Lower Risk
  - Company
    - Mature Firm
    - Low Risk
    - Time is not critical

It should be recognized that, as with any continuum, most characteristics and therefore most firms, fall somewhere between the “end points.” Even so, the capital structure choices of new high tech firms, especially during the 1990s, tend to fall on the equity side while the “old economy” firms continue to confirm the debt preference of Pecking Order Theory.

**Conclusion**

We examine the capital structure choices of high tech firms in the 1990s and how these choices do and do not support the relevant theories of capital structure. These theories are the Static Trade Off Theory and the Pecking Order Theory. We briefly examine the literature that has evolved which tends to support one theory or the other.

We find that capital structure choices among high tech firms in the 1990s support, in some ways, the Static Trade Off conclusions of Opler, et. al. (1999). We also find that the market conditions of the 1990s allowed newer, smaller and riskier firms greater access to equity markets than ever before as a means of building large cash reserves.

Although we find that the capital structure choices of new high tech firms support some elements of Static Trade Off Theory, our study leads us to support also the ideas of Shyam-Sunder and Myers (1999) whose modified Pecking Order Theory accommodates some equity issues. This is despite the reliance of
the Pecking Order hypothesis upon management’s virtually unswerving reliance on internally generated funds and debt. With this in mind, we propose an extension of Pecking Order Theory and introduce a “Pecking Order Scale” that allows for the multitude of high-tech equity issues observed over the last decade. We view the key factors that influence capital structure choice as a continuum from all equity at one extreme to all debt at the other.

We believe that the idea of a Pecking Order Scale is a new concept that might help resolve some of the issues surrounding capital structure theory. This examination of the new high tech firm is a cursory overview, and we encourage additional work, particularly in the following areas:

1. A more complete analysis of capital structure choice in new high tech firms, with a consideration of the empirical evidence.
2. The development of a more comprehensive list of the factors that influence capital structure choice, and whether all factors can be applied to a Pecking Order Scale.
3. The development of mathematical models for each factor with an eye to developing the new Pecking Order Scale into an empirical model.

References


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