

WHEN DO SLACK RESOURCES IMPACT NEW VENTURE SUCCESS?

By

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A dissertation submitted in partial fulfillment of  
the requirements for the degree of

DOCTOR OF PHILOSOPHY

WASHINGTON STATE UNIVERSITY  
College of Business

MAY 2009

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## ACKNOWLEDGEMENTS

I am grateful to Dr. Richard Reed for providing generous support and guidance throughout my PhD program and more specifically for guidance in this dissertation. I appreciate his advising and encouragement in this endeavor. Not only has he devoted time and energy to supervise my work, but also taught me to think critically. He continuously provided me with valuable input and the necessary feedback for my work to be thorough. I have the utmost respect for his integrity, professionalism, intellect, and work ethic.

I am also grateful to my committee members: Dr. Jonathan Arthurs has helped make my early career in academia what it is. He has allowed me valuable opportunities to work and learn from him. Jonathan has also been a mentor, friend, teacher and colleague to me in a very generous way. I am very grateful to his endless support, patience, and guidance.

Dr. Min-Chiang Wang also has been instrumental in my academic career. Min-Chiang spent time with me discussing statistical questions and issues. His kindness and helpfulness have guided my studies and challenged me in a positive way.

I could have never asked for a better gift than to have the privilege to have worked with and been influenced by Richard Reed, Jonathan Arthurs, and Min-Chiang Wang. I thank for serving on my dissertation committee.

Special thanks for the faculty, staff, and graduate students of the Department of Management and Operations at Washington State University for their endless support, friendship, and thoughtfulness.

Last but not least, I would like to extend my appreciation for Dr. Craig Parks from the Department of Psychology at Washington State University for always answering any questions that I had with utmost enthusiasm and clarity throughout my PhD.

To all, I will always remember and appreciate your support.

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May 2009

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## Abstract

A significant body of research exists on organizational slack in large publicly traded firms. Little work exists on the value of slack resources for younger firms. Using a unique sample of high-tech, initial public offerings (IPOs), this dissertation examines how slack resources affect the short- and long-term success of these firms. Financial and non-financial data are collected from IPO prospectuses.

I argue and test the relationship using partial hierarchical regression analysis that firms that possess financial, innovational, and managerial slack resources provide a signal to potential investors regarding the quality of the IPO. The results provide evidence that slack resources increase IPO value and percent premium paid. I also estimate the semiparametric Cox Proportional Hazards model to test whether slack resources significantly impact the probability of post-IPO survival. I find that the probability of post-IPO survival increases with pre-IPO working capital and R&D-investment slack.

For practitioners, the most important implication is that certain types of slack resources are essential for the success of startup firms. Some key findings include: a strong financial position and sufficient managerial talent and expertise at the time of the IPO were found to be vital for achieving high valuation. While, for the long run, leading one's industry in investments in research and development (R&D) is essential to the survival of post-IPO firms.

For research, the most important findings are IPO firm-specific slack resources may act as a signal of quality, different forms of slack resources (financial, innovational, and managerial) are vital to short- and long-term success, investors place considerable value on slack resources, and a deeper understanding of the behavior of slack resources in a unique setting.

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## **Dedication**

I dedicate this dissertation to Andrea, my wife, Isam Sebastian, my son; my future baby; my parents; and the rest of the family for their continual support, love, and care.

I am grateful to Andrea for her never ending love, support, patience, and encouragement. I want to also thank her for often assuming more than her share of parenting responsibilities, and for keeping me on track and focused throughout.

And to my dear son Isam Sebastian who without his beautiful smiles, hugs, and kisses completing this project would have been much more difficult.

I am also tremendously indebted to my dear parents, Dr. Issam Mousa and Rima Habash. Without their love, help, support, and belief in me throughout my life, I would have not been where I am today. They are and always will be my inspiration.

## INTRODUCTION

This study attempts to develop a more fully conceptualized view of initial public offering (IPO) valuation. I argue that excess or “slack” resources possessed by firms undergoing an IPO can signal the quality and future potential of that firm. From a resource-based perspective (RBV), I reason that valuable slack resources can provide a competitive advantage to IPO firms and, therefore, a promise of superior financial performance. Because an IPO firm has not yet demonstrated the ability to successfully handle the demands of public trading (e.g. market fluctuations), they are discounted by investors (Certo, 2003). Slack resources may compensate for the “liability of market newness.” Studies of organizational slack typically have focused on publicly traded firms; little attention has been given in the literature to the effect of organizational slack on the performance of firms undergoing an IPO. Additionally, scholars have focused on established, and/or successful firms, concluding that they possess organizational slack, at least in part, because of their sustained profitability (Please see Deephouse & Wiseman, 2000 for a great review; George, 2005; Greve, 2003). I test whether or not slack resources are critical for young, privately held organizations with limited history in terms of sales and profitability.

Resources act as incentives to experiment, take risks, and make proactive strategic choices (George, 2005). They are deployed to build capabilities that make firms competitive, maintain coalitions that ensure the convergence of personal and organizational goals, and to act as buffers in periods of economic duress (George, 2005). Some scholars have reported that resources controlled by a firm generally enhance growth (e.g., Bamford, Dean, & McDougall, 2000; Cooper, Gimeno-Gascon, & Woo, 1994). Others argue that they can generate a sustained

competitive advantage (e.g., Barney, 1991). Given this critical role, the presence or absence of excess resources and their impact on performance carries substantial implications for scholarship in IPO research and the practice of management (George, 2005). In this paper, I will use “slack resources” and “excess resources” interchangeably.

Slack is a dynamic quantity that denotes the difference between a firm’s current resources and the current resource demands on the firm (Mishina, Pollock, & Porac, 2004). Slack resources can be diverted or redeployed to achieve organizational goals (George, 2005). Slack has been used to explain diverse organizational phenomena including performance, innovation, goal conflict, effectiveness, and political behavior. These resources differ in both type (e.g., financial or social capital) and form (e.g., absorbed or unabsorbed). I postulate that excess resources could signal future competitive advantage, thus helping investors evaluate IPO firms.

According to market signaling theory, certain variables or indicators send signals to potential investors about the capabilities and, therefore, the future value of firms (Akerlof, 1970; Spence, 1973). Market signaling mechanisms are considered especially fundamental in the case of firms undergoing an IPO due to the scarcity of information available to investors. For example, a young pharmaceutical firm would have the majority of its resources invested in R&D, an area which is invisible to potential investors. New products have a long development period and there is no guarantee the product will meet Federal Drug Administration requirements and become profitable.

Secrecy is another issue. The future competitiveness of an IPO is potentially threatened when certain information is exposed to the firm's competitors. Firms are understandably reluctant to communicate much information. Hence, an information asymmetry exists (Keasey, McGuinness, & Short, 1992). In order to help investors overcome these obstacles,

entrepreneurs—with favorable inside information—can signal to the market the quality of the firm’s research capabilities (Spence, 1973). This can be achieved through releasing its R&D expenditures, history of technological and financial performance, or the number of products brought to the market (Deeds, Decarolis, & Coombs, 1997), for example. In addition, an IPO can signal value through its potential to innovate, the presence of board members with prior IPO experience, or managers with the experience to navigate an IPO and successfully manage rapid growth.

Strategic management research attempts to determine a firm's potential for sustained, superior, performance (Rumelt, Schendel, & Teece, 1994). The premise is that sustained superior-performance arises from sustained competitive advantage (Barney, 1997; Roberts, 1999). The concept of competitive advantage has had a major influence on the field of management, generating a large volume of scholarly output, both theoretical and empirical (Bowen & Wiersema, 1999). This concept is now widely accepted (Barney, 1997). In addition, firms do seek to truly identify, devise, and leverage competitive advantage (Porter, 1996). “Competitive advantage has become for the field [of strategic management] a central matter to understand and explain in terms of causality. It has not proven a simple task” (Schendel, 1994: 3).

The resource-based view of strategic management (Amit & Schoemaker, 1993; Barney, 1986; Dierickx & Cool, 1989; Mahoney & Pandian, 1992; Wernerfelt, 1984) explores the “resources and capabilities of firms that enable them to generate above normal rates of return and sustainable competitive advantage” (Oliver, 1997: 697). The RBV argues that the fundamental objective of the firm is to achieve “above-normal returns” (Conner, 1991: 132). This implies that all firms will seek to realize a competitive advantage wherever possible to achieve above-normal

returns (Wiggins & Ruefli, 2002). The fundamental concept can be traced back to the works of Ansoff (1965), Chamberlin (1933), and Selznick (1957). But perhaps the most influential work is associated with Michael Porter in the early 1980s (Porter, 1980; 1985). Later, Porter and other scholars (e.g., Amit & Schoemaker, 1993; Barney, 1991; Porter, 1985) focused on the expanded concept of sustained competitive advantage; they proposed that some forms of competitive advantage are very difficult to imitate and can therefore lead to persistent superior economic performance (Amit & Schoemaker, 1993; Barney, 1991; Conner, 1991; Ghemawat, 1986; Oliver, 1997; Porter, 1985, 1996).

Penrose (1959) was one of the first researchers to realize the importance of resources to a firm's competitive position. She argued that a firm consists of a bundle of resources that potentially contribute to the firm's competitive position if those resources' valuable services are made available to the firm (Newbert, 2007). Building on Penrose's work, Wernerfelt argued that "resources and products are two sides of the same coin" (1984: 171), suggesting that a firm's performance is driven directly by its products and indirectly (and ultimately) by its resources (Newbert, 2007). He thus proposed that firms must recognize and obtain resources that are crucial to the development of highly demanded products to earn above normal returns (Wernerfelt, 1984). Relying on two main assumptions—that resources and capabilities are heterogeneously distributed among firms and that they are imperfectly mobile—and the work of Penrose (1959), Wernerfelt (1984), and others, Barney (1991) argued that firms with valuable and rare resources can achieve a competitive advantage and benefit from short term enhanced performance. A firm must be organized in such a way that it fully can exploit the potential of resources to achieve competitive advantage (Barney, 1997). For the purposes of this study, I will adopt the RBV definition of competitive advantage as a capability (or a set of capabilities) or a

resource (or a set of resources) that give a firm an advantage over its competitors which, all other things being equal, leads to higher relative performance (Wiggins & Ruefli, 2002).

The RBV logic is insightful and pertinent in answering our queries for two main reasons. First, because of the greater managerial complexity and liability of newness, IPO firms demand more resources to cushion the costs and risks incurred during this unpredictable time. The IPO is a major event in a firm's life cycle. The process of undergoing an IPO increases a firm's vulnerability which could be compared to the "liability of newness" faced by a start-up firm (Andrews & Welbourne, 2000; Stinchcombe, 1965). The process can be tremendously challenging to firms and managers especially given that the process can last from several months to a few years, during which time management is unable to focus fully on just running the business (Andrews & Welbourne, 2000). For example, the time demands on the CEO and top management team (TMT) are substantial. Not only must they run the daily operations of the firm, they also have to prepare the prospectus—a document that informs investors and the world about the company—and should be out selling the company to create much needed demand for the stock. In the months prior to offering, the CEO travels the country (in some cases the world) on a 'road show' talking to potential investors about the company and generating enthusiasm for the company. Hence, managerial teams that are unprepared for the process might suddenly find themselves overwhelmed with the amount of work required. Firms also face resource constraints. Even more essential is the seriousness of this limitation which hinges on the type of resources to be deployed during the IPO process and as the company goes public. Hence, it is appropriate to assess which resources are most useful to the successful IPO and to long-term survivability.

Second, the RBV conceives of a firm as a collection of resources (Penrose, 1959; Silverman, 1999) and underscores the effect of the firm's resource heterogeneity, rather than the



external environment, on its competitive position (Barney, 1991). Consequently, the fact that some firms are superior to others in the marketplace is attributable to their possession of unique resources (Peteraf, 1993). Along this line, it can be argued that variations in firm valuation and survivability emanate from differences in resource slack.

The central arguments of this paper thus are (1) slack resources are crucial to the valuation and future success of young ventures; (2) the effects of slack on firm valuation and future survivability are best understood by focusing on the specific properties of a slack resource—how rare and valuable the resources are and to what extent they signal future performance; (3) firms with the potential to achieve competitive advantage will have higher survival rates in the long run; (4) slack resources could act as credible signaling mechanisms, allowing investors to distinguish between poor and high quality IPOs.

This work also aims to extend current understanding in several ways. First, I propose that IPO firm-specific slack resources represent important information for investors. Therefore this research conceives of slack resources as a quality signal. This research aims to extend the conceptualization of slack resources by arguing that different forms of slack resources (financial, innovational, and managerial) are essential to a firm's success. It also provides insight into the value investors place on slack resources. It provides empirical support for the conceptual framework by drawing on a rich set of IPO data in the United States during the period of 2001-2005. I test hypotheses of the resource-based view related to the impact of firm-specific financial status and investments in innovation and managerial capital on the performance of an IPO firm and its survivability. I extend organizational slack research by moving away from mature and well-established organizations, and suggest that IPOs provide a unique context in which to study the interrelationships between slack resources and IPO market valuation. In addition, this study

extends our knowledge of organizational slack by moving beyond the traditional emphasis on financial slack to include other types of slack such as human resources and technology (Meyer, 1982). By examining all three, this work will provide a more complete understanding of the effects of excess resources on organizations. Finally, this research contributes to the resource based view by considering a number of organizational elements that will help us better understand the competitive position of firms.

## **THEORETICAL FOUNDATIONS AND LITRATURE REVIEW**

### **The IPO Process**

The strategic decision to undergo an Initial Public Offering (IPO) is an extremely important one, representing a milestone in the life cycle of the entrepreneurial firm. When firms transition from the private to the public sphere, they increase their legitimacy in the business community, gain improved access to debt financing, and create a means of exit for major shareholders (Sutton & Benedetto, 1988). However, the most important reason for going public is to infuse investment capital into the firm (Arkebauer, 1991). The amount of capital a firm can raise depends on negotiations between the IPO firm and the lead underwriter. The potential for raising capital is based upon (1) financial characteristics of the firm such as assets and book value (Welbourne & Andrews, 1996), (2) intangible assets such as the TMT (Certo, 2003; Nelson 2003). Additionally, it is well documented that the majority of small business failures result from insufficient funding and heavy debt loads (Jones, 1979; Peterson, Kozmetsky, & Ridgeway, 1983; Wucinich, 1979). By going public, entrepreneurial firms can overcome these pitfalls.

At the time of the IPO, the firm offers its stock for the first time on the public market. IPO firms undergo many internal changes as they submit to the scrutiny of shareholders, underwriters, and the Securities and Exchange Commission (Welbourne & Andrews, 1996) 1996). The IPO firm attempts to acquire professional management, achieve and sustain profitability, and provide the required organizational and operational transparency (Yang & Sheu, 2006). After the IPO, the firm receives a substantial cash infusion that may increase its chances of survival. The focus here is on the firm's future potential to deliver earnings and the manager's job is to convince stockholders that the company will survive and prosper (Nelson, 2003).

Few IPO firms possess clear performance records. Without such, investors have little indication of the firm's ability to cope with market fluctuations and other demands of public trading (Certo, 2003). The fluctuations in equity values during the first few days of trading after an IPO (Ritter & Welch, 2002) are testimony to the difficulties investors face when determining the true value of IPO firms (Certo, 2003; Libin & Wrona, 2001).

Given the information asymmetry surrounding the IPO process (Nelson, 2003), investors will seek nontraditional methods to minimize the risk in valuing IPO firms (Certo, 2003). Investors lower their anxiety and increase their trust in a relatively new firm by relying on signals that could indicate the quality of the firm (Certo, 2003). For example, prestigious underwriters and well respected board members will avoid associating themselves with lower quality private firms to protect their reputations (Certo, 2003).

Previous IPO research in the field of management has argued that IPO firms signal investors to indicate firm quality, thus improving IPO performance (Beatty, 1989; Carter & Manaster, 1990). Research shows that the reputations of investment bankers (Carter, Dark, &

Singh, 1998b), auditors (Beatty, 1989) and venture capitalists (Megginson & Weiss, 1991) all serve as signals in the IPO process. The fact that investment bankers avoid poor quality IPO firms to protect their reputations is evidence of the credibility of this type of signal (Certo, 2003). These studies provide academicians and practitioners with crucial information regarding the IPO process. For example, Nelson (2003) demonstrates that the stock market reaction at the time of the IPO of founder-led firms is higher than that of non founder-led firms, indicating that investors value firms run by a founder-CEO. As a result, venture capitalists might be more willing to invest in firms that are run and managed by their founders. Founder-CEOs therefore can reduce uncertainty around the IPO by signaling the firm's stability (Nelson, 2003).

Thus, a deeper understanding of the process of going public may offer considerable contribution to the development of equity financing and the promotion of entrepreneurial and venture capital activities (Filatotchev, 2006; Zingales, 1995). Practitioners want to know what creates value at the IPO (Nelson, 2003). While finance researchers have investigated macroeconomic effects and market conditions, it remains the strategic-management researcher's job is to link performance to corporate, structural, operational, and behavioral conditions and choices (Nelson, 2003).

### **IPO firm performance—Evaluation of IPO firms by investors**

Traditional methods of measuring firm performance using variables such as return on assets (ROA) or return on equity (ROE) are not useful in the case of IPO firms given the lack of public equity sales records. Also, a considerable number of IPOs do not have earnings. For these reasons, testing relative firm-performance at IPO turns out to be a more difficult task than expected.

Although there are a number of ways to measure the performance of an IPO firm this research focuses on just two: IPO valuation and percent premium. Other well known measures include underpricing—a unique IPO performance indicator. This variable represents money “left on the table” that the new IPO firm forgoes. In other words, this money accrues to initial investors in an IPO but not the initial owners of the IPO firm (Daily, Certo, & Dalton, 2005). Given that a new venture’s liquidity is particularly important due to its liability of newness (cf. Singh, Tucker, & House, 1986), underpricing is detrimental for new ventures.

Underpricing is usually calculated in this manner:

$$\text{Underpricing} = \frac{[(\text{The first day closing price (P1)} - \text{the initial offer price (Po)}) / \text{the offer price (Po)}].$$

Managers generally have a strong incentive to leave as little money as possible on the table (Certo, Daily, & Dalton, 2001b). However, there are a few exceptions. For example, it has been argued that a few managers might favor underpricing (e.g., Thurm, 1999) for a variety of reasons. One possible motive for leaving money on the table is the managers’ ability to recapture lost wealth at a later date by selling retained equity (Certo et al., 2001b). Recent research indicates that this might be unwise. Spiess and Petway (1997) found that any wealth loss by managers (insiders) attributed to underpricing is not recouped by the first seasoned equity offering. In addition, a typical lock up period averages 180 days (Cheffins, 1999), effectively excluding firm insiders from selling retained shares at the optimal time (Certo et al., 2001b).

There are a number of other theories that have been advanced regarding new issues underpricing. These theories have focused on various features of the associations between investors, issuers, and the investment bankers taking the firms public. They are not generally mutually exclusive and some may be more important to some IPOs than to others (Ritter, 1998).

Ritter (1998) listed and reviewed the following theories: 1. The winner's curse hypothesis, 2. The market feedback hypothesis, 3. The bandwagon hypothesis, 4. The investment banker's monopsony power hypothesis, 5. The lawsuit avoidance hypothesis, 6. The signaling hypothesis, and, 7. The ownership dispersion hypothesis. All of them involve rational strategies by buyers. They can be criticized on two different fronts: extreme assumptions and unnecessarily convoluted stories (Ritter, 1998). Conversely, Ritter argues that each theory possesses an element of truth. Further, the underpricing phenomenon has persevered—and exists in every nation with a stock market—for decades with no sign of going away (Ritter, 1998).

However, the use of underpricing as a performance measure is beyond the scope of this paper (please see Ritter (1998) for a very good and comprehensive review). The majority of studies in the IPO field use underpricing as a dependent variable (e.g., Arthurs, Hoskisson, Busenitz, & Johnson, 2008b; Certo, Covin, Daily, & Dalton, 2001a; Filatotchev & Bishop, 2002; Nelson, 2003; Pollock & Rindova, 2003). The main interest of this paper lies in understanding how resources affect firm valuation. In contrast, underpricing captures wealth creation for first day investors and lost wealth for initial shareholders who sold their equity to investment banks at a price below its value in the investor market at the end of the IPO date (first day of trading) (Certo et al., 2001b).

Two measures of the value of an IPO firm that are of particular interest in this paper are percent premium and IPO value. Percent premium has been applied to the assessment of investor optimism about the future value of firms at the time of the IPO. This measure has been applied by a number of researchers in the IPO field (e.g., Lester, Certo, Dalton, Dalton, & Cannella, 2006; Nelson, 2003; Welbourne & Andrews, 1996). Welbourne and Andrews (1996) argue that the stock price at IPO is deceptive because it fails to account for the value of the firm's assets.

They recommend using a premium to represent the amount of the stock price considered to be above book value. Percent premium provides a more robust estimate of investor perceived future-value (Lester et al., 2006). The percent premium is calculated as follows:

$$\text{Percent premium} = [(\text{share price} - \text{book value per share}) / \text{share price}]$$

Here the share price is the same as the offer price (equal to the stock price at the time of the IPO), with the book value equal to the firm book-value.

An important characteristic of this measure is that it uses both accounting-based and stock-price information. This allows the measure to consider difficult-to-account for assets of the firm (Nelson, 2003). Although some authors have suggested that percent premium reflects the value of a firm's intangible assets (Rasheed, Datta, & Chinta, 1997; Welbourne & Andrews, 1996), there has been no empirical support for this assertion. What it does demonstrate is the difference in the value of the firm as it is obtained from historical accounting figures and the stock price (Nelson, 2003). Nelson (2003) argues that the difference in gauging firm value could possibly be measuring intangible assets, investor over enthusiasm, monopoly control, or some other factor that would put the stock price out of synch with accounting based figures. The effect of some of these alternative explanations could be absorbed using certain control variables (Nelson, 2003). In keeping with previous research in the IPO field (e.g., Lester et al., 2006), I believe that this dependent variable is consistent with the use of signaling theory, which provides a framework for this dissertation.

Another measure, IPO value, is also frequently discussed in the literature (Deeds et al., 1997; Finkle, 1998; Gulati & Higgins, 2003; Zimmerman, 2008). This dependent variable refers to the capital raised by a firm at IPO. Successfully raising enough capital at IPO is vital to the future growth and survival of a firm (Deeds et al., 1997; Deeds, Mang, & Frandsen, 2004;

Finkle, 1998). This variable is usually measured as the total value of the capital for the firm raised during the firm's IPO, less the underwriters' fees as provided on the cover page of a firm's prospectus (Deeds et al., 1997; Finkle, 1998; Gulati & Higgins, 2003; Zimmerman, 2008). It is regarded as a measure of IPO performance (Gulati & Higgins, 2003) as well as a measure of the market's valuation of a firm at the time of IPO (Deeds et al., 2004; Finkle, 1998).

This measure is extremely important given that firms go public primarily to infuse a large amount of investment capital (Arkebauer, 1991; Deeds et al., 2004). Deeds and colleagues (2004), stress that the success of an IPO can be determined by the amount of capital that flows into a firm. This amount is contingent upon a positive appraisal by the financial market (Deeds et al., 2004) and results from negotiations between the IPO firm and the lead underwriter (Zimmerman, 2008). It has been argued in the literature that ability to raise capital is dependent on assets, earnings, book value, and other financial characteristics (Welbourne & Andrews, 1996). It also depends upon intangible assets (Deeds et al., 1997) such as the TMT (Certo, 2003; Finkle, 1998; Nelson, 2003; Welbourne & Cyr, 1999). I argue that IPOs with a certain type of excess resources can signal potential investors regarding the future prospects of their firm and hence accumulate more capital.

## **Signaling Theory**

### *Influencing IPO Investor Decision-Making—an overview*

Signaling theory is useful in situations where information asymmetry is high (Spence, 1973). In his seminal examination of the labor market, Spence (1973) used the example of an employer hiring a new employee. The potential employer is in a situation of information asymmetry. How can the employer distinguish between candidates? Spence argues that in this



case educational background serves as a signal that reduces information asymmetry. The core argument here is that high quality applicants prove their worth by enduring the rigors of higher education, providing a signal that consistently allows the employer to select higher quality candidates. Therefore, managers have no choice but to rely on signals to identify individuals capable of becoming productive members of the company.

Spence (1973: 357) defines signals as those “observable characteristics attached to the individual that are subject to manipulation by him.” He further remarks that signals are the result of intentional and voluntary actions resulting in uncertainty-reducing characteristics that are costly to achieve (Spence 1974). Research on signaling at the organization level has considered a wide variety of characteristics that can serve as signals about firms in markets known to be burdened with uncertainty (e.g., corporate governance characteristics (Certo, 2003; Certo, Daily, Cannella, & Dalton, 2003; Sanders & Boivie, 2004), warranties linked to new product introductions (Akerlof, 1970), affiliations with prominent actors (Carter & Manaster, 1990; Gulati & Higgins, 2003; Higgins & Gulati, 2006), insider buying and selling of stocks (Sanders & Boivie, 2004), and founder presence (Nelson, 2003)).

Market-signaling mechanisms are vital for start-up firms that aim to go public especially given the fact that young companies face many difficulties in their quest to grow and flourish. For example, newer companies seldom possess strong employee loyalty, working relationships with stakeholders (e.g., suppliers), or deep understanding of their environment (Stinchcombe, 1965). Inexperienced organizations have little, if any, manufacturing experience, forcing them to work under the guidance of immature and unrefined routines (Sorensen & Stuart, 2000). Given that many young firms find it extremely difficult to produce outputs of consistent quality, they face a high probability of closure (Hannan & Freeman, 1984).

Because of the relative shortage of information regarding an IPO firm, managers are thus eager to find ways to communicate their high quality to potential investors (Certo et al., 2001b). For example, firms usually delay going public until they have a period of very strong operating performance (Jenkinson & Ljungqvist, 2001), thus signaling to investors that the young firm will be able to achieve above normal returns and survive in the future. Also, the board of directors can act as a signal to potential resource holders about the quality of a young firm (Certo et al., 2001b), especially given that investors value prestigious board structures, thus reducing the liability of market newness and improving IPO firm stock-performance (Certo, 2003).

Other signals, for example, can indicate a TMT's ability to manage the firm (Zimmerman, 2008). Clark, Cornwell, and Pruitt (2002) write, "signaling theory revolves around the judicious use of signals that are consistent with the attainment or possession of a particular and valued attribute that, in the absence of the signal, would be very difficult to unambiguously convey" (p.26). Because of the high information asymmetry surrounding an IPO (Certo, 2003), signaling theory may help scholars achieve a deeper understanding of the actions taken by firms to improve their appeal to potential investors.

Signaling mechanisms can be vital communication tools for IPO firms (Certo et al., 2001b) especially given the assertion of managers that operating a high quality firm with excellent investment potential is not enough to convince market participants of its superior value (Lawless, Ferris, & Bacon, 1998). An essential tenet of signaling theory is that the signal must be observable (Spence, 1973) and known in advance (i.e., occur prior to any transaction offer) (Certo et al., 2001b; Janney & Folta, 2003). This would permit the informed participants in the transaction to make the most of the signal. The second critical attribute is that the signal must be costly for lower quality IPO firms to utilize, thus making easy imitation unlikely or difficult.

The study of slack resources as a signaling device is consistent with the two key signaling criteria. Because resource information is included in the prospectus, slack resources are observable and known in advance of the actual offering. Financial slack information, for example, can be gathered from a firm's balance sheet. Information on other types of slack, such as managerial and innovational slack, also can be found in the prospectus. Slack resources are costly for competitors to imitate. For example, possessing R&D slack requires considerable investments above the industry average, which could be very costly for competitors to imitate.

Potential investors rely on basic parameters to value an IPO firm. A number of signals are available to lend credibility to a firm beyond these basic parameters. Most signaling models in the IPO literature communicate the intrinsic quality of the firm. All are variations on the signaling theme originally introduced into economics by Spence (1974). The next section will review some of the main signaling mechanisms discussed in the IPO literature that are available for firms to use. Firms are not limited to a single signaling mechanism.

### *Signaling Models in IPO Literature*

#### ***Retained Ownership***

Leland and Pyle (1977) propose that the IPO firm's value is a function of the retained ownership by the initial stockholders (before the IPO). This argument is based on the belief that a higher percentage of pre-IPO ownership implies that the wealth portfolios of the firm's stockholders are less diversified, with the majority of owner wealth invested in the company. This also suggests that the owners will be unwilling to accept such a risk without great confidence of high future returns. Percentage of ownership is, therefore, a signal of value

(Leland & Pyle, 1977). The owners' willingness to invest heavily in their company can be interpreted as a signal of confidence in the IPO (Firth & Liao-Tan, 1998).

Although the contribution of Leland and Pyle's work is substantial, the empirical support for their model is mixed. For example, Krinsky and Rotenberg (1989) using Canadian data, and Kim, Krinsky, and Lee (1994) using Korean data, found no support for the relationship between market valuation and retained ownership. On the other hand, Downes and Heinkel (1982) using American data, Clarkson, Donoh, Richardson, and Sefcik (1991) using Canadian data, and Keasey and McGuinness (1992) using British data, did find support for a positive relationship between valuation and ownership. The reasons behind the mixed results are unclear (Firth & Liao-Tan, 1998). One possible explanation is found in the work (in the owner-control literature) of Morck, Shleifer, and Vishny (1988). They argued that high levels of insider ownership are linked to management entrenchment and poor corporate performance, which thus can lead to a lower IPO-valuation. Another rationale suggests that capital expenditure plans derived from using the proceeds of the new issue (found in the prospectus) reveal an anticipation of increased returns (Trueman, 1986). Thus, the capital expenditure plans may partially replace the retained ownership signal, resulting in a weakening of Leland and Pyle's expected positive relationship between retained ownership and IPO valuation. These explanations may help explain some of the inconsistencies in the research findings mentioned earlier.

### ***Debt***

Another signaling mechanism available to IPO firms is the use of debt levels. High debt-levels may indicate a manager's confidence in a favorable financial outcome for the firm (Ross, 1977). Thus, Ross (1977) assumed that debt can signal future prospects. Ross's work can be

extended to the IPO field. Other examples from the literature include Darrough and Stoughton (1986) and Greenwald, Stiglitz, and Weiss (1984). Both papers discuss the role of debt in signaling firm value.

### ***Board of Directors***

Certo and colleagues found that prestigious boards are associated with less underpricing (Certo et al., 2001b). This is based on the fact that director prestige can confer legitimacy. Such legitimacy is considered essential for any firm planning to go public (Rock, 1995). This finding is consistent with Pfeffer and Salancik's (1978: 145) observation that "prestigious or legitimate persons or organizations represented on the focal organization's board provide confirmation to the rest of the world of the value and worth of the organization".

### ***Underpricing***

A number of theoretical models have been developed to relate the underpricing of a new issue with the market value of the firm (e.g., Allen & Faulhaber, 1989; Chemmanur, 1993; Grinblatt & Hwang, 1989; Welch, 1989). The key assumption in these models is that the issuing firm is better informed about the present value of its future cash flows than are investors or underwriters (Jenkinson & Ljungqvist, 2001). According to these models, underwriters do not have an explicit role. Another mainly hidden assumption is that firms go public to transfer ownership and control to new shareholders (Jenkinson & Ljungqvist, 2001). This may or may not be the case in reality. Here it is important to point out that Chemmanur's (1993) variation on the signaling theme has many of the same assumptions as other models. However, this model does not view underpricing as an effective signaling-device.

The main argument raised by these models is that significant underpricing is coupled with higher market valuation. Hence, the signal is the initial offering-price (Jenkinson & Ljungqvist, 2001). This basically means that only good quality firms can afford to dissipate wealth by underpricing (Brau & Fawcett, 2006). This is predicated on the notion that entrepreneurs will offer a large discount only when they are convinced of good future prospects such that the stock price will rise considerably above the issue price. Underpricing may enhance the market's reception for future rights issues or seasoned issues.

One challenge for these models is that it is difficult to explain how entrepreneurs and investors can estimate the level of underpricing before an IPO. Jenkinson and Ljungqvist (2001) raise the issue of the optimality of signaling. Would any firm really choose the underpricing signal if they had other options? How about the choice of a reputable underwriter (Booth and Smith, 1986), or a reputable auditor (Titman & Trueman, 1986) or venture capitalist? And how about the choice of a board, particularly the choice of outsiders on the board, each of whom, out of concern for their reputation, will work hard to ensure direct disclosure of information to potential investors (Hughes, 1986). Unless underpricing proves to be the most cost-effective signal, which seems unlikely, the existence of alternatives dents the credibility of this signaling model (Jenkinson & Ljungqvist, 2001).

### ***Financial Advisors***

Titman and Trueman (1986) suggested that the quality of the IPO firm's advisors (e.g., underwriters and investment banks) will signal information about the IPO. They note that entrepreneurs with positive information about their firms will seek to hire high quality advisors. The market takes note when a new issue becomes associated with high-quality advisors,

believing that these advisors will not allow their names to be linked to a low-quality or overpriced issues. High-quality advisors have considerable reputational capital and are unwilling to risk that capital through involvement with low-quality firms. Therefore, it can be argued that IPOs with highly reputable financial advisors will achieve superior market valuation. Moreover, high-quality advisors usually have a large asset base behind them. This also might lead potential investors to believe that the firm, if it does poorly, may be able to recover losses from these advisors.

Some empirical studies have found that high-quality advisors are correlated with lower underpricing (e.g., Holland & Horton, 1993). Other researchers have modeled and empirically tested the relationship between the demand for high-quality advisors and firm valuation (Beatty, 1989; Booth & Smith II, 1986).

The literature covers a number of different types of advisors, with a specific focus on underwriters and merchant and investment banks. One of the difficulties faced by researchers was establishing rankings for advisor quality. This issue has largely been resolved. Researchers (e.g., Arthurs, Busenitz, Hoskisson, & Johnson, 2008a) now use rankings posted on Ritter's personal website at the University of Florida. Those rankings are based on the methodology employed by both Carter and Manaster (1990) and Carter et al. (1998a).

### *Signaling and Performance in IPO Literature*

The majority of IPO research, which found that certain signals influence IPO performance, has mainly used underpricing as the dependent variable (See Table 1). Relying on signaling theory, Certo and others (2001b) argued that board structure could be related to IPO performance. They found a statistically significant, negative relationship between board size and

IPO underpricing (see also, Carter et al., 1998a), suggesting that potential investors may view larger boards as a signal of increased access to critical environmental resources. They also found a negative and statistically significant relationship between board reputation and IPO underpricing. These findings suggest that having prestigious board members may diminish underpricing.

Four studies in the IPO literature focus on the use of signals to raise capital as a dependent variable (Deeds et al., 1997; Finkle, 1998; Sanders & Boivie, 2004; Zimmerman, 2008). The recent study by Zimmerman (2008) suggested that TMT heterogeneity provides a signal of quality to potential investors. Zimmerman (2008) found that the TMT's functional and educational backgrounds are linked to the amount of capital raised through the IPO process. Because firms undergo an IPO to secure resources to grow and survive, the amount of capital raised in an IPO is of great interest (Welbourne & Andrews, 1996). Therefore, in the study of IPOs, a deep understanding of the role of signals in securing resources is valuable (Zimmerman, 2008). In another study, Deeds and colleagues (1997), suggested that certain scientific capabilities can send credible signals about quality to potential investors. They elected to use the amount of capital raised from an IPO as the dependent variable because firms undergo an IPO primarily to raise capital.



**TABLE 1: Signals found to influence IPO performance**

<b>Signal</b>	<b>How</b>	<b>Studies in the Literature</b>
VC backing/partnerships	e.g., Provide financial resources and expertise that serve as important signals of new venture quality	(Barry, Muscarella, Peavy, & Vetsuypens, 1990; Brav & Gompers, 2003; Gulati & Higgins, 2003; Lin, 1996; Megginson & Weiss, 1991)
Auditor reputation	The quality of the auditor will signal the high quality of the IPO firm	(Beatty, 1989; Daily, Certo, Dalton, & Roengpitya, 2003; Titman & Trueman, 1986)Beatty, 1989; Daily et al., 2003; Titman & Trueman, 1986)
Underwriter reputation	Prestigious underwriters will not associate themselves with low quality firms	(Barry et al., 1990; Beatty & Ritter, 1986; Booth & Smith II, 1986; Carter & Manaster, 1990; Carter et al., 1998b; Daily et al., 2003)
Strong earnings history	A history of strong earnings signals future strong performance	(Teoh, Welch, & Wong, 1998)
Prominent affiliations with organizations	Firms with prominent affiliations go through the IPO faster and are valued better	(Gulati & Higgins, 2003; Stuart, Hoang, & Hybels, 1999)
Lockup period	A lengthier lockup period signals that owners will have to be associated with the firm up to a point and that they are taking on a liquidity cost	(Arthurs et al., 2008a)
Firm size	Larger firms might have access to more resources	(Carter et al., 1998a, b; Daily et al., 2003; Ibbotson, Sindelar, & Ritter, 1988)
TMT composition	TMT composition can signal legitimacy along three dimensions: 1. Access to resources, 2. Ability to fulfill key roles, 3. Ability to attract endorsement from prestigious partners	(Higgins & Gulati, 2006)
Corporate governance	Prestigious directors could increase firm legitimacy and hence lower information asymmetry	(Certo, 2003; Certo et al., 2001b; Lester et al., 2006; Nelson, 2003; Sanders & Boivie, 2004)
Equity retained by insiders	A signal of confidence to prospective investors	(Certo et al., 2001a; Daily et al., 2003; Downes & Heinkel, 1982; Filatotchev & Bishop, 2002; Fischer & Pollock, 2004; McBain & Krause, 1989)

In this paper, building on previous research (e.g., Deeds et al., 1997), I theorize that a specific aspect of an IPO firm, slack resources, can signal its value to potential investors. In an attempt to lower uncertainty about future performance, a firm, through the availability of slack resources, signals to investors that it has the capacity to grow and is structured for high performance. I anticipate that slack resources do impact IPO valuation and future survivability.

### **Resource Based View**

The resource based view (RBV) attempts to explain sustained differences in firm performance. The assumptions of the RBV—that resources and capabilities are heterogeneously distributed among firms and imperfectly mobile—allow for the existence of variations in firm endowments, and also for these variations to exist over time (Barney, 1991; Newbert, 2008). Building on these assumptions, scholars posit that firms with unique resources can produce short and long term economic rents and sustain competitive advantage by virtue of unique resource positions, permitting these firms to build better products for the same or lower costs (Conner, 1991; Mahoney & Pandian, 1992). Resources are considered unique when they are valuable, rare, inimitable, and non-substitutable (Barney, 1991). A firm with unique, rare, and valuable resources may generate a competitive advantage over its rivals, thereby achieving superior performance (Barney, 1991; Conner, 1991; Mahoney & Pandian, 1992; Peteraf, 1993). In order for the firm to sustain its competitive advantage, it must ensure that its resources are inimitable and non-substitutable thus preventing competitors from copying or circumventing the value of the resources and competing away its benefits (Hatch & Dyer, 2004). Firms that succeed in attaining such resources should be able to improve both short and long term performance (Amit & Schoemaker, 1993; Barney, 1997; Powell, 2001).

The strength of the ‘isolating mechanisms’ will determine how long a firm can enjoy competitive advantage (Rumelt, 1984). Isolating mechanisms shield resources from competitors’ attempts at imitation and preserve the appropriation of stable rent-streams (Mahoney & Pandian, 1992; Peteraf, 1993). Examples of isolating mechanisms include producer learning, buyer switching-costs, reputation, buyer search-costs, channel crowding, firm specificity, causal ambiguity, social complexity, path dependence, and time-compression diseconomies (Dierickx & Cool, 1989; Lippman & Rumelt, 1982; Peteraf, 1993; Reed & DeFillippi, 1990; Rumelt, 1987).

The RBV has undoubtedly made a strong impact on the field of strategy. The RBV is one of the most widely accepted theories of strategic management (Powell, 2001). Scholars have worked hard to enhance the insights of the RBV by examining it empirically in profit-maximizing firms (see Barney, 2001 for a partial review). Over the years, more and more researchers have spent time and effort to develop an empirical body of literature on the RBV (Barney, 2001). However, actual empirical support for the RBV varies greatly among the studies (Newbert, 2007). Consequently, additional research is needed in this area (Carmeli & Tishler, 2004), especially given that most studies have examined a single resource (or factor) such as human capital (e.g., Hitt, Bierman, Shimizu, & Kochhar, 2001) or leadership (e.g., Waldman, Ramirez, House, & Puranam, 2001). Such studies provide important knowledge. For example, managers in a specific industry can learn about which elements are most important for them to capture and keep. Nevertheless, it is imperative to understand that an organization’s competitive position cannot be derived from a single factor—no matter how important that element is—rather, it is the result of a complex combination of organizational elements (Carmeli & Tishler, 2004). It is extremely difficult to imagine any company that has achieved sustained competitive advantage from a single element. The competitive advantage of Cisco (Carter, 2001), Wal-Mart

(Stalk, Evans, & Shulman, 1992) or Southwest (Porter, 1996), for example, cannot be attributed to one factor. Rather they must be credited to the successful integration of various strategic and non-strategic elements (Carmeli & Tishler, 2004). Even within a single industry, sustainable competitive advantage is achieved through different combinations of organizational elements. Thus, to correctly capture and truly understand which elements have led to the success of certain firms we need to examine a number of elements. Both the Timex and Rolex companies have achieved great success making timepieces while employing utterly different business models. Timex competes predominantly on scale while Rolex competes on quality, prominence, and marketing (Barney, 1997). Based on these considerations, this study examines the role of different types of slack resources on the success of organizations at IPO.

### **Organizational Slack**

The origins of the organizational slack construct can be traced back to the influential book by Cyert and March (*A behavioral Theory of the Firm*, 1963). They defined slack as “the difference between total resources and total necessary payments” (Cyert and March, 1963: 42). In 1981, Bourgeois published a seminal article in *Academy of Management Review* in which he adapted Cyert and March’s (1963) concept to define slack as a resource cushion that firms can use in a discretionary manner. Bourgeois defined organizational slack as “that cushion of actual or potential resources which allows an organization to adapt successfully to internal pressures for adjustment or to external pressures for change in policy, as well as to initiate changes in strategy with respect to the external environment (1981: 30). Although Bourgeois’ (1981) definition of slack is more than 25 years old, it remains the most commonly used definition in the

management literature (Greenley & Oktemgil, 1998; Marino & Lange, 1983; Meyer, 1982; Milliken & Lant, 1991; Sharfman, Wolf, Chase, & Tansik, 1988).

The sections that follow review the extant research on organizational slack, discuss whether slack is good or bad, and explore the different forms of organizational slack.

### *A Review of Organizational Slack*

As already noted, the prevalent view of organizational slack utilized in the literature is based on Cyert & March's (1963) behavioral theory of the firm. Under this view, slack is seen in a positive light as an inducement for organizational members to expand goals (aspirations) during prosperity and a buffer or cushion against uncertainty in difficult times. Conversely, proponents of agency theory refute this behavioral view (Davis & Stout, 1992), arguing that slack motivates managers to behave in ways that do not benefit the owners. For instance, Jensen (1986) views slack as an incentive for agents to partake in deviant behavior at the expense of shareholder value. Tan and Peng (2003) were the first researchers to test these competing hypotheses. They argued and found that neither theory is superior to the other, but asserted that it is possible to specify the circumstances under which each theory is likely to be supported. They found that organization theory (the behavioral view) is more insightful when slack measures are unabsorbed. Conversely, they found that agency theory is more significantly supported when the slack measures are absorbed. They conclude by arguing that the question scholars should ask is, "what amount of slack is optimal?" They also argued that researches should avoid focusing on simplified questions such as "is slack consistently good or bad," which is common in the literature.

With the publication of “On the Measurement of Organizational Slack,” (1981) Bourgeois introduced concepts and measurements that have been widely used in management research. This led to a stream of research utilizing slack as the central independent variable (See Table 2 for a summary of seminal organizational slack contributions). Bourgeois argued that organizational slack can be treated as one of two variable types (operational and workflow), or as a facilitator of strategic behavior. Operational slack is seen as an incentive for organization members to stay with the firm (Cyert & March, 1963; March & Simon, 1958). Because restraints are few when a firm possesses excess resources, it is seen as a way to reduce conflicts (Moch & Pondy, 1977). Workflow slack is seen as a technical fender between organizational functions or units (Cohen, March, & Olsen, 1972).

**TABLE 2: Key theoretical and empirical organizational slack studies**

<b>Findings</b>	<b>Author(s)</b>
Argued that because firms require excess resources to grow, they have the incentive to manage those resources productively and efficiently	(Penrose, 1959)
Suggested that slack fulfills two roles by absorbing environmental unpredictability: a stabilizing one and an adaptive one	(Cyert & March, 1963)
Proposed that slack could have a curvilinear relationship with performance. This is because slack can supply managers with resources to engage in either creative or nonoptimizing behavior	(Bourgeois, 1981)
Established that different slack types differently affect: 1) political behavior, 2) goal disagreement, and 3) goal consensus	(Bourgeois & Singh, 1983)
Found that absorbed slack is related to risk-taking (+), and also found that both absorbed and unabsorbed slack are related to performance (+)	(Singh, 1986)
He found that available and potential slack have a positive, linear relationship with performance. He also found little support for any hypothesized curvilinear relationship between slack and performance	(Bromiley, 1991)
Found strong support for the proposed inverse U-shaped relationship between slack and innovation	(Nohria & Gulati, 1995, 1996)
The relationship between slack and responding to environmental shifts is contingent upon a firm's strategy (in regards to resource allocation choices).	(Cheng & Kesner, 1997)
They found that slack has positive, negative, linear, and nonlinear relationships with performance	(Greenley & Okemgil, 1998)
In privately held companies, performance increases and then decreases with an increase in low-discretion slack, but performance is positively related in linear manner to increases in high-discretion slack. Also, greater resource demand is positively related to performance	(George, 1995)

Under the second type, workflow, organizational slack is seen as a facilitator of strategic behavior. Slack is viewed as supporting creative, suboptimal, and political behaviors. The existence of surplus resources permits creative action and encourages the firm to compete more aggressively in its environment (Bourgeois, 1981). Therefore, firms may be more willing to venture into unfamiliar territories, incur greater risk (Moses, 1992), and experiment with new strategies (Hambrick & Snow, 1977; Thompson, 1967). Because slack gives organizations the freedom to experiment with various opportunities and options, managers are more likely to make satisficing decisions than optimizing decisions (Simon, 1957). The result is suboptimal, but acceptable, behavior. Bourgeois' arguments in regard to slack as a facilitator of political behavior suggest that slack gives decision makers the freedom to make decisions with little information, and that, when necessary, may give an organization the time needed to collect additional information.

Bourgeois (1981) demonstrated the complexity of the organizational slack construct, and provided the foundation for methods of measuring slack that are used in the literature to this day. Thus, it becomes essential to define the context in which slack is used in this research: Organizational slack will be seen as a facilitator of strategic behavior. The remainder of the literature review will focus on research linking organizational slack to the strategic activities of firms.

### *Organizational Slack: Good or Bad?—and the relationship with performance*

As noted earlier, slack has generally been viewed in the management literature as having both positive and negative effects on firms. On the positive side, slack is argued to expand



organizational capabilities (Chakravarthy, 1986), increase flexibility for future scenarios or strategic changes and generate future options (Chakravarthy, 1986; Evans, 1991; Greenley & Oktemgil, 1998; March & Simon, 1958; Sharfman et al., 1988), protect organizations from downside risk (Singh, 1986), encourage risk taking behavior (Moses, 1992; Singh, 1986), inhibit organizational decline (Hambrick & D'Aveni, 1988), increase the ability of firms to forego short-term gains in favor of long-term outcomes (Bourgeois, 1981; Sharfman et al., 1988), increase access to information (Shafman & Dean, 1997), support exploitation of opportunities (Bourgeois, 1981), affect the fit between structure and strategy (Litschert & Bonham, 1978), influence a firm's ability to adapt to its environment (Bourgeois, 1981; Miller & Leiblein, 1996), diminish goal conflict (Cyert & March, 1963), assist facilitates innovation (Cyert & March, 1963; Damanpour, 1987, 1991; Nohria & Gulati, 1995, 1996; Singh, 1986), and provide incentive for expansion (Penrose, 1959).

The negative view of organizational slack has argued that it leads to organizational complacency (Starbuck, Greve, & Hedberg, 1978; Tushman & Romanelli, 1985; Whetton, 1980), organizational inefficiency and nonoptimizing behavior (Bourgeois, 1981; Simon, 1957), and a lack of discipline (Clayton, Gambill, & Harned, 1999). This view holds that slack lessens the incentives to innovate (Jensen, 1986; Leibenstein, 1969); encourages poorly thought out investment decisions (Donaldson & Lorsch, 1983), increases the vulnerability of firms to takeovers (Davis & Stout, 1992), and leads to careless spending and wasted resources (McGrath & MacMillan, 2000).

Although there are differences in opinions regarding the effect of slack resources, most researchers view it as beneficial. This is understandable given that most scholars take a more behavioral approach to theoretical conceptualizations of slack. More than forty years have passed

since Cyert and March (1963) questioned the function and consequence of organizational slack; the situation has not improved much (Greenley & Oktemgil, 1998). The lack of consistent results could be attributed to a number of factors (Greenley & Oktemgil, 1998). Studies have measured slack and performance in a number of different ways. Consistency of measurement has been lacking. Some researchers have used innovation, risk taking, and adaptability as the dependent variable rather than performance (Bromiley, 1991; Cheng & Kesner, 1997; Nohria & Gulati, 1995, 1996). While it is important to understand and study these variables, they are intervening variables between slack and performance. Thus, studying them does not directly support the study of performance. Similarly, slack has not been measured consistently. Some studies include one measure, while others include many. Some measured slack relative to industry slack, while others used unweighted measures. Also, different analysis techniques have been used to determine those relationships. Greenley and Oktemgil (1998) have suggested that different slack types could interact differently when different performance measures are used. For instance, Bergh and Lawless (1998) found a positive available-slack relationship with performance. They also found a non-significant recoverable-slack relationship, and a negative potential slack-performance relationship.

To resolve the matter, scholars have argued that slack may be advantageous only up to a certain point (Bourgeois, 1981; Nohria & Gulati, 1995, 1996; Tan & Peng, 2003). Bourgeois was the first to hypothesize a curvilinear relationship between slack and firm performance. He linked organizational inefficiency to slack. He argued that inefficiency is a natural outcome of high levels of slack within an organization. However, he emphasized that an efficient firm is not necessarily a successful one. Thus effectiveness should never be sacrificed. Bourgeois's view that slack improves performance up to a certain level, suggests that firms should have enough

resources to deal with unpredictable circumstances (opportunities or threats), while at the same time resources should be limited sufficiently to prevent irresponsible behavior (Cheng & Kesner, 1997).

Nohria and Gulati (1995, 1996) hypothesized, and found strong support for, a curvilinear relationship between slack and innovation. Their (1995, 1996) papers are the first empirical studies to document a curvilinear relationship. Although, prior to their efforts, Bromiley (1991) did hypothesize that the slack-performance relationship possibly is U-shaped. His results however, did not support his hypothesis. Instead he finds a linear, positive relationship between slack and performance. Nohria and Gulati (1995, 1996) concluded by suggesting that the correct question is “what amount of slack is optimal?” and to avoid focusing on simpler questions such as whether slack is uniformly good or bad (Nohria & Gulati, 1996: 1260).

The first empirical work to find evidence of a curvilinear relationship between organizational slack and performance was a study by Tan and Peng (2003). They hypothesized and demonstrated the existence of such a relationship. They also agree with Nohria and Gulati (1996) that the right question to ask “is not whether slack is uniformly good or bad for performance, but rather, what range of slack is optimal for performance” (Tan & Peng, 2003: 1260).

Also revealed in a review of the literature, is that no existing slack research examines the influence of slack on firm valuation and future success in the IPO context. Scholars have studied the relationship between slack and performance. This research operationalized performance using a profitability criterion such as return to assets (Greenley & Oktemgil, 1998; Hambrick & D'Aveni, 1988; Miller & Leiblein, 1996; Wiseman & Bromiley, 1996), return on equity (Greenley & Oktemgil, 1998; Miller & Leiblein, 1996; Wiseman & Bromiley, 1996), return on

investment (Greenley & Oktemgil, 1998), or return on sales revenue (Greenley & Oktemgil, 1998; Wiseman & Bromiley, 1996). Nevertheless, testing relative firm-performance at the IPO stage is a challenging undertaking. Traditional measurement variables like ROE or ROA are not very useful given the lack of a public equity sales-record and the fact that a considerable segment of firms at the IPO stage have few or no earnings. Thus, different measures have been developed and applied specifically for firms undergoing an IPO (e.g., percent price premium). The percent-premium measure uses both accounting-based and stock-price information.

### *The Different Forms of Organizational Slack*

As mentioned earlier, organizational slack is a complex construct. To add to the complexity, organizational slack has a number of classifications, which have been used extensively throughout the literature. For example, Meyer (1982) remarked that slack can exist in diverse forms such as financial, human resource, and technology. Financial slack, however, has been the most used form of organizational slack in the management literature when assessing strategy.

Five main classifications emerge from the management literature when organizational slack is qualified as financial slack: 1) Bourgeois' (1981) (absorbed, unabsorbed, and potential slack). 2) Bourgeois and Singh's 1983 (available, potential, and recoverable slack). 3) Chakravarthy's (generated and invested slack). 4) Singh's (1986) (absorbed and unabsorbed slack). And 5) Sharfman's et al. (1988) classification (high and low discretionary slack).

Apparent in most of the earlier literature is that each of these classifications are measured using financial ratios.

Given the challenges in operationalizing organizational slack, management scholars have moved beyond the original conceptualizations of the early thinkers (Cyert & March, 1963; March & Simon, 1958). Bourgeois (1981) introduced a number of easy to obtain financial measures of slack that became the foundation for all of the financial measures that came later. For example, Iyer and Miller (2008) applied Bourgeois' (1981) classification to measure absorbed slack as the ratio of selling, general, and administrative expenses (SGA) to sales. Unabsorbed slack was the current ratio (current assets/current liabilities). For potential slack, they used the ratio of debt to equity. Cheng and Kesner (1997) applied Bourgeois and Singh's (1983) classification (available slack, potential slack, and recoverable slack). They used the current ratio to measure available slack, the equity-to-debt ratio to measure potential slack, and divided general and administrative expenses by sales to measure recoverable slack. Greenley and Oketmgil (1998) measured generated slack using cash flow/investment, debt/equity, EBIT/interest cover, market/book value, current assets/current liabilities, and sales per employee. They measured invested slack in four different ways: administration costs/sales, dividend payout, sales/total assets, and working capital/sales. Also, Hambrick and D'Avni's (1988) choice of slack measures were guided by the work of Bourgeois (1981) and Singh (1986). The first measure they chose to use was the firm's equity-to-debt ratio and the second measure they chose was working capital as a percent of sales. Both of those measures are supposed to serve as indicators of unabsorbed slack, however, they differ in the immediacy they convey. For example, working capital portrays immediate slack, while the ratio of equity-to-debt portrays potential slack. Singh (1986) measured absorbed slack using working capital/sales, and SGA/sales. But for unabsorbed slack he used the quick ratio. Chakravarthy (1986) measured generated slack using five different proxies: 1. Cash flow divided by investment ratio, 2. Sales per employee, 3. Sales

divided by total assets, 4. Debt divided by equity, and 5. Market-to-book value. In contrast, he used only three ratios to measure invested slack: 1. Working capital divided by sales, 2. R&D divided by sales, and 3. Dividend-payout ratio. For a summary of the different slack measures and classifications that have been used throughout the literature please see Table 3.

**TABLE 3: A summary of key previous studies**

**Highlighted are the different slack classifications and measures employed by earlier researchers**

<b>How authors measured slack</b>	<b>Studies from the Literature</b>
<ol style="list-style-type: none"> <li>1. Available Slack:               <ol style="list-style-type: none"> <li>a. <math>(\text{Net profit} - \text{dividends}) / \text{sales}</math></li> <li>b. Dividends / net worth</li> <li>c. <math>[(\text{Cash} + \text{securities}) - \text{current liabilities}] / \text{sales}</math></li> </ol> </li> <li>2. Recoverable Slack:               <ol style="list-style-type: none"> <li>a. Inventory/sales</li> <li>b. Accounts receivable/sales</li> <li>c. Ratio of selling, general and administrative expenses (SGAE)/sales</li> </ol> </li> <li>3. Potential Slack:               <ol style="list-style-type: none"> <li>a. Price/earnings ratio</li> <li>b. Long-term debt/net worth</li> </ol> </li> </ol>	(Bourgeois & Singh, 1983)
<ol style="list-style-type: none"> <li>1. Generated Slack:               <ol style="list-style-type: none"> <li>a. Cash flow divided by investment ratio</li> <li>b. Sales per employee</li> <li>c. Sales divided by total assets</li> <li>d. Debt divided by equity ratio</li> <li>e. Market-to-book value.</li> </ol> </li> <li>2. Invested Slack:               <ol style="list-style-type: none"> <li>a. Working capital divided by sales</li> <li>b. R&amp;D divided by sales ratio</li> <li>c. Dividend-payout ratio</li> </ol> </li> </ol>	(Chakravarthy, 1986)
<ol style="list-style-type: none"> <li>1. Absorbed Slack:               <ol style="list-style-type: none"> <li>a. SGAE</li> <li>b. Working capital</li> </ol> </li> <li>2. Unabsorbed Slack:               <ol style="list-style-type: none"> <li>a. Cash and securities</li> </ol> </li> </ol>	(Singh, 1986)
Income (expenditure over a five year period)	(Damanpour, 1987)
<ol style="list-style-type: none"> <li>1. Unabsorbed Slack:               <ol style="list-style-type: none"> <li>a. Equity-to-debt ratio</li> <li>b. Working capital/sales</li> </ol> </li> </ol>	(Hambrick & D'Aveni, 1988)
<ol style="list-style-type: none"> <li>1. Available Slack:               <ol style="list-style-type: none"> <li>a. Current Ratio (current assets/current liabilities)</li> </ol> </li> <li>2. Recoverable Slack:               <ol style="list-style-type: none"> <li>a. SGAE/sales</li> </ol> </li> <li>3. Potential Slack:               <ol style="list-style-type: none"> <li>a. Debt-to-equity ratio</li> <li>b. Interest-coverage ratio (ratio of income before taxes and interest charges to interest charges)</li> </ol> </li> </ol>	(Bromiley 1991)
1. Available Slack:	(Moses, 1992)

<ul style="list-style-type: none"> <li>a. Net income/sales</li> <li>b. Change in stockholder equity/sales</li> <li>c. (cash + marketable securities – current liabilities)/sales</li> </ul> <p>2. Recoverable Slack:</p> <ul style="list-style-type: none"> <li>a. Working capital/sales</li> <li>b. Inventory/sales</li> <li>c. Accounts receivable/sales</li> <li>d. SGAE/sales</li> <li>e. Non-current assets/sales</li> </ul> <p>3. Potential Slack:</p> <ul style="list-style-type: none"> <li>a. Current liabilities/stockholder equity</li> <li>b. Long-term liabilities/stockholder equity</li> </ul>	
Cash flow	(Davis & Stout, 1992)
Subjective measures: A composite measure based on two questions from a survey	(Nohria & Gulati, 1995, 1996)
<ul style="list-style-type: none"> <li>- Recoverable Slack <ul style="list-style-type: none"> <li>a. Inventory/sales</li> <li>b. Accounts receivable/sales</li> <li>c. SGAE/sales</li> </ul> </li> </ul>	(Miller & Leiblein, 1996)
<ul style="list-style-type: none"> <li>1. Available Slack: <ul style="list-style-type: none"> <li>a. Current ratio</li> </ul> </li> <li>2. Recoverable Slack: <ul style="list-style-type: none"> <li>a. SGAE/sales</li> </ul> </li> <li>3. Potential Slack: <ul style="list-style-type: none"> <li>a. Interest-coverage ratio</li> <li>b. Debt-to-equity ratio</li> </ul> </li> </ul>	(Wiseman & Bromiley, 1996)
<ul style="list-style-type: none"> <li>1. Available Slack: <ul style="list-style-type: none"> <li>a. Current ratio</li> </ul> </li> <li>2. Potential Slack: <ul style="list-style-type: none"> <li>a. Equity-to-debt ratio</li> </ul> </li> <li>3. Recoverable Slack: <ul style="list-style-type: none"> <li>a. SGAE /sales</li> </ul> </li> </ul>	(Cheng & Kesner, 1997)
Subjective measures (used a survey)	(Sharfman & Dean, 1997)
<ul style="list-style-type: none"> <li>1. Generated Slack: <ul style="list-style-type: none"> <li>a. Debt-to-equity ratio</li> <li>b. Cash flow/investment</li> <li>c. EBIT/interest</li> <li>d. Market/Book value</li> <li>e. Current assets/current liabilities</li> <li>f. Sales per employee</li> </ul> </li> <li>2. Invested Slack: <ul style="list-style-type: none"> <li>a. Sales/total assets</li> <li>b. Dividend payout</li> <li>c. Administration costs/sales</li> <li>d. Working capital/sales</li> </ul> </li> </ul>	(Greenley & Oktemgil, 1998)



<ol style="list-style-type: none"> <li>1. Recoverable Slack <ol style="list-style-type: none"> <li>a. Accounts receivable/sales</li> <li>b. Inventory/sales</li> <li>c. SGAE/sales</li> </ol> </li> </ol>	(Reuer & Leiblein, 2000)
<ol style="list-style-type: none"> <li>1. Absorbed Slack: <ol style="list-style-type: none"> <li>a. SGAE to sales</li> </ol> </li> <li>2. Unabsorbed Slack: <ol style="list-style-type: none"> <li>a. Quick assets/liabilities</li> </ol> </li> <li>3. Potential Slack: <ol style="list-style-type: none"> <li>a. Debt-to-equity ratio</li> </ol> </li> </ol>	(Greve, 2003)
<ol style="list-style-type: none"> <li>1. Available Slack: <ol style="list-style-type: none"> <li>a. Current ratio</li> </ol> </li> <li>2. Recoverable Slack: <ol style="list-style-type: none"> <li>a. SGAE to sales</li> </ol> </li> <li>3. Potential Slack: <ol style="list-style-type: none"> <li>a. Debt-to-equity ratio</li> </ol> </li> </ol>	(Deephouse & Wiseman, 2000)
Discretionary Slack: subjective measure (two self-report items adapted from Nohria and Gulati (1995))	(Sharma, 2000)
Subjective measures for absorbed and unabsorbed slack (questions on a survey)	(Tan & Peng, 2003)
<ol style="list-style-type: none"> <li>1. Financial Slack <ol style="list-style-type: none"> <li>a. working capital (current assets – current liabilities)</li> </ol> </li> <li>2. Human Resource Slack <ol style="list-style-type: none"> <li>a. Firm employees/firm sales – industry employees/industry sales</li> </ol> </li> </ol>	(Mishina et al., 2004)
<ol style="list-style-type: none"> <li>1. High Discretion Slack: <ol style="list-style-type: none"> <li>a. Cash reserves</li> </ol> </li> <li>2. Low Discretion Slack: <ol style="list-style-type: none"> <li>a. Debt-to-equity ratio</li> </ol> </li> <li>3. Transient Slack: <ol style="list-style-type: none"> <li>a. Resource availability = (owners equity + debt) – (fixed assets + other noncurrent assets)</li> <li>b. Resource Demand = [cash required (5 days worth of sale) + accounts receivable + inventory] – accounts payable</li> </ol> </li> </ol>	(George, 2005)
<ol style="list-style-type: none"> <li>1. Financial Slack: <ol style="list-style-type: none"> <li>a. Cash reserves (for a theatre)/firms total expenses</li> </ol> </li> <li>2. Customer Relational Slack: <ol style="list-style-type: none"> <li>a. Revenue (level of subscription revenue)/firms total expenses</li> </ol> </li> <li>3. Operational Slack: <ol style="list-style-type: none"> <li>a. Unutilized seating capacity (total number of seats/total seating capacity)</li> </ol> </li> <li>4. Human Resource Slack: <ol style="list-style-type: none"> <li>a. Number of full time directors, designers, and</li> </ol> </li> </ol>	(Voss, Sirdeshmukh, & Voss, 2008)

<p>actors on a theater's staff/total number of directors, designers, and actors the theatre had employed for that year</p>	
<ol style="list-style-type: none"> <li>1. Absorbed Slack:             <ol style="list-style-type: none"> <li>a. SGAE/sales</li> </ol> </li> <li>2. Unabsorbed Slack:             <ol style="list-style-type: none"> <li>a. Current Ratio</li> </ol> </li> <li>3. Potential Slack:             <ol style="list-style-type: none"> <li>a. Debt-to-equity ratio</li> </ol> </li> </ol>	<p>(Iyer &amp; Miller, 2008)</p>

A few researchers (Bourgeois & Singh, 1983; Bourgeois, 1981; Sharfman et al., 1988) provided a solid rationale for the existence of different forms (classifications) of slack based on managerial discretion in the deployment of resources (George, 2005). In this classification, slack resources are considered part of a continuum of managerial discretion. High-discretion resources (e.g., cash and credit lines) will increase a manager's flexibility and strategic options while low-discretion resources (e.g. debt and fixed capacity) will lower it (Sharfman et al., 1988). Sharfman and colleagues pointed out that unabsorbed slack is high discretion while absorbed slack, excess costs in specialized assets, is low discretion (1988). These authors argued further that both high- and low-discretionary slack can coexist and are often employed together.

It is important to note that there is a great deal of overlap among these classifications. Even though I chose to review a sample of the financial measures in the organizational slack literature, it becomes apparent very quickly how much overlap exists between categories. For instance, the current ratio was utilized as a measure of unabsorbed slack, available slack, and even generated slack. It also is important to note that inconsistency in the measures used is attributed to data gathering limitations. It is, however, imperative to understand that many financial ratios have very similar interpretations.

The only instance where slack is not measured with financial ratios is in the work of Nohria and Gulati (1995, 1996) where the authors used a subjective measure that asks departmental managers two questions based on Bourgeois' (1981) work. Their data was obtained through a self-reported questionnaire mailed to department managers at the national subsidiaries of two major multinational corporations. One was European, the other Japanese. The questions were: (1) "Assume that due to some sudden development 10% of the time of all people working in your department has to be spent on work totally unconnected with the tasks and

responsibilities of your department. How seriously will your output be affected over the next year?” (2) “Assume that due to similar development, your department’s annual operating budget is reduced by 10%. How significantly will your work be affected over the next year?”

It also is important to note that none of these empirical studies measured or uncovered the importance of innovational and managerial slack and the role that they play in the valuation and future survivability of IPO firms.

## **THEORETICAL DEVELOPMENT**

Although both innovational and managerial slack are not well described in the organizational-slack literature, it can be argued that innovational and managerial slack are natural extensions of existing slack theory. The empirical observations presented in this work should raise new questions and offer new insights into organizational-slack theory and the field of entrepreneurship.

### **Slack Resources**

Slack resources are excess resources that are accessible to an organization during a given planning cycle (Nohria & Gulati, 1996; Sharfman et al., 1988). Slack resources convey the notion of a cushion of excess resources available to organizations that either will solve many organizational problems or facilitate the pursuit of goals outside the realm of those dictated by optimization principles (Bourgeois, 1981).

Slack can amass in an organization due to past performance, poor planning, or as an intentional planned buffer (Voss et al., 2008). Slack provides a cushion of actual or potential resources that allows a firm to adapt to internal pressure to change policy and external pressures

for changes in strategy (Bourgeois, 1981). Absorption of slack during periods of growth can be used to stabilize a firm's operations. During periods of distress, it can allow firms to maintain their aspirations and internal commitments (Cyert & March, 1963; Levinthal & March, 1981; Meyer, 1982). Through this dual internal and external role, slack influences performance (George, 2005).

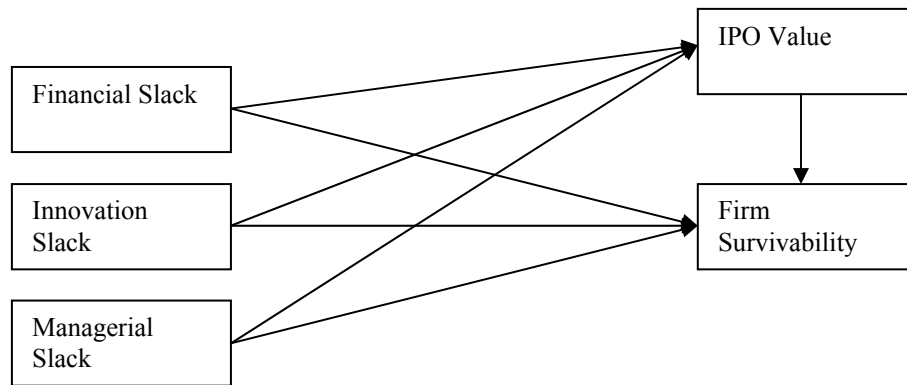
Researchers in public firms have found that low- and high-discretion resources vary in their impacts on performance. This is probably not true in the case of private firms undergoing an IPO. In private firms, the allocation and utilization of resources are likely to dominate managerial decisions (George, 2005). In a survey of 542 entrepreneurs who had just taken their firm public, Arkebauer (1991) found that the most important reason for going public was to infuse investment capital into the firm. This implies that IPO firms lack sufficient resources to allow them to remain competitive (or that the founders wish to use the IPO as an exit strategy). In a study of privately held firms, Holtz-Eakin and colleagues found that private firms in general are undercapitalized and their performance is improved by resource infusion (1994a). George (2005), using a diverse sample of five technology-intensive and five non-technology-intensive industries, similarly argued that privately held firms are undercapitalized. Behavioral arguments suggest that slack enhances experimentation and risk taking, which influences performance (Bromiley, 1991; Singh, 1986) as well as the degree of innovation of a firm (Nohria & Gulati, 1996).

In synthesizing this research, two reasons emerge for the positive effect of both high- and low-discretion slack on the valuation and future success of IPO firms. First, slack eases capital restrictions and improves the strategic choices available to managers in making investments with positive performance implications (George, 2005). Second, it allows experimentation and risk

taking, which also may have a positive effect on performance. Thus, I expect both low- and high-discretion slack to be positively related to firm valuation and long-term success. Because the presence of slack implies that these firms are adequately capitalized.

As previously noted, the management literature has primarily focused on financial slack when assessing performance (Bromiley, 1991; George, 2005; Tan & Peng, 2003), risk taking (Wiseman & Bromiley, 1996), and innovation (Nohria & Gulati, 1995, 1996). A few researchers have attempted to measure slack differently (e.g., Voss et al., 2008). Using a sample of nonprofit professional theaters, Voss examined financial, operational, customer, and human resource slack to determine how it interacts with environmental threats. They also studied the effect of those slack resources on product exploration and exploitation. The present study attempts to further extend the previous work by measuring not only financial slack, but also innovational and managerial slack using a U.S. sample of IPO firms. I develop the following model to test the effect of different forms of slack resources on short- and long-term IPO firm performance.

**Figure 1: The Model**



### *Financial Slack*

Researchers have used financial slack in a number of different forms as a predictor of risk taking (Wiseman & Bromiley, 1996), innovation (Nohria & Gulati, 1996), and performance (Bromiley, 1991; Tan & Peng, 2003). Financial Slack refers to the level of assets available to an organization (e.g., cash on hand) (Kraatz & Zajac, 2001) that could be easily deployed to varied uses (Mishina et al., 2004). The existence of liquid financial resources in a firm indicates that the firm has resources in excess of what is required to meet current obligations and support current sales levels (Mishina et al., 2004). Financial resources can be generated internally or externally. Internal resources are composed mainly of the profits from a firm's present investments. Those raised externally are acquired through capital markets or financial institutions and can be used for future investment. Financial slack is the least absorbed form of slack, especially given that it is completely divisible for the allocation of multiple activities (Greve, 2003).

From an RBV perspective, financial assets are valuable to an organization, but they are not rare given that they are generic (Latham & Braun, 2008; Voss et al., 2008). Even though managers have high discretion in the allocation of such a valuable resource, managers have to be very careful because resources are finite and bad decisions could lead to misuse of those resources. With the growth demands on IPO firms, there should be little motivation to conserve and a greater willingness to deploy financial slack to projects that will increase the likelihood of long-term survivability. For example, an IPO firm is more likely to invest in risky exploration projects than an established firm with good performance, given that such projects can strengthen an organization's long-term position (Voss et al., 2008). Undergoing an IPO is an extremely difficult, unpredictable, and stressful endeavor. Flexibility is crucial to successfully navigate the



process. Growth expectations are known to be high, but how high? Does a new pharmaceutical company have to go from developing one drug a year to ten? Financial slack can provide needed flexibility during this period of uncertainty by providing management with the resources to take advantage of emergent opportunities and resolve unforeseen demands for growth. In the long run, this flexibility should make expansion into new and uncertain businesses less problematic and should increase the rate of growth (Mishina et al., 2004).

Even though some scholars have argued that slack may be advantageous only up to a certain point (Bourgeois, 1981; Nohria & Gulati, 1995, 1996; Tan & Peng, 2003), I argue that in the case of firms undergoing an IPO, such arguments do not hold. Bourgeois' original thinking linked organizational inefficiency to slack; he argued that inefficiency is a natural outcome of high levels of slack within an organization. This may be true in successful and well established firms. However, firm valuation may depend on whether a firm will have the ability to successfully navigate the IPO process. In this case, slack would ease capital restrictions and improve the strategic choices of managers for investments with positive performance implications (George, 2005). Also, it allows experimentation and risk taking, which may have positive performance effects (George, 2005). In view of these arguments, I propose that higher levels of financial slack are positively related to firm valuation at IPO. The higher the level of financial slack, the stronger and more apparent is the quality signal to investors.

*P1: There is a positive relationship between financial slack and IPO firm performance.*

Using precedent previously established in the literature (e.g., Mishina et al., 2004; Voss et al., 2008), and building on the view that slack resources should be considered as excess

resources rather than just total resources (Moses 1992), therefore I rely on two different measures of financial slack (cash reserves and working capital). Cash reserves represent the level of available cash (cash on hand) to an organization (Kraatz & Zajac, 2001). Working capital captures aspects of the level of current resources relative to activity (Bourgeois & Singh, 1983). Working capital measures the net resources the organization has tied up in current or operating assets, relative to the level of activity (Moses, 1992). Thus, large stores of current resources should be an indication of slack. Details on approaches used to measure each cash reserves and working capital are described in the methods section, in the interim, it can be stated that:

*H1a: There is a positive relationship between working capital and IPO valuation.*

*H1b: There is a positive relationship between Cash Reserves and IPO valuation.*

*H1c: There is a positive relationship between working capital and Percent Premium.*

*H1d: There is a positive relationship between Cash Reserves and Percent Premium.*

Financial slack is beneficial to organizations. The value of the firm, in the long run, is mostly determined by its capital investment and operating decisions (Baker & Powell, 2005). Therefore, in order for a firm to guarantee that it will be in a position to adopt all of its positive net present value (NPV) projects, a firm must have adequate financial slack (Baker & Powell, 2005).

Although financial resources are not rare or unique, they are essential and do offer a competitive advantage to firms that possess them (Latham & Braun, 2008). A firm's possession of capital, for example, permits a broader range of strategic options and provides high levels of competitive advantage.

Firms can use financial resources to purchase equipment, employ scientists, build new laboratories, invest in new buildings, hire sales people, invest in R&D, and improve marketing. Financial resources thus offer to firms a high level of transferability to profit-yielding activities (Amit & Schoemaker, 1993).

Some scholars have argued that a firm's future growth strategies (e.g., diversification or internationalization) are mainly determined by its existing portfolio of resources (Penrose, 1959). Penrose (1959) insisted that this is particularly true for firms' unused financial resources. She further indicated that "internal obstacles arise when some of the important types of specialized services required for expansion in particular directions are not available in sufficient amounts within the firm" (1959:66). These impediments become more pronounced after an IPO, when companies face high levels of risk and uncertainty. Nevertheless, the presence of slack permits managers increased leeway in the face of highly ambiguous outcomes, thereby encouraging strategic behavior and facilitating adjustment to new environments (Miles, 1982). "Other scholars confirm this view by suggesting that firms with slack are more likely to respond aggressively to shifting environmental demands than those without slack" (Cheng & Kesner, 1997). In addition, slack can mitigate risk related to environmental pressures by shielding a firm's technical core (Cheng & Kesner, 1997; Thompson, 1967) and allowing the firm to persevere (Tan & Peng, 2003).

In light of the demands on IPO firms and the high uncertainty associated with an IPO, a firm's capital, as a crucial resource for its continued existence, can become increasingly scarce and thus more valuable. The transformation to a public corporation is based on a key assertion that because issuers are in the early stages of growth, they will need to search for additional capital shortly after the IPO (Jain & Kini, 2000). The danger of this approach, in regard to survivability, lies in the possibility of changes and shifts in market sentiments and a narrowing window of opportunity to issue capital on favorable terms. Jain and Kini (2000) observed numerous firms in the Internet business-to-consumer segment of the market were going public at huge valuations with first day closing prices often several times more than the initial offering price. The shift in attitudes that followed caused dramatic drops in valuations, at a time when the newly public firms had a crucial need for extra capital. Gloomy prospects for both equity and debt financing forced issuers to either fail outright, or access private equity markets on highly unfavorable terms, or alternatively consider being acquired in order to survive (Jain & Kini, 2000).

Given these arguments for the benefits of financial slack in a highly uncertain environment—such as the period right after an IPO—I predict that firms undergoing an IPO with ample resources in the form of financial slack will outperform firms with less financial slack over the course of the first few years of going public. I therefore offer the following hypothesis:

*P2: There is a positive relationship between financial slack and the long term survivability of an IPO.*

*H2a: There is a positive relationship between working capital and survival.*

*H2b: There is a positive relationship between Cash Reserves and survival.*

### *Innovational Slack*

Schumpeter's (1942) emphasis on the essential need for innovation by firms and society at large is rarely disputed. Some authors even argue that innovation is an essential source of competitive advantage and long-term survival among organizations (Porter, 1990; Woodman, Sawyer, & Griffin, 1993). Innovations have the potential to transform companies and industries. The majority of innovations are worth very little to the innovators, while others are extremely valuable (Bosworth & Jobome, 1999). An innovation can be both vital to a certain firm and the cause of decline for other firms in the same industry (Christensen & Bower, 1996; Tushman & Anderson, 1986).

Proponents of slack argue that organizational slack plays a vital role in allowing innovation (Nohria & Gulati, 1995). Slack permits firms to more safely experiment with new strategies and innovative projects that most probably would not be approved in a more resource-constrained environment (Cyert & March, 1992). Other researchers counter this argument, suggesting that slack diminishes incentives to innovate and promotes undisciplined investment in R&D activities that rarely yield economic benefits (Leibenstein, 1969). In order to reconcile these differences, Nohria et al. (1995, 1996) hypothesized and demonstrated that the actual relationship between slack and innovation is curvilinear (an inverse U-shape).

Behavioral theory treats firms as coalitions of actors to analyze the decision process of an organization. In a business organization, coalition members include managers, employees,

stockholders, suppliers, customers, tax collectors, lawyers, and so on (Mahoney, 2004).

Advocates of behavioral theory argue that slack provides opportunities for managers to appease their political coalitions by allowing parties to pursue their own agendas (Cyert & March, 1963).

Researchers have amplified this concept by arguing that slack relaxes internal controls and creates funds that can be redirected toward projects with uncertain outcomes, fostering innovation (George, 2005). Slack provides a source of funds for innovations that would not otherwise be approved (Cyert & March, 1992). Along these lines, evidence indicates that slack has a positive effect on innovation and performance in public firms (Bromiley, 1991; Damanpour, 1987; Greve, 2003).

My interest lies specifically with the slack useful for generating innovation, which will be called in this paper “innovational slack”. Innovational slack refers to the stock of resources available to an organization such as underused R&D facilities, specialized development staff, and time for development activities. Managers can allocate a certain amount of time for product developers to work on their own projects and loosen performance standards for new projects (Jelinek and Schoonhoven 1990). Google goes so far as to budget for innovation on employee’s time (Iyer & Davenport, 2008). From the bottom up, every employee must allocate time for innovation. Technical employees are required to spend 20% of their time on projects of their own choosing, while the rest of their time is devoted to core business activities. Managers are required to supervise closely the 20% that engineers spend on a variety of projects. Managers allocate their time as follows: 70% to the core business, 20% to related, but non-core projects, and 10% to businesses and products that are completely different from the company’s core business (Iyer & Davenport, 2008). In other cases, product developers appropriate time for projects that are unknown to higher levels of management (Burgelman, 1991). The invention of

the extremely successful 3M post-it™ would not have been possible if it were not for an employee's deep curiosity and the flexible environment that allowed him to work on such projects.

Overall, then, innovational slack is a refinement to existing organizational-slack theory. I view innovational slack as excess unused intellectual property, and excess R&D spending. Building on the above arguments I suggest that firms with high levels of innovational slack will have resources that are rare, valuable, and difficult-to-imitate, and, thus, from a resource-based-perspective, such firms should be able to achieve sustainable competitive advantage. Therefore, investors will value more highly firms that have innovational slack. I also argue that these firms will be better able to survive.

IPO firms operate under very specific conditions. Uncertainty about the firm is relatively high at the time of the IPO. Little prior company information exists to assist investors in assessing the value of these young firms. There is no publicly available stock price record and, often, no substantial sales records. Often the record of the top management team is limited or non-existent. Overall, there is only very limited information for investors to consider. For instance, a young biotechnology company's future potential to develop and market products is unknown. Given that "signals to investors about current and potential future value necessarily engage the structural and behavioral characteristics of the firm to a great degree; more so than in the trading of public shares" (Nelson, 2003). Therefore high levels of innovational slack should positively signal to investors the value of that firm. At IPO, higher levels of innovational slack should send a stronger and clearer indication to investors regarding the firm's ability to achieve future competitive advantage.

Conversely, some may contend that too much slack before the IPO would imply that such firms will face diminishing discipline. As slack increases, the discipline that is exercised in the selection, ongoing support, and termination of projects becomes lax (Jensen, 1993; Leibenstein, 1969; Nohria & Gulati, 1996). Over time and with increasing slack, risky projects with negative net present value (NPV) may be funded simply because the resources exist to indulge agents for whom these are pet projects (Nohria & Gulati, 1996). Escalation of commitment also becomes an issue given that excess levels of slack make it difficult to terminate someone's pet project (Staw, Sandelands, & Dutton, 1981). In times of slack, Cyert and March (1963) note that negotiations are not as intense and managers are generally less rigid in demanding that projects meet their forecasted targets. Therefore, slack fosters a permissive atmosphere around resource allocation that increases both the risk that poor projects will continued even in the face of negative information and that projects will be abandoned simply because someone ran out of energy, became bored, or ran into a tough problem (Nohria & Gulati, 1996). However, I argue that such views would only hold in the case of older, publicly traded firms. Corporations that face extremely high growth demands and massive public scrutiny, but have only limited resources, will respond differently to the availability of excess resources. The TMT of these firms realize that they are watched constantly and that there is very limited room for error. Managers in such firms understand that the valuation is simply a short term goal and the key is future survivability. Thus, they should manage for the long-term benefit of the organization more than the short-term. Managers are interested in the future success of an IPO firm for a number of reasons including the desire to grow their holdings and the fact that their reputations are closely tied to the success of the IPO firm.



Similar to the idea that larger IPOs are better positioned in the market and have the resources to withstand a decline in value (Hensler et al. 1997), I argue that IPOs that possess innovational slack will be better positioned to continue innovating, at least for a while, no matter what happens after the IPO. Also, such firms are better able to recover from their mistakes than firms without a cushion. Becoming a publicly held firm represents a destabilizing period in the history of the firm (Jain & Kini, 2000). Issuing firms must endure changes in ownership structure and governance mechanisms. They face increased risks related to changes in capital market conditions—given that investor sentiments can change at any time regarding any product, technology, or company. They are under pressure to meet analyst expectations and face increased market-monitoring. A slowdown in capital markets may lead to financial constraints for issuing firms, especially given that IPOs represent a form of staged financing. Reduced access to financing may lead managers to cut down on certain investments such as R&D. Pre-IPO innovational slack can help shield firms these post-IPO risks, increasing the probability of survival.

This is particularly true when, faced with a seasoned competitor; the speed with which an IPO firm can exploit technological discoveries becomes critical. The ability to accelerate innovation processes can lead to competitive advantage (Eisenhardt & Martin, 2000). In order to take advantage of innovations, firms are faced with a continuously shrinking window of opportunity due to spillovers, imitation attempts by competitors, and technological obsolescence (Markman, Gianiodis, Phan, & Balkin, 2005). Porter (1980) also suggested that as speed becomes the basis for competition, rivals are compelled to search for newer sources of technological knowledge and must depend on accelerated innovation to guide product

differentiation and fuel competitive advantage. Thus, going through an IPO, cannot in any way be allowed to limit the firm's ability to innovate.

This study therefore, predicts that excess innovational resources would be valued and appreciated by investors and would allow an IPO firm to more successfully compete and survive after the IPO. These arguments lead to the following hypotheses.

*P3: There is a positive relationship between innovational slack and IPO firm performance.*

Traditionally patents and R&D spending have been associated with innovation and performance. Patents are indicators of essential technology positions and innovation activity (Deeds et al., 1997). Patents also are widely accepted measures by policy makers, analysts (Van der Eerden & Saelens, 1991), and researchers (Deeds et al., 1997). Thus, one of the measures used to proxy for innovational slack is called patent slack.

The relative amount of R&D spending has been used as an indicator of innovative activity in many industries (Scherer, 1980). A number of studies have considered the relationship between R&D spending, productivity returns and firm's performance (Comanor, 1965; Grabowski & Vernon, 1990; Graves & Langowitz, 1993). Therefore, another measure of innovational slack will be called R&D slack. Details on the approaches used to measure patent and R&D slack will be discussed in the methods section.

*H3a: There is a positive relationship between patent slack and IPO value.*

*H3b: There is a positive relationship between R&D slack and IPO value.*

*H3c: There is a positive relationship between patent slack and Percent Premium.*

*H3d: There is a positive relationship between R&D slack and Percent Premium.*

*P4: There is a positive relationship between innovational slack and the long term survivability of an IPO.*

*H4a: There is a positive relationship between patent application slack and survival.*

*H4b: There is a positive relationship between R&D intensity slack and survival.*

### *Managerial Slack*

More than half a century ago, Penrose (1959) recognized the importance of managerial slack as an essential factor in firm growth. She observed that firms are able to grow and develop only when excess ‘managerial services’ are released to take advantage of the productive opportunity of the firm. In addition, she hypothesized that the managerial limits on firm growth could not be overcome simply by hiring more managers. There is evidence in the literature that

limited managerial time and resources hinder a firm's growth and its capacity to respond proactively to environmental changes (Gibb & Scott, 1985).

According to the RBV, it can be argued that managers and their abilities are an organizational resource that can be valuable, rare, and inimitable. Managerial slack refers to specialized and skilled top management team resources that are rare and absorbed. This definition is based on an earlier conceptualization of human-resource slack (Mishina et al., 2004). Competitive markets work very hard to retain and protect skilled and specialized executives who are central in creating long-term competitive advantage (Barney, 1991). These competitive efforts increase the rarity of managerial slack even further. In addition, managerial slack is absorbed because the resources are tied up in the organization's current operations.

Rumelt (1984) argued that the strength of the isolating mechanisms (e.g., causal ambiguity, social complexity, path dependence) determine how long a firm can enjoy a competitive advantage. Isolating mechanisms shield resources from competitors' imitation attempts and preserve the appropriation of stable rent-streams (Mahoney & Pandian, 1992; Peteraf, 1993). Examples of isolating mechanisms include producer learning, buyer switching costs, reputation, buyer search costs, channel crowding, firm specificity, causal ambiguity, social complexity, path dependence, and time compression diseconomies (Dierickx & Cool, 1989; Lippman & Rumelt, 1982; Peteraf, 1993; Reed & DeFillippi, 1990; Rumelt, 1987). Kor and Mahoney (2004) argued that Penrose (1959) contributed to our knowledge of isolating mechanisms in a number of ways, two of which apply to managerial slack. The first is firm-specific knowledge possessed by managers. The second is managers' shared, team-specific experience. Managers' experience with their firm-level resources produces firm-specific knowledge about the productive opportunities that are unique for this firm (Penrose, 1959).

Penrose further observed that this experience-based knowledge is proprietary because it cannot rapidly be transferred to new managers, nor can it be purchased in the market (1959). She also emphasized that managers cannot function well as a team without firm-specific, shared experience in the TMT, which leads to the creation of tacit knowledge of strengths, weaknesses, and idiosyncratic habits of team members (Penrose, 1959). In order for managers promptly to seize and capitalize on productive opportunities in the environment, the management team must share team-specific experience to triumph over any process difficulties they encounter. These might stem from lack of knowledge or from a lack of confidence in each other's abilities (Kor & Mahoney, 2004; Penrose, 1959). Thus when an IPO's TMT possesses these two isolating mechanisms, the IPO has a better chance of sustaining a competitive advantage over time.

Penrose also pointed out that newer firms are faced with numerous difficulties and that focusing on growth while managing those difficulties is extremely challenging. She explained:

“A new firm having to exert special efforts to keep its existing footing, let alone expand, may have to devote an extraordinarily high proportion of its existing managerial talent to current operations; once it succeeds in catching the public fancy, in obtaining the confidence of capital suppliers and of consumers, in solidly establishing its trade relations, the operating problems may diminish, growth becomes possible and if growth can take place in the firm's existing areas of operations, the proportion of total services that must be devoted to operations may remain relatively low. On the other hand, if competition is intense and supply and demand conditions require constant adaptations, the firm may not be able to do much more than keep on its feet and, if it expands at all, can expand only slowly” (Penrose, 1959: 205).

From a behavioral point of view, scholars have argued that increases in organizational resources permit experimentation and organizational change (Cyert & March, 1963; March, 1981). “Organizations with spare time and spare resources have greater opportunities for experimentation and less strict performance monitoring and so have the resources and managerial patience needed to innovate” (Greve, 2003). If managers are busy fighting fires on a

daily basis, they will not be able to devote enough time to planning for and directing the firm's growth.

The notion of having more than enough managerial resources and experience at the time of the IPO is my conceptualization of managerial slack. Managerial slack is viewed as an investment that can prepare an organization for continuous growth and success. The pressures placed on high-growth firms are well documented in the entrepreneurship literature (Covin & Slevin, 1997; Bruton & Prasad, 1997; Hambrick & Crozier, 1985). Managerial slack is one way to relieve the pressures of high growth and reduce the risk of failure.

Overall, then, managerial slack is a refinement of existing organizational-slack theory. This study views managerial slack as an excess of managers and managerial experience relative to firm assets. In other words, to acquire managerial slack a firm should grow its managerial base at a faster rate than its asset base. In doing so a firm can (1) build a "cushion" to allow for flexibility and adaptability in times of high growth, and (2) invest and prepare for future growth to remain ahead of the competition.

Although an IPO can provide firms with many benefits (e.g., cash), the transformation from a private to a public company brings with it a number of costs that should not be ignored. The change to a public firm necessitates a change in the firm's goals and objectives. This is because the IPO firm's management is dealing with new investors who have different objectives and time horizons than earlier investors and therefore have different needs that must be served (Fischer & Pollock, 2004). Additionally, the top management team must determine how to deploy the new financial resources available to their firm through intensifying existing strategic initiatives or by implementing new strategies that can involve a range of activities (Husick & Arrington, 1998). For instance, the IPO firm could engage in acquisitions that change the

boundaries of the firm or enter new product or geographic markets with which the firm has little experience (Husick & Arrington, 1998).

The top management team must learn to deal with reduced flexibility in managerial discretion, increased oversight from the firm's board of directors, greater demands from investors for short-term performance, and less tolerance of negative press and performance volatility (PriceWaterhouse, 1995). After the IPO, the TMT must deal with significant cultural changes, as well as change resulting from its employees' new found wealth as options are exercised and stock is sold which could lead to some employees leaving the company, while others may be less willing to make the personal sacrifices that were required to get the firm to the IPO stage (Fischer & Pollock, 2004). As the company continues to grow, managers' continued adaptation to and management of challenges becomes a part of company life. Thus, an excess number of qualified individuals will be required to handle the daily demands of the job even as they plan for the future. Furthermore, the survival of IPO firms may possibly be dependent upon them not only managing the transition to becoming a public firm, but also being able to correctly grow the firm. This study therefore argues that a surplus of qualified managers may signal the quality of an IPO firm. For example, investors may detect that an IPO firm that employs managers with team and firm-specific experience could sustain their competitive advantage over time. Compared to a firm with a few, overworked managers who are unable to devote the necessary time growing the firm.

#### Managerial Experience:

As per the previous definition, I argue that managerial experience also has a tremendous effect on firm performance and survival. This study suggests that such experience can be a signal

of quality. Penrose (1959) and other researchers have argued that managers play a vital role in choosing a firm's direction, the markets it will participate in, and the blend of resources it will deploy and nurture (Castanias & Helfat, 1991; Kor & Mahoney, 2000; Mahoney & Pandian, 1992). An extremely important insight from the RBV provides that in order to generate superior returns a firm must not only possess unique resources but it should also effectively and innovatively manage such resources (Mahoney, 1995). In particular, the bundle of managerial experiences executives have can reflect the TMTs skills, knowledge, and competencies (Carpenter, Sanders, & Gregersen, 2001; Harris & Helfat, 1997). In order to assess managerial competence at the upper ranks, an examination of the bundle of managerial experiences in the TMT is essential, especially because professional management experience molds the knowledge, confidence, and imagination of managers (Penrose, 1959; Van de Ven, Hudson, & Schroeder, 1984). I argue that managers with industry-specific management experience will have a positive effect on firm performance and survival. I specifically suggest that excess managerial experience, will allow those firms to more successfully manage the transition from a private to a public company.

Industry-specific management experience involves knowledge of the opportunities, threats, competitive conditions, supplier and buyer relations, customers, industry norms, and regulations specific to an industry (Kor, 2003). New developments in technology, competition, regulations, and other industry conditions are generally linked to prior industry conditions; this is very similar to the path dependence of resource accumulation and capability development (Oster, 1999). In the case of new ventures, previous industry-specific managerial experience can be exceptionally important given that knowledge of industry conditions and relationships may



considerably reduce the liability of newness (Cooper et al., 1994) as those companies struggle in developing connections with suppliers and customers in the industry (Stinchcombe, 1965).

Industry-specific experience also is difficult for competitors to imitate (Kor, 2003). In a perfectly efficient labor market not subject to scarcity (e.g., human capital), it would be easy to recruit an executive with the desired skills and experience. However, in a setting where labor markets are not perfectly efficient, recruiting becomes more challenging (Castanias & Helfat, 1991). New ventures operating under high uncertainty and making irreversible investments face a case of labor market imperfections. Managers may be reluctant to join a risky entrepreneurial firm without very attractive incentives. This, of course, is difficult given the limited financial resources available to these firms. Further, the stock options they provide are risky (Kor, 2003). This work thus theorizes that the collective, industry-specific managerial experience of a firm contributes to the competence of the TMT. Based on the previous arguments, the following hypothesis has been developed:

*P5: There is a positive relationship between managerial slack and the valuation of the IPO firm.*

Traditionally the TMT has been defined as all inside top level executives such as the Chief Executive Officer (CEO), Chief Operating Officer (COO), business unit heads, and vice presidents (Carpenter et al., 2001; Finkelstein & Hambrick, 1996). Specifically in the IPO literature, researchers have considered all inside executives listed in the prospectus as key management personnel (e.g., Kor, 2003). Therefore, this paper similarly used the number of all insiders, insider slack, listed in the prospectus as proxy of managerial slack. A second proxy,

experience slack, was implemented in this study to capture a different dimension of managerial slack. This measure is specifically aimed to capture the managerial knowledge of the opportunities, threats, competition, specific technologies (Kor, 2003) and equipment, and trade secrets of an industry. In this study, I will refer to this measure as experience slack. Further details on exact measurement issues are provided in the methods section.

*H5a: There is a positive relationship between the number of insiders slack and IPO value.*

*H5b: There is a positive relationship between insiders' industry experience slack and IPO value.*

*H5c: There is a positive relationship between number of insiders slack and Percent Premium.*

*H5d: There is a positive relationship between insiders' industry experience slack and Percent Premium.*

Post-IPO firms are at an especially vulnerable point in their development (Kroll, Walters, & Le, 2007). The TMT must change from managing a private company to managing a public one. They also must cope with the expectations of a number of regulatory agencies and the financial community (Fischer & Pollock, 2004). As a firm goes through such a unique period, the

TMT is faced with limited resources and strategic options relative to more established rivals (Zahra & Filatotchev, 2004). Further, the TMT must set their firm apart from their larger and more established competitors, while skillfully handling the uncertainties associated with younger firms (Kroll et al., 2007). The liability of newness further amplifies these difficulties (Stinchcombe, 1965).

Another critical element of successfully completing an IPO has to do with post-IPO research coverage. Generally, analysts can begin issuing reports on IPO firms during the first 25 days following the IPO. Positive analysts reports will help stimulate demand for the stock of the IPO firm through a number of mechanisms including the providing of ‘booster’ shots to jump start a stock when demand softens (Jain et al., 2000). Entrepreneurs have been known to point to their inability to catch the attention of an analyst shortly after the IPO as an important factor in explaining their declining stock price (Jain et al., 2000).

Therefore, because managing post-IPO firms is an intricate task that involves substantial creativity (Kroll et al., 2007), I suggest that excess managerial resources and experience is of tremendous value to the survival of young firms.

*P6: There is a positive relationship between managerial slack and the long term survivability of an IPO.*

*H6a: There is a positive relationship between number of insiders slack and survival.*

*H6b: There is a positive relationship between insiders’ industry experience slack and survival.*

## **IPO Valuation and Survivability**

### *IPO Valuation*

Research on pricing in the IPO market has a long and well-established history in the finance field. In the management field, scholars similarly seem to be gaining more interest in issues surrounding IPOs. Researchers have studied a variety of pricing predictors in the IPO market. Items of interest have included a number of independent variables such as, venture capital backing, underwriter's prestige, firm size, and firm age. Table 4 offers a summary of the studies available in the literature.

**TABLE 4: Predictors of pricing in the IPO markets in the literature:**

**A summary of key previous studies**

<b>Independent Variables</b>	<b>Examples from Literature</b>
The effect of venture capital (VC) backing	(Barry, Muscarella, Peavy, & Vetsuypens, 1990) (Megginson & Weiss, 1991)
Underwriter prestige	(Carter & Manaster, 1990; Carter et al., 1998b; Megginson & Weiss, 1991)
Firm size	(Ibbotson et al., 1988)
Firm age	(Megginson & Weiss, 1991; Mikkelsen, Partch, & Shah, 1997; Ritter, 1991)
Media attention	(Pollock & Rindova, 2003)
Whether the CEO is also the founder	(Certo et al., 2001a)
Investment bankers	(Daily et al., 2005)
Level of CEO equity	(Certo, 2003)
Top management team legitimacy	(Cohen & Dean, 2005)
Innovation	(Heeley, Matusik, & Jain, 2007)

Researchers have examined issues relating to IPOs in two different ways. The first perspective (e.g., in the case of VC backing and high prestige underwriters) focuses on the idea that investors look at entities associated with an IPO and assume that those entities have scrutinized the IPO firm. The sheer involvement of those entities provides a positive signal for investors, thus motivating them to invest.

The other perspective used by scholars involves looking for general firm-level proxies (e.g., firm size or age) as signals about the viability of a firm. This literature is very interesting and useful for both academics and practitioners and has improved dramatically our understanding of IPO valuation. What is interesting is that only one study, thus far, has attempted to examine the effects of specific internal firm activities, which directly impact the ability of firms to generate rents, that affect pricing in the IPO market (see Heeley et al., 2007). Heeley and colleagues focused on understanding the effects of a firm's innovation activities on IPO performance. I examine the relationship between slack resources and the performance and survivability of IPO firms.

### *IPO Survivability*

Management research into the survival of IPO firms in U.S. markets is limited. Some of the key articles on this topic are summarized in Table 5. In one key article, Hensler, Rutherford, and Springer (1997) explored the relationship between several characteristics and survival using a sample of IPOs between 1975-1984. The authors found that the age, size, percentages of shares owned by insiders, and IPO activity in the market at the time of listing are all positively related to survival. They also found industry to be of importance to the survival of an IPO. The study

further suggested that survival time lessens with the number of risk factors listed in the prospectus and also with general market level at the time of listing.

**TABLE 5: Predictors of Survival in the IPO Markets in the Literature:**

**A summary of key studies in previous literature**

<b>Independent Variables</b>	<b>Examples from Literature</b>
Firm age	(Hensler et al., 1997)
Firm size	(Bhabra & Pettway, 2003; Hensler et al., 1997; Jain & Kini, 1999)
Percentages of shares owned by insiders	(Hensler et al., 1997)
Underwriter prestige	(Jain & Kini, 1999)
Pre-IPO profitability	(Bhabra & Pettway, 2003)
R&D spending	(Bhabra & Pettway, 2003; Wilbon, 2002)
The number of risk factors	(Bhabra & Pettway, 2003)
VC backing	(Jain & Kini, 2000)



Jain (Jain & Kini, 1999) looked at the life cycle of IPOs utilizing a sample of firms listed from 1977-1990. The authors observed the sample over five years and they found that 69% survived, 17% were acquired, and 14% failed to survive. They focused on determining factors that influenced the transition into one of these three states. Their findings demonstrate that size, operating performance—prior to the IPO—and underwriter prestige all are positively related to survival, whereas other findings showed a negative relationship with survival (e.g., firm risk, industry barriers to entry and higher industry concentration).

Another study looked at the relationship between prospectus information and performance of initial public offerings utilizing a random sample of 242 IPOs from 1987-1991 (Bhabra & Pettway, 2003). The data were coded completely from the IPO prospectuses. They also examined survival after five years of going public using a logistic regression model by observing whether an IPO was delisted or failed. They found that the prospectus information is an important and useful predictor of survival. More specifically, they found that collectively pre-IPO profitability, R&D spending, relative offer size, firm size, and the number of risk factors in the prospectus are helpful—significant—in predicting survival.

#### *The Effect of IPO Valuation on Survivability*

Understanding IPO valuation represents a crucial area of investigation, particularly because a firm's ability to raise capital in an IPO directly impacts its ability to employ new managers, create a sales team, increase marketing, and invest in R&D, new projects, and equipment (Certo, 2003). Therefore, the ability of a firm successfully to finalize an IPO may perhaps affect long-term measures of performance (e.g., Ritter, 1991), as well as the firm's survival capabilities (e.g., Jain & Kini, 2000).

Undergoing an IPO is a unique and special occurrence comparable to a only limited number of events in terms of the demands for change to strategy, structure, personnel, control processes, and standard-operating procedures (Jain & Kini, 2000). Undergoing an IPO can be very destabilizing to the firm and jeopardize its survival unless appropriate adaptation takes place (Jain & Kini, 2000). The destabilizing effect of issuing an IPO can be deduced from previous empirical research that suggests that nearly a third of IPO-issuing firms fail or are acquired within five years of going public (Jain & Kini, 1999).

According to Jain and Kini (1999) after completing an IPO, a firm can either survive as an independent public firm, be acquired, or fail. Arguably, both survival and acquisition are much more desirable results for managers and owners than failure. Survival is the major goal of a firm and in the long run is an essential condition for success in other terms such as market share and profitability (Suarez & Utterback, 1995). Surviving as an independent firm is a rational and desirable outcome for entrepreneurs who went public to finance the growth of their company through issuing stock (Jain & Kini, 1999). Alternatively, firms that completed an IPO as the first step in the sale of their firm will become targets of acquisitions after the IPO and effectively lose their existing identity as a stand-alone entity (Jain & Kini, 1999). In keeping with previous literature (e.g., Jain et al., 1999; Hensler et al., 1997), this study focuses on firms that have survived as an independent firm. I follow Hensler et al.'s (1997) definition of a firm's failure to survive as delisting from the trading exchange for negative reasons.

I expect that firms with relatively better IPO performance to have an increased likelihood of survival. Researchers have argued that corporations that go public later in their life cycle may already have a history of earnings and sales and most probably are already profitable at the IPO and are therefore expected to display reasonably higher pre-IPO operating performance (Jain &

Kini, 1999). Jain et al. (1999) argued that the transition to a post-IPO firm will be influenced by the pre-IPO operating performance. Along those same lines, this study proposes that firms with relatively higher valuation at the time of the IPO should have better resources (e.g., potential future cash flow) and better chances of survival, especially because these firms are less likely to get into financial distress or need a capital infusion from a bidder. Because of their larger IPO value, these firms will be more likely to have the resources to cope with the high post-IPO growth requirements and, again, have a better chance of survival. Accessibility to more resources, particularly those resources considered central to formulating the firm's strategies and generating competitive advantage, are the primary source of a firm's profitability (Grant, 1991). Strong financial resources can help firms achieve competitive advantage; possessing capital has been viewed as a main driver of competitive advantage in the management literature (Amit et al., 1993).

*P7: There is a positive relationship between IPO valuation and long term survivability of an IPO.*

*H7: There is a positive relationship between IPO value and survival.*

## METHODS

### Sample and Data Collection

To test the hypotheses, I developed a sample of high-tech ventures in the U.S. market that had undertaken an IPO between 2001 and 2005. Based on Standard Industrial Classification (SIC) codes, firms were identified as operating in high-technology industry sectors (Daily et al., 2005). The sample thus includes firms from various industries. High-technology firms are defined as those in SIC codes 28 (biotechnology and drugs), 35 (computer and related), 38 (medical equipment), 73 (software), 36 (electronics and communication), and 48 (telephone equipment and communications services) (Bradley, Jordan, Ha-Chin, & Roten, 2001; Carpenter & Petersen, 2002; Loughran & Ritter, 2004).

The time frame of this study was selected to omit extremely low or high volume years such as the DotCom bubble of 1999 and 2000. The data were collected from a number of sources, the prospectuses found on the Securities and Exchange Commission (SEC's) Electronic Data Gathering and Retrieval (EDGAR) system for IPOs, LexisNexis database, general web search using Google, and the University of Chicago Center for Research and Securities Prices (CRSP) database.

IPO prospectuses of each firm provided the necessary information in this study for all independent and most control variables. Previous studies similarly have used IPO filings as a primary source of data (e.g., Beatty & Zajac, 1994; Deeds et al., 1997; Filatotchev & Bishop, 2002; Lester et al., 2006; Welbourne & Andrews, 1996; Zimmerman, 2008). The firm's prospectus includes details of the firm's background, products, top executives, executive compensation, and operating history. These prospectuses reveal valuable information to investment bankers, regulators, investors, and other interested parties (Beatty & Zajac, 1994).

The revised Securities and Exchange Act of 1934 sets the requirements for prospectuses, which guarantees that the information is as accurate and consistent as management can provide. Given this strict requirement and the fact that the SEC has placed great importance on the quality of prospectuses, they can be considered are a reliable data source (Marino, Castaldi, & Dollinger, 1989).

Foreign firms were excluded from the initial sample because research has identified national differences in IPO survival (Espenlaub, 1999). Consistent with prior research in the field, holding companies, financial institutions, and real estate investment trusts (REITs) were excluded from the sample (e.g., Fischer & Pollock, 2004). Three firms were excluded because prospectuses could not be found for them, leaving 172 firms. To determine the minimum sample size required for this study, I ran a power analysis. I set the study to have a strong power level (by convention larger than 0.8). Following Cohen (1988) I assume that a medium effect size ( $f^2$ ) (by convention = 0.15). I used an Alpha level ( $\alpha$ ) = 0.05 and I took all the predictors in the study into account. I found that to achieve the desired power level, a sample of 153 will be required<sup>1</sup>. Thus, I believe that the current sample size is large enough to detect the hypothesized relationships. The sample is ideal for a test of the effect of slack resources on IPO valuation and future survivability for a number of reasons, (1) this is the most current sample that could be obtained while avoiding the years of the Dotcom bubble, (2) by focusing on high-tech firms, I

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<sup>1</sup> Computing a-priori sample size requires four input parameters. (1) The alpha (probability) level, (2) The number of predictors in the linear model (not including the intercept), (3) The anticipated effect size (f-square), and (4) The desired statistical power level. Once these four input parameters are known, a-priori sample size can be computed using the following method: 1) Setting the initial value of the denominator degrees of freedom equal to the number of predictors +1. 2) Estimating the critical value of the Fisher F-distribution using the number of predictors, the denominator degrees of freedom, and the probability level. 3) Computing the noncentrality parameter (lambda). 4) Estimating the value of the noncentral F-distribution using the number of predictors, the denominator degrees of freedom, lambda, and the critical F-value. 5) Calculating the current model power by computing the cumulative area under the normal curve from zero to the noncentral F-value. 6) If the observed statistical power is less than the desired power level, increment the denominator degrees of freedom and repeat steps 2 through 5. 7) The a-priori sample size is equal to the number of predictors + the denominator degrees of freedom + 1 (Please See Cohen et al. (2003) and Cohen (1988) for a great review).

could better examine the effect of innovational slack on firm performance and survival, (3) the availability of slack data, and (4) the availability of performance and survivability data. The choice of the sample cutoff (2005) had to do with (1) accessing a reasonable number of offerings for a full census study, and (2) allowing for an examination of post-IPO survival which is an important component of this study.

There is considerable variety in industry context in the sample, and it is possible that slack may differ across industries (George, 2005). For instance, Miller, Lant, Milliken, and Korn (1996) illustrated that slack correlates differently with performance in the furniture versus software industries. And because slack is operationally defined as excess absolute levels of resources (Nohria & Gulati, 1996), I chose to calculate slack as the deviation from the mean of each of the six industries in the IPO sample (e.g., George 2005). George (2005) emphasized that this method offers a close estimate of excess resources in comparison to industry norms.

### **Dependent Variables:**

Three different measures of IPO success, “IPO value”, “percent premium”, and “post-IPO firm survival” were applied in this study in order to capture the effect of slack resources on those different measures.

#### *IPO Value*

This measure represents the capital raised at IPO, and is the total value of the capital for the firm raised through the firm’s IPO while subtracting the underwriters’ fees as presented on the cover page of the firm’s prospectus (Deeds et al., 1997; Finkle, 1998; Gulati & Higgins, 2003). IPO value is both an IPO measure of firm performance (Gulati & Higgins, 2003;

Zimmerman, 2008), and a measure of how the market values a company at the time of the initial offering (Finkle, 1998).

#### *Percent Premium (offer price)*

The second dependent variable is the percent premium or offer price. Percent premium is a measure of investor optimism about the future value of a firm at the time of the IPO. This value is calculated as the share price at the time of IPO minus the firm's book value divided by share price at the time of IPO. This uses both accounting-based and stock price information to measure "difficult to account for" assets (Nelson, 2003: 715) and reflects the price of the firm's stock on the first day of trading.

#### *Post-IPO firm survival*

The second part of the study focuses on a long term dependent variable which measures firm failure or survival in the years following the IPO up to December 2008. In order for an IPO to be considered a survivor in this study, the firm must continue to operate independently and as a public organization. This definition is based on earlier work (e.g., Bach & Smith, 2007; Jain & Kini, 1999) which viewed acquisitions and mergers as being dissimilar to survival given that most acquisitions of newly public firms were preceded by a period of declining stock, a sign of corporate weakness (Jain & Kini, 1999). However, this approach has not been followed by all researchers; some have considered acquisitions and mergers as survivors (e.g., Fischer & Pollock, 2004). Hence, the decision to eliminate acquired firms from the survivor category is partly based on prior studies that propose that such firms are distressed (Welbourne & Andrews, 1996). In addition, the focus of this research is on firms that continue to operate as independent

public organizations, which is similarly consistent with other IPO survival studies (e.g., Jain & Kini, 2000).

I constructed a dichotomous outcome measure coded 1 for a firm that was traded as an independent entity at the end of 2008 and 0 otherwise (1 = survival, 0 = a state of non-survival). Firms that were delisted from the trading exchange for negative reasons or were acquired are classified as non-survivors. In keeping with prior studies (e.g., Hensler et al., 1997), I chose to classify all firms that are delisted for negative reasons as failures. The data used to calculate IPO firm failure were drawn from the CRSP database, where delisting codes for negative reasons consist of bankruptcy, liquidation, failure to meet financial guidelines to list, insufficient capital, insufficient float, nonpayment of fees or delinquency in filings, insufficient number of market makers, price falling below acceptable levels, and insufficient number of shareholders.

### **Independent Variable: Measures of Organizational Slack**

Several measures of slack have been suggested and used in the management literature. However, selection of the most suitable operationalization is a hotly debated subject (Mishina et al., 2004). The most utilized slack measures build on the seminal work of Bourgeois (1981). Typical measures have included the ratio of selling, general, and administrative expenses (SGAE) to sales; ratio of quick assets to liabilities; or the ratio of debt to equity (Bromiley, 1991) (See Table 3 for a more comprehensive list). Even though previous studies have discussed different types of slack, the measures used to actually operationalize slack have tended to be strictly financial ratios. Qualitative measures of slack are very rare (e.g., Mishina et al., 2004). Nevertheless some studies have used qualitative measures (e.g., Meyer, 1982) and some perceptual measures (e.g., Nohria & Gulati, 1996).



As just noted, most studies have relied on financial measures to capture various types of slack (e.g., Greve 2003). This is likely because financial measures are readily available and are well established in the literature. A few studies have investigated the role of other slack resources without fully relying on financial data. A recent piece examined customer relational slack, operational slack, and human slack in a sample of nonprofit professional theaters to investigate the effects of slack resources on product exploration and exploitation (see Voss et al., 2008 for a good example).

This work aims to extend previous literature by developing and utilizing new measures of slack to more fully capture the effect of slack on firm performance. In addition, this study considers the insights of previous studies in constructing the slack measures. A number of researchers have suggested that organizational slack should not simply be measured as an absolute amount of resources, rather it should be measured relative to a target resource-level (Bromiley, 1991; March & Shapira, 1987; Miller & Leiblein, 1996; Mishina et al., 2004). Financial ratios that are widely used in the literature may differ from one industry to another. Ratios that are the norm in one industry could be extraordinarily high or low in another industry and thus slack measures may not generalize across industries (Miller & Leiblein, 1996). Lev (1969) argued that average industry financial ratios offer reasonable proxies for target levels. Therefore, I measured all slack resources as the difference of a firm's own measures (e.g. accounting ratios) and its industry average.

Another debate in the literature is in regards to the measurement of change in slack over time vs. assessment of the level of slack at a given moment in time (e.g., Bourgeois and Singh, 1983; Marino and Lange, 1983; Moses, 1992). I chose to measure slack taken at a particular instant for two reasons: 1) Examining changes in slack are appropriate only when the dynamics

of slack over time are of interest (Mishina et al., 2004). 2) Static measures are more appropriate when investigating the deployment of slack resources in the short term (e.g., Marino and Lange, 1983). All data required for the independent variables were obtained from the IPO prospectuses.

### *Financial Slack*

Financial Slack will be operationalized using two different methods. First, working capital was chosen because it has been identified by scholars as the most appropriate and useful operationalization of financial slack given that it considers the appropriate level of working capital to meet current needs (Moses, 1992). Working capital is calculated by taking the difference between a firm's current assets (e.g., cash and cash equivalents, accounts receivable, inventory, marketable securities) and a firm's current liabilities (e.g., accounts payable and accrued expenses) (Brealey & Myers, 1996).

The amount that is left after subtracting current liabilities from current assets is a measure of short term financial resource utilization (Bromiley, 1991; March & Shapira, 1987; Miller & Leiblein, 1996). A positive result indicates positive financial slack, implying that such a firm has surplus resources; rather than using those resources for productive purposes the firm is storing cash and other current assets at a higher level than is necessary (Mishina et al., 2004). Negative financial slack would mean that a firm is stretching its resources more than anticipated. Both Mishina et al. (2004) and Moses (1992) argued that working capital is the best measure of financial slack. Thus, in keeping with their research, I chose to use this measure of the slack available for immediate resource needs. In this study, financial slack was calculated using the following equation:

$$\text{Working Capital} = (\text{Firm working capital}) - (\text{Avg. Industry working capital}).$$

The second measure of financial slack is a firm's cash reserves as documented in the prospectus. These are available for deployment for virtually any purpose. This measure has been used in previous literature (e.g., George, 2005; Voss et al., 2008). In the work by, Voss and colleagues, a theater's cash reserve was used as a measure of financial slack (2008) (their sample included 214 non-profit professional theaters). They examined how slack resources interact with environmental threat appraisal to influence product exploration and exploitation. In this work, firm cash reserves were calculated using the following:

$$\text{Cash Reserves} = (\text{Firm cash reserves}) - (\text{Avg. industry cash reserves}).$$

This measure of financial slack is consistent with those adopted in other studies (e.g., George, 2005; Miller & Leiblein, 1996; Mishina et al., 2004; Voss et al., 2008).

### *Innovational Slack*

Two variables will be used to measure innovational slack. I will use R&D spending and patents as proxies for innovation. Both R&D spending (input to the innovation process) and patents (output of research) are indicators of firm innovation. The data were collected from the IPOs' prospectuses.

R&D investment slack is the first measure I developed to determine whether or not a firm's R&D spending is excess. Each firm will be measured relative to its peer firms as suggested by earlier research (Bromiley, 1991). If firms spend more on R&D than the industry average, there is a higher probability of them having slack than if they spent less than the industry average. This variable is based on the R&D investment variable which typically has been calculated as the level of investments divided by the firm's sales, assets, or number of employees (e.g., Deeds, DeCarolis, & Coombs, 1998; Dowling & McGee, 1994; Ettlie, 1998; Fryxell, 1990; Hill & Snell, 1988; Kor, 2006; Scherer, 1965). In this study, R&D investments are standardized by total assets because many IPO firms do not have sales in the early years of product development (Deeds et al., 1998; Kor, 2006).

$$R\&D\ investment\ slack = (Firm\ R\&D/firm\ assets) - (Avg.\ industry\ R\&D/Avg.\ industry\ assets)$$

The second measure I developed to measure innovational slack is patent intensity slack. Patents are specifically considered indicators of vital technology positions and innovative activity (Ashton & Sen, 1988). Patents also can be considered inputs in the new product development process (Pakes, 1985). According to Deeds, DeCarolis, and Coombs (1998) a firm's patent stock is an indication of the size of a firm's stock of intellectual property, and thus research productivity. This measure will be constructed by subtracting the total number of patents held by a firm from the industry average to estimate excess resources. Again, a figure above the average of the industry is likely to be a proxy for slack (as opposed to below industry

average). This includes patents granted directly to the firm and patents in which the firm is the sole licensee. Patent intensity slack is measured using the following equation:

$$\text{Patent intensity slack} = (\text{number of firm patents}/\text{firm assets}) - (\text{Avg. industry patents}/\text{Avg. Industry assets})$$

### *Managerial Slack*

While earlier studies have discussed different types of slack, the measures used to operationalize slack have tended to be strictly financial ratios (Mishina et al., 2004). Quantitative measures of managerial slack are thus almost nonexistent. Two exceptions are Welbourne, Neck, and Meyer's (1999) and Mishina et al.'s (2004) studies. Welbourne et al. (1999) suggested measuring human resource slack by examining the number of employees relative to sales. Mishina et al. (2004) agreed that such a measure might be a useful starting place especially because several authors have applied sales/total employees as a measure of productivity, or 'generated' slack (e.g., Chakravarthy, 1986; Greenley & Oktengil, 1998). Mishina et al. (2004) inverted the ratio so that larger values indicate greater levels of slack. Like previous scholars, they measured slack relative to a target level (e.g., Bromiley, 1991).

Managerial slack was defined earlier in the study as those excess managerial skills and experiences that will help the firm stay focused and able to grow. The TMT was defined as all inside, top-level executives listed in the management section of the prospectus composing the firm's management team (e.g., Kor, 2006). Managerial slack is calculated in two different ways to capture all of the dimensions of this construct. The first measure assumes that firms with more

managers are more likely to have slack managerial resources. Thus, the total number of TMT slack, was calculated using the following equation:

$$\text{Number of Managers} = (\text{number of Firm TMT/firm assets}) - (\text{Avg. industry TMT/Avg. industry assets})$$

I developed this measure based on previous studies (Mishina et al., 2004; Welbourne et al., 1999). However, given that IPO firms are in an early stage of development and generally have little or no revenue (Deeds et al., 1998), dividing by total assets was the logical choice to measure a firm's excess managerial capacity. I also felt that it was important to follow the recommendations of previous authors to measure a firm's managerial slack relative the industry.

The second measure is designed to capture the experience of the TMT. Industry-specific management experience includes managerial knowledge of the threats, opportunities, buyers and suppliers, distributors, governmental regulations, and technologies specific to the industry and the competition (Kor, Mahoney, & Michael, 2007; Mosakowski, 1993; Spender, 1989). Every specific position in a firm in the same industry allows managers to better understand the needs and wants of the suppliers and buyers in that industry. Further, several competitive, technological, and regulatory developments in industry follow a path-dependent pattern (Arthur, 1994). Therefore, historical and experience-based knowledge of the industry might be valuable for the perceptions and evaluation of new entrepreneurial opportunities (Kor et al., 2007).

Based on Kor (2003), I measure this variable as the average number of managerial positions held in the same industry by the managers in comparison to the average industry TMT positions held. This measure captures the breadth of industry-specific experience possessed by

the managers (Kor, 2003), and similar to the first measure, assumes that firms with more managers with industry experience will have more slack experience to draw upon. Also, because the size of TMT's differ from one company to the other, taking the number of positions held relative to the average number of the TMT will control for the size of the firm.

$$\begin{aligned} \text{Managerial Experience} = & (\text{Avg. Firm TMT positions} / \text{Tot. number of firm insiders}) \\ & - (\text{Avg. industry TMT positions} / \text{Avg. number of industry insiders}) \end{aligned}$$

### **Control Variables**

To control variance not of central interest in this work, I implemented all of the following variables. All control variables were obtained from the IPO prospectus for each IPO firm in the sample. These variables were selected based on their theoretical relevance and on precedent in the literature. The nine control variables in this study include firm age, firm size, use of proceeds, risk factors, underwriter reputation, founder status, venture backing, prior sales, and industry effect.

#### *Firm Age*

Previous IPO research has acknowledged the importance of firm age in terms of its effects on organizational outcomes including governance and performance (Meggison & Weiss, 1991). Firm age frequently is a controlled-for variable (e.g., Beatty, 1989; Beatty & Zajac, 1994; Finkle, 1998; Lester et al., 2006). It was employed as a control variable in this work because older firms, both prior to and following the IPO, have been found to financially outperform younger firms (Certo et al., 2001a; Ritter, 1998). Finkle (1998) argued that age can provide an

advantage to older firms because they can acquire more information, resources, have better relationships, and more experience. Also, firms with longer track records are known to have a greater chance of survival (Fischer & Pollock, 2004; Stuart et al., 1999). Age was calculated as the number of years from founding to the end of 2008 (e.g., Dimov & Shepherd, 2005; Zimmerman, 2008).

### *Firm Size*

As a proxy for organization size and power, I use *Total assets*. The variable is transformed by taking the natural log of total assets in order to control for skewness. Additionally, it is important to note that the importance of firm size has been acknowledged in previous IPO literature in terms of its effect on governance and performance (Booth and Chua, 1996; Megginson and Weiss, 1991). Research shows that larger IPO firms tend to outperform smaller ones in terms of stock appreciation (e.g., Megginson & Weiss, 1991; Mikkelsen et al., 1997). In addition, larger firms could have greater levels of slack resources such as administrative support that the company can deploy to achieve higher performance (George, 2005).

### *Use of proceeds*

The extent of voluntary disclosure that an IPO firm provides has been found to be significantly related to IPO performance (Leone, Rock, & Willenborg, 2007). By being more specific about how it will use IPO proceeds, a firm can reduce underpricing. Thus management has to balance the costs and benefits of disclosing such information. The typical issuer probably leans toward vague disclosure for a few reasons (Leone et al., 2007): proprietary costs



(Verrecchia, 2001), uncertainty about whether the manager is informed, (DYE, 1985) and agency costs (Healy & Palepu, 2001). Leone et al., (2007) further suggests that the relation between use of proceeds and underpricing stems from disclosure regarding plans to use the IPO cash for financing and investing activities. Such activities can include deleveraging, capital expenditures, and R&D as opposed to other operating activities (e.g., advertising, marketing, promotion, or sales).

### *Number of Risk Factors*

I sought to control for the amount of risk facing the IPO firm because higher risk may increase underpricing. Certo and others (2001a: 650) write that “risk factors associated with a firm can affect both performance expectations and realized performance”. Therefore, a firm’s risk position was operationalized as the number of risk factors as reported in the prospectus (Beatty & Zajac, 1994; Welbourne & Andrews, 1996). The assumption here is that although all risk factors are not equally significant, more risk factors normally denote a higher risk-position (Certo et al., 2001a). It is mandatory for management to report risk factors accurately. A firm that fails to accurately report these factors can face legal action (Feltham, Hughes, & Simunic, 1991). Types of risks included in this measure are technical obsolescence, new products, few or limited products, low number of years in operation, inexperienced management, technical risk, seasonality, customer dependence, supplier dependence, inexperienced underwriter, competition, legal proceedings against company, liability and government regulation.

### *Underwriter Reputation*

I also control for underwriter reputation. The reputation of the underwriter could impact investors' perceptions of IPO firm quality (Beatty & Ritter, 1986; Carter & Manaster, 1990; Carter, 1992; Carter et al., 1998b). Prestigious underwriters could signal that the issue price is a correct indicator of all existing inside information (Booth & Smith II, 1986). I coded this variable from Jay Ritter's personal website at the University of Florida (where all underwriter reputation rankings are available) based on the methodology employed by Carter and Manaster (1990) and Carter, Dark and Singh (1998).

#### *CEO Founder Status*

I also controlled for Founder effects because founders may affect the survival and performance of new ventures (Certo et al., 2001a; Nelson, 2003). I used a dummy variable to operationalize CEO founder (1=founder, 0=nonfounder).

#### *Venture Capitalist Backing (VC-Backing)*

I controlled for the possible effects of VC-backing (e.g., Certo et al., 2001b; Megginson & Weiss, 1991). This variable has been shown to influence the ability of an IPO firm to raise capital (Brav & Gompers, 2003; Gulati & Higgins, 2003; Megginson & Weiss, 1991; Zimmerman & Zeitz, 2002). Firms backed by venture capitalists were calculated as a dichotomous measure coded 1 if the IPO is enjoying venture capital backing or 0 if not. According to the certification and monitoring argument (Jenkinson & Ljungqvist, 2001), venture capitalists who participate in the IPO market may repeatedly influence investor valuations. More recent work, however, shows that the relationship between venture capitalists and IPO underpricing is much more complicated than first assumed. For instance, some researchers have

suggested that venture capitalists try to time IPOs to benefit from certain market conditions (Lerner, 1994), while others established that VC-backed IPOs were more underpriced than their counterparts (Jain & Kini, 1994). Further, Brav and Gompers (2003) revealed that there was no difference in underpricing between IPOs with and without VC backing after controlling for market exchange and underwriters. Empirical research has also demonstrated that VC backed firms have higher chances of survival in the post-IPO period (Khurshed, 2000). Another reason for including this control variable is that venture capitalists can influence the amount of slack resources a firm has; VCs are known to be active investors who aim to add value to younger firms through their interaction with and advice to managers (MacMillan, Kulow, & Khoylian, 1989).

#### *Prior Sales*

Because firm profitability in the year prior to IPO can impact firm valuation, I also controlled for firm profitability (e.g., Certo, Daily, and Dalton, 2001). Investors consider a firm's revenue track record before the IPO (Zimmerman, 2008). Prior sales were measured using the total revenue as reported in the prospectus in each firms' income statement. This measure could also impact the amount of slack a certain firm has for a particular year given that the budgeting process will depend, in part, on prior sales.

#### *Industry Effect*

Greater IPO performance may occur due to an Industry effect (Certo et al., 2003). Even studies with only high-tech IPO-firms, industry has been shown to influence IPO success (Certo et al., 2001a; Nelson, 2003; Stuart et al., 1999). Also, the relationship between slack and

performance may be affected differently depending on the industry. Researchers found that in the furniture industry, for example, slack is associated differently to performance than in the software industry (Miller et al., 1996). Previous researchers suggested that controlling for industry when investigating slack's various components could be especially important (Sharfman et al., 1988). Therefore, I included a dummy variable for industry using the 2-digit SIC (Standard Industry Classification) codes, with SIC code 73 (software) being the omitted category.

### *Acquisitions*

A dichotomous measure (1 = acquired a company, 0 = did not acquire any company) was created to control for firm acquisitions during the period of observation<sup>2</sup> for the survival analysis. I elected to control for this variable because firms may grow or decline, and thus acquire or lose slack, simply because of acquisitions (Weinzimmer, 2000). Porter (1987) suggested that acquisitions are a major source of firm growth (Porter, 1987). Others argued that acquisitions may often require substantial financial resources (Hitt, Hoskisson, & Ireland, 1990), thus increasing their financial risk (Hitt, Hoskisson, Johnson, & Moesel, 1996). These data were collected through LexisNexis database and cross checked through a general web search using Google search engine.

### **Methods of Analysis**

Consistent with other IPO research, all hypotheses in regards to the IPO firm-valuation were analyzed using partial hierarchical multiple regression analysis (Arthurs et al., 2008b; Certo et al., 2001a; Dimov & Shepherd, 2005; Zimmerman, 2008). The general form of a prediction

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<sup>2</sup> From IPO until death or the end of the study.

equation from multiple regression analysis is:  $DV = a + b_1 * X_1 + b_2 * X_2 + \dots + b_k * X_k + e_k$ .

This type of analysis allows the researcher to determine the order of entry of the variables<sup>3</sup>. F-tests are employed to calculate the significance of each added variable, or set of variables, to the explanation reflected in R-square.

The second set of hypotheses, which focuses on IPO firm survival, were estimated using Cox regression to conduct an event history analysis of IPO firm survival. The main benefit of using survival analysis is that it overcomes some of the problems linked with using cross-sectional models (e.g., logistic regression) to predict failure (Jain & Kini, 2000). Logistic regression assumes a steady state for the failure process that is typically violated. Logistic analysis can only predict whether an event can occur, not when it will occur. Such models are unable to distinguish between firms that failed within six months and those that fail within two years (Lowers, Messina, & Richard, 1999). The use of survival analysis allows the researcher to assess the conditional probability of firm failure—assuming that that firm has survived until the present time. Therefore, survival analysis can deal with censored data, which represent situations where the response (or event) has not yet occurred. The IPO market is characterized by such situations. Also, these data are right censored. This is because, at any point in time, a large proportion of firms that went public are still operating. Moreover, the time window is different for each firm. For example, this study includes firms with IPO dates anywhere from 2001 to 2005. Thus, firms that went public in 2001 were tracked for seven years, while firms that went public in 2005 were tracked only for three.

This approach is consistent with other research in the field (Arthaud-Day, Certo, Dalton, & Dalton, 2006; Brush, Manolova, & Edelman, 2008; Busenitz, Fiet, & Moesel, 2005; Jain,

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<sup>3</sup> This is not to be confused with Hierarchical Linear Models that deals with observations that are not independent.

Jayaraman, & Kini, 2008; Jain & Kini, 2000). For a detailed discussion of Cox Proportional Hazards, please refer to Cox (1972). By comparison, parametric models do not require researchers to identify a baseline relationship between time and failure (event) rates (Allison, 1984). This is an important assumption given the early stage of theoretical development on pre-founding failure rates (Brush et al., 2008).

This semi parametric method is quite robust in its accommodation of nonproportional hazards. It accomplishes this by including time as part of the interaction term in the dependent variable (years X venture exists) (Busenitz et al., 2005). The general form of the simple, one predictor Cox regression is as follows:  $\lambda(t_i) = \lambda_0(t_i)\exp(\beta'x_i)$ , where  $x$  is the independent variable (covariate),  $\beta$  is the regression coefficient, and  $t$  indicates the time to the event. Beta ( $\beta$ ) can be estimated using the maximum likelihood function.  $\lambda(t_i)$  is the baseline hazard function which estimates the expected risk of an event occurring without the presence of the covariate, and  $\exp(\beta'x_i)$  is the hazard ratio which indicates the shift of the baseline function, or the increase or decrease in the risk of the event occurring when the covariate is included (Allison, 1984; Brush et al., 2008). The significance of the explanatory variables ( $x_i$ ) in the model can be measured by the likelihood ratio statistic ( $-2(\log(L_0) - \log(L_n))$ ).  $\log(L_0)$  indicates the maximum log-likelihood value under the restriction  $B = 0$ .  $\log(L_n)$  denotes the maximum log-likelihood of the unrestricted estimated model. Note that the likelihood ratio statistic is asymptotically Chi-square distributed.

Cox proportional models allow us to keep all companies in the sample until a certain firm fails. Thus offering a more complete information set in regards to the relationship between the independent variables and firm failure.

## RESULTS

Table 6 presents a list of all the propositions and their related hypotheses that are tested in this study.

**TABLE 6: Propositions and related hypotheses**

<b>Propositions</b>	<b>Related Hypotheses</b>
P1: There is a positive relationship between financial slack and IPO firm performance.	H1a: There is a positive relationship between working capital and IPO valuation.
	H1b: There is a positive relationship between Cash Reserves and IPO valuation.
	H1c: There is a positive relationship between working capital and Percent Premium.
	H1d: There is a positive relationship between Cash Reserves and Percent Premium.
P2: There is a positive relationship between financial slack and the long term survivability of an IPO.	H2a: There is a positive relationship between working capital and survival.
	H2b: There is a positive relationship between Cash Reserves and survival.
P3: There is a positive relationship between innovational slack and IPO firm performance.	H3a: There is a positive relationship between patent slack and IPO value.
	H3b: There is a positive relationship between R&D slack and IPO value.
	H3c: There is a positive relationship between patent slack and Percent Premium.
	H3d: There is a positive relationship between R&D slack and Percent Premium.
P4: There is a positive relationship between innovational slack and the long term survivability of an IPO.	H4a: There is a positive relationship between patent application slack and survival.
	H4b: There is a positive relationship between R&D intensity slack and survival.
P5: There is a positive relationship between managerial slack and the valuation of the IPO firm.	H5a: There is a positive relationship between the number of insiders slack and IPO value.
	H5b: There is a positive relationship between insiders' industry experience slack and IPO value.
	H5c: There is a positive relationship between number of insiders slack and Percent Premium.
	H5d: There is a positive relationship between insiders' industry experience slack and Percent Premium.
P6: There is a positive relationship between managerial slack and the long term	H6a: There is a positive relationship between number of insiders slack and survival.

survivability of an IPO.	H6b: There is a positive relationship between insiders' industry experience slack and survival.
P7: There is a positive relationship between IPO valuation and long term survivability of an IPO.	H7: There is a positive relationship between IPO value and survival.

Table 7 presents the descriptive statistics and a correlation matrix for all variables used in the models. Overall, the correlations are low to intermediate. The correlations between the performance variables and the dependent and control variables are low. Patent slack is positively correlated with R&D slack, a result that is not surprising because any firm that heavily invests in research on the one end would also want to protect any innovations that might be found during the process. Thus, it is logical that as the commitment to R&D increases, so would the number patents owned by the firm. Working capital and cash reserves are positively related to prior sales, suggesting that a control for prior sales is important for measuring the effect of working capital and cash reserves. This finding is reasonable given that firms with large prior sales should have higher levels of working capital and cash. The number of manager's slack is negatively correlated with firm size in these data, suggesting that a control for firm size is important for measuring the effect of managerial slack. Patent and R&D slack were also positively correlated with managerial slack. However, because the variance inflation factors (VIF) for these terms are, 1.617 and 1.763 respectively, well below the VIF of 10 that Kennedy advocates is indicative of 'harmful collinearity' (Kennedy, 1992 :183), thus it is assumed that this correlation will not confound the results of any statistical tests<sup>4</sup>.

The correlation table also shows that both of the short-term dependent variables (IPO value and percent premium) applied in this study are uncorrelated ( $r = .084$ ). This means that if

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<sup>4</sup> The VIF is computed as  $1/(1 - r^2)$



some variables predict for IPO value, they may not predict for percent premium. Both of those dependent variables measure different aspects of IPO firm performance (IPO value measures the total proceeds a firm can earn while percent premium measures the investors' enthusiasm for a firm). Based on this, I executed two independent regressions for each of the dependent variables.

To test for multicollinearity, I examined the VIF for all models; none were close to the commonly accepted threshold of 10 (Cryer & Miller, 1994; Neter, Wasserman, & Kutner, 1985). The VIF values ruled out the possibility that multicollinearity and the instability of  $b$  and  $\beta$  were a serious problem. I further examined the Durbin-Watson statistic to verify that autocorrelation was not a problem (Neter et al., 1985). The value of  $d$  when IPO value was the dependent variable was 1.73. When percent premium was the dependent variable,  $d$  was 1.95. Thus, none of the models have autocorrelation problems, an indication that the observations are independent.

**TABLE 7: Means, Standard Deviations, and Correlations**

Variables	Means	s.d.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	
1 IPO Value	128002891.6	315842313																						
2 PercentPrem	.772	.20956	.084																					
3 Mgrsslk	.001	.001	-.093	-.04																				
4 Expernceslk	.0296	.44057	-.005	-.097	.177*																			
5 Cash	-0.0024	107280411	.278**	-.033	-.128	-.095																		
6 Wkg Cap	.0024	126953094	.388**	.03	-.115	-.11	.534**																	
7 Patslk	.001	.00001	.363**	-.018	.618**	-.007	-.032	-.047																
8 R&Dslk	.3568	1.96941	-.049	-.007	.658**	-.041	-.034	-.079	.841**															
9 Firm Age	10.4419	9.81001	.084	.139	-.141	-.150*	.126	.319**	-.115	-.11														
10 Firm Size	7.683	.65152	.317**	.351**	-.602**	-.223**	.380**	.475**	-.270**	-.313**	.347**													
11 Proceeds	3.7674	2.57143	-.017	-.004	.146	.098	-.035	.011	.059	.058	.05	-.093												
12 Risk Factors	33.5233	7.25352	.014	-.163*	-.028	-.038	.207**	-.061	.06	.051	-.032	-.131	-.096											
13 UndwrtrRep	8.0477	1.34323	.181*	.134	-.355**	-.071	.162*	.148	-.028	.013	.138	.474**	-.119	-.063										
14 Founder	.5756	.4957	-.152*	-.142	.162*	-.005	-.121	-.001	.009	.107	-.11	-.220**	.005	-.122	.051									
15 VC	.8198	.3855	-.133	-.034	-.144	-.049	.128	.016	-.057	.024	-.067	.055	-.168*	.083	.175*	.011								
16 SIC28	.2616	.4408	-.065	-.328**	.046	.025	.085	.034	.124	.204**	-.179*	-.074	.189*	.059	-.004	.106	.101							
17 SIC35	.0407	.19817	.053	.07	.081	.06	.03	.012	-.029	-.046	.186*	.128	.042	-.132	-.035	-.003	-.215**	-.123						
18 SIC36	.1279	.33496	.202**	.021	-.092	-.072	.055	.022	-.024	-.048	.078	.041	-.162*	.053	.134	.045	.039	-.230**	-.079					
19 SIC38	.1919	.39491	-.089	-.160*	.087	.054	.07	.028	.017	-.031	.072	-.215**	.05	.168*	-.122	-.153*	.109	-.292**	-.101	-.188*				
20 SIC48	.0523	.22333	.064	.544**	-.073	.028	.034	.013	-.031	-.04	-.102	.255**	-.06	-.056	.127	-.064	.109	-.141	-.049	-.091	-.115			
21 PriorSales	253319.0494	1095483.35	.334**	.085	-.078	-.107	.624**	.873**	-.032	-.043	.269**	.498**	-.027	-.029	.124	-.003	-.053	.02	.231**	-.047	-.091	-.018		
22 Acquisition	.6453	.4798	.154*	.207**	-.156*	-.057	.026	.135	-.113	-.181*	.275**	.258**	-.011	-.222**	.077	-.091	-.119	-.303**	.092	.104	-.1	.012	.122	

\* Correlation is significant at the 0.05 level (2-tailed).

\*\* Correlation is significant at the 0.01 level (2-tailed).

Table 8 presents the results of the first partial hierarchical regression analysis. I used a two-step hierarchical regression analysis to test the significance in predicting IPO value of the independent variables over the control variables. The first model contained all of the control variables, whereas in the second model, the independent variables were added to the base model.

**TABLE 8: Results of Partial Hierarchical Regression Analysis on IPO Value <sup>a</sup>**

<b>Variables</b>	<b>Model 1: Controls</b>	<b>Model 2: Slack Resources</b>
<i>Control</i>		
Age of firm	-.088	-.046
Proceeds	.032	.012
Risk Factors	.025	.016
Underwriter Reputation	.106	.099*
Founder	-.139†	-.03
Venture Capitalist	-.167*	-.077†
SIC28	.013	-.026
SIC35	-.02	.064
SIC36	.231**	.124**
SIC38	.025	-.12*
SIC48	.054	.018
Prior Sales	.295***	-.15
Firm Size	.121	.045
<i>Main effects</i>		
Mgr Slack		-.129†
Experience Slack		.042
Cash Reserves		.129*
Working Capital		.401***
Patent Slack		1.368***
R&D Slack		-1.061***
<i>R</i> <sup>2</sup>	.238	.787
Adjusted <i>R</i> <sup>2</sup>	.174	.760
<i>F</i>	3.740***	29.123***

<sup>a</sup> n = 172. Standardized coefficients are reported.

† p < 0.10

\* p < 0.05

\*\* p < 0.01

\*\*\* p < 0.001

Model 1, representing only the control variables (firm age, use of proceeds, risk factors, underwriter's reputation, founder effect, VC-backing, prior sales, industry effects, and firm size), was significant with an  $R^2 = .238$  and adjusted  $R^2 = .174$  at  $p < .000$  ( $F = 3.740$ ). Four control variables were significantly related to IPO value. Two control variables were positively linked to IPO value: SIC code 36—electronics and communication—( $p < .01$ ), and prior sales ( $p < .001$ ). Founder effect and VC backing were negatively related to IPO value at ( $p < .10$ ) and ( $p < 0.05$ ) respectively.

The independent variables, including financial slack (cash slack and working capital slack), innovational slack (R&D investment slack, and patent intensity slack), and managerial slack (number of insiders slack, and insider's experience), were all entered as a block in the second model. The addition of the slack variables to the equation with control variables resulted in an improvement in the model, where the  $R^2 = .787$  and adjusted  $R^2 = .760$  at  $p < .001$  ( $F = 29.123$ ). As mentioned earlier the VIF showed no indication of multicollinearity.

The results from model 2 indicate that the additional variables do contribute significantly to our understanding of IPO value where the change in  $R^2 = .549$ . The results also show that five of the six independent variables (cash reserves, working capital, R&D investment slack, patent intensity slack, number of insiders slack, and insider's experience slack) add to our ability to predict the amount of capital raised through IPO beyond the control variables. Working capital was positively and significantly related to the size of the IPO valuation ( $p < .001$ ), providing strong support for hypothesis 1a. Cash reserves were positively and significantly related to IPO value ( $p < 0.05$ ), providing support for hypothesis 1b.

Hypothesis 3a proposes a positive relationship between patent application slack and IPO value. The coefficient for this variable is positive and significant ( $p < .001$ ), providing strong support for hypothesis 3a. Hypothesis 3b proposes a positive relationship between R&D investment slack and the capital raised. The coefficient for this variable is negative and significant ( $p < .001$ ), contrary to expectation. It appears that R&D slack has a negative impact on IPO value.

Hypothesis 5a proposes a positive relationship between number of insiders slack and the IPO value. Opposite to expectations, the coefficient for this variable is negative and significant ( $p < 0.10$ ). Therefore, number of insiders slack appears to negatively affect IPO value.

Hypothesis 5b proposes a positive relationship between industry experience slack and the capital raised. The coefficient for this variable is not significant and thus providing no support for hypothesis 5b.

Four control variables were found to be significantly related to the capital raised in Model 2. Underwriter reputation ( $p < 0.05$ ) and SIC 36 ( $p < 0.10$ ) were both positively related to IPO value. VC backing ( $p < 0.10$ ) and SIC 38 ( $p < 0.05$ ) were found to be negatively related to the capital raised at IPO. In comparison with model 1, the results show that underwriter reputation and SIC 38 became significant after the addition of all the independent variables, while founder effect and prior sales lost their significance.

Table 9 presents the results of the second partial hierarchical regression analysis. I used a two-step hierarchical regression analysis to test the significance in predicting percent premium (offer price) of the independent variables over the control variables. All of the control variables were entered in the first step (Model 1). In the second step, all of the independent variables were added to the base model (Model 2).

**TABLE 9: Results of Partial Hierarchical Regression Analysis on Percent Premium <sup>a</sup>**

<b>Variables</b>	<b>Model 1: Controls</b>	<b>Model 2: Slack Resources</b>
<i>Control</i>		
Age of firm	.085	.058
Proceeds	.075	.078
Risk Factors	-.067	-.037
Underwriter		
Reputation	.004	.022
Founder	-.083	-.108†
Venture Capitalist	-.022	-.017
SIC28	-.305***	-.251***
SIC35	-.009	-.055
SIC36	-.043	.026
SIC38	-.192**	-.081
SIC48	.445***	.442***
Prior Sales	-.004	.369*
Firm Size	.128	.348**
<i>Main effects</i>		
Mgr Slack		.22*
Experience Slack		-.091
Cash Reserves		-.21*
Working Capital		-.35*
Patent Slack		-.113
R&D Slack		.109
<i>R</i> <sup>2</sup>	.451	.516
Adjusted <i>R</i> <sup>2</sup>	.404	.454
<i>F</i>	9.669***	8.258***

<sup>a</sup> n = 172. Standardized coefficients are reported.

† p < 0.10

\* p < 0.05

\*\* p < 0.01

\*\*\*  $p < 0.001$

Model 1 was significant with an  $R^2 = .451$  and adjusted  $R^2 = .404$  at  $p < .000$  ( $F = 9.669$ ). Again, this model contains the control variables firm age, use of proceeds, risk factors, underwriter's reputation, founder-effect, VC-backing, prior sales, industry effects, and firm size. Three control variables were significantly related to IPO value: SIC 28 (biotechnology and drugs), 38 (medical equipment), and 48 (telephone equipment and communications services). SIC code 48 is positively associated with IPO value ( $p < .001$ ). The other two control variables were negatively linked to IPO value: SIC code 28 ( $p < .001$ ), and SIC code 38 ( $p < .01$ ).

The independent variables: cash reserves, working capital, R&D investment slack, patent slack, number of insiders slack, and insider's experience slack were all entered as a block in the second model. The addition of the slack variables to the equation with control variables resulted in an improvement in the model, where the  $R^2 = .516$  and adjusted  $R^2 = .454$  at  $p < .001$  ( $F = 8.258$ ). As mentioned earlier, the VIF showed no indication of multicollinearity among the variables.

The results from model 2 suggest that the addition of independent variables contributed to our understanding of percent price-premium where  $\Delta R^2 = .05$ , although less so than it did for the variable IPO value. The results reveal that three of the six independent variables (cash reserves, working capital, R&D investment slack, patent intensity slack, number of insiders slack, and insider's experience slack) add to our understanding of the prediction of the relative value of the firm as assessed by investors.

Hypothesis 1c proposes a positive relationship between working capital and percent price premium. The coefficient for this variable is negative and significant ( $p < 0.05$ ), thus, it would



appear that a firm with excess working capital would not generate high levels of investor enthusiasm and optimism about the future value of the firm. Hypothesis 1d proposes a positive relationship between cash reserves and the percent premium. The coefficient for this variable is negative and significant ( $p < 0.05$ ), suggesting that cash reserves negatively impact investor optimism regarding IPOs' future value.

Hypothesis 3c proposes a positive relationship between patent slack and IPO value. The coefficient for this variable is not significant. Thus, patent slack appears to have little impact on percent premium. Hypothesis 3d proposes a positive relationship between R&D investment slack and percent premium. The coefficient for this variable is not significant. Therefore it appears that R&D slack has little effect on percent price premium.

Hypothesis 5c proposes a positive relationship between number of insiders slack and percent premium. The coefficient for this variable was positive and significant at ( $p < 0.05$ ). Thereby providing support for hypothesis 5c. It appears that executive slack is associated with percent premium. Hypothesis 5d proposes a positive relationship between industry experience slack and the percent premium. The coefficient for this variable was not significant. Hence, it also appears that managers with excessive industry experience have little impact on percent price premium.

Five control variables appear to be significant in the full model. The control variables are found to be positively and significantly related to percent premium: SIC 48 ( $p < 0.001$ ), Prior sales ( $p < 0.05$ ), and firm size ( $p < 0.01$ ). In contrast, I found that founder effect ( $p < 0.10$ ) and SIC 28 ( $p < 0.001$ ) are both negatively related to percent premium.

Table 10 presents the results of the Cox proportional hazard (CPH) regression models of survival durations of high-tech IPO firms. The overall model Chi-square statistic, individual

variable coefficients, hazard rates, and their associated p-values are reported for both models. Additionally, for both of the estimated models in Table 10, the first column contains the estimated coefficients and the second column reports the hazard ratios associated with the explanatory variables. Given that the dependent variable is the logarithm of the hazard rate, a positive coefficient on an explanatory variable in the CPH model indicates that an increase in the variable is linked to an increase in the hazard rate. That is, a positive coefficient indicates that an increase in the variable leads to an increase in the probability of survival.

**TABLE 10: Regression results of Cox hazard model on the survival of**

**IPOs**

<b>Variables</b>	<b>Coef.</b>	<b>Hazard ratio</b>	<b>Coef.</b>	<b>Hazard ratio</b>
<i>Control</i>				
Age of firm	.022*	1.023	.023*	1.023
Proceeds	-.131**	0.877	-.131**	0.877
Risk Factors	.06***	1.062	.06***	1.062
Underwriter Rep	-.214*	0.807	-.215*	0.807
Founder	-.206	0.814	-.206	0.814
Venture Capitalist	.618*	1.856	.618*	1.855
SIC28	-.203	0.816	-.203	0.817
SIC35	-.375	0.688	-.378	0.685
SIC36	-.034	0.967	-.036	0.965
SIC38	-.596†	0.551	-.595†	0.552
SIC48	.775†	2.171	.775†	2.171
Prior Sales	-.2	0.818	-.2	0.819
Firm Size	.001	1.001	.001	1.000
Acquisition	-.697**	0.498	-.697**	0.498
<i>Main effects</i>				
Mgr Slack	-105605.757	0.001	-103553.932	0.001
Experience Slack	.196	1.216	.196	1.216
Cash Reserves	.001	1.001	.001	1.000
Working Capital	.001*	1.001	.001†	1.000
Patent Slack	-52494.97	0.001	-54348.589	0.001
R&D Slack	.224†	1.251	.228	1.256
IPO Value			.001	1.000
<i>Overall Chisquare</i>	69.269		69.403	

† p < 0.10  
 \* p < 0.05  
 \*\* p < 0.01  
 \*\*\* p < 0.001

Model 1 in Table 10 includes all control variables (firm age, use of proceeds, risk factors, underwriter's reputation, founder effect, VC-backing, prior sales, industry effects, firm size, and acquisitions) and all independent variables (cash reserves, working capital, R&D investment slack, patent intensity slack, number of insiders slack, and insider's experience slack). The important question that I aim to answer here is which covariates are effective predictors that can be used to predict survival? So, is firm age an effective predictor of firm survival? The positive value of the regression coefficient means that as the value of age increases, so would the probability of survival. The estimated coefficient is significantly different from zero. Thus, age does appear to be an effective predictor variable in this model. Given that the hazard rate  $Exp(B) = 1.023$ , this indicates that each unit increase in firm age is expected to increase the probability of survival 2.3%. I will use a two step approach to those questions for all variables. First, I will identify all the positive and negative regression coefficients in model 1 and model 2. This will tell us how each coefficient is related to the probability of survival. Second, I will explain all the linkages with  $Exp(B)$  and how much would the probability of survival increase or decrease.

In model 1, I find that the coefficients of firm age ( $p < 0.05$ ), risk factors ( $p < 0.001$ ), VC-backing ( $p < 0.05$ ), SIC 48 ( $p < 0.10$ ), working capital ( $p < 0.05$ ), and R&D slack ( $p < 0.10$ ) are positive and significant. On the other hand, the coefficients of use of proceeds ( $p < 0.01$ ), underwriter reputation ( $p < 0.05$ ), SIC 38 (medical equipment) ( $p < 0.10$ ) and acquisitions ( $p < 0.01$ ) are negative and significant. Overall, the results in model 1 indicate that an increase in the age of the firm, the number of risk factors listed on the prospectus, number of venture capitalists sitting on the board, SIC 48, the amount of working capital associated with a firm, and the level of R&D investment slack at the IPO are associated with an increase in the probability of

survival, while, an increase in the number of uses of proceeds listed on the prospectus, underwriter's reputation, being in the medical equipment industry, or acquiring other firms are associated with a decrease in the probability of staying alive. The results showing that working capital and R&D slack have a positive and significant impact on the survival of the high-tech IPO firm are supportive of hypothesis 2a and 4b. Therefore, hypotheses 2b, 4a, 6a, and 6b are not supported.

In Model 2, in addition to all the control and independent variables, I included a measure of the amount of capital a firm raises at IPO (IPO valuation) as an independent variable to test hypothesis 7 (which proposes that there is a positive relationship between IPO value and survival). The results indicate that the coefficient for this variable is not significant. An increase in the amount of capital raised at IPO appears to have little impact on the overall probability of IPO firm survival. Thus, hypothesis 7 is not supported.

So far, I have identified the variables that significantly influence the probability of IPO firm survival. It also is important to assess the impact on the risk or hazard rate of an average IPO firm's survival. The column labeled Hazard ratio (in Table 10) shows the impact on the hazard rate, given a unit change in the explanatory variable. Specifically, in the case of continuous independent variables, the hazard ratio represents the estimated percent change in the hazard of the event (survival) for a one unit increase in the covariate of interest (controlling for other covariates). The hazard ratio is obtained by subtracting one from the hazard ratio and multiplying by 100. For instance, when looking at the Cox regression results, a one-year increase in Firm age increases the hazard rate by a factor of 1.023, a 2.3% increase. Likewise, one more item identified in the use of proceeds affects the hazard rate by a factor of 0.883, which is equal to a 12.3% decrease. In the case of independent variables, the hazard ratio is interpreted

as the estimated hazard of the occurrence of the event of interest for those with a value of 1 relative to the estimated hazard for those with a value of 0 after controlling for other covariates (Allison, 2000; Hellmann & Puri, 2002; Jain et al., 2008).

The results from Model 1, as shown above, indicate that each additional year of existence for an IPO firm (age) at the time of the IPO increases the probability of survival by 2.3%. I also find that as a firm becomes more specific and detailed about their plans for the IPO proceeds by one unit, the probability of survival declines 12.3%. A one unit increase in the number of risk factors as reported in the prospectus indicates that the probability of survival will increase 6.2%. Further, an increase in underwriter prestige of one unit affects the hazard rate by a factor .807, a 19.3% decline. The risk ratio for venture capital participation indicates that VC-baked firms have a 1.88 times more likely that these firms will survive relative to IPO firms without VC-baking. Similarly, I also found that the risk ratio for participation in SIC code 38 (medical equipment) indicates that firms in the medical equipment industry have a .55 times less likely that these firms will survive relative to IPO firms not in this industry. Participation in SIC code 48 has a risk ratio that shows that firms within this industry are 2.17 times more likely to survive in comparison to firms that are not a in this industry. The existence of acquisitions results in a hazard ratio that shows that a firm in this industry is .49 times less likely to survive in comparison to peer firms in other industries. decline in the firm's survival probability.

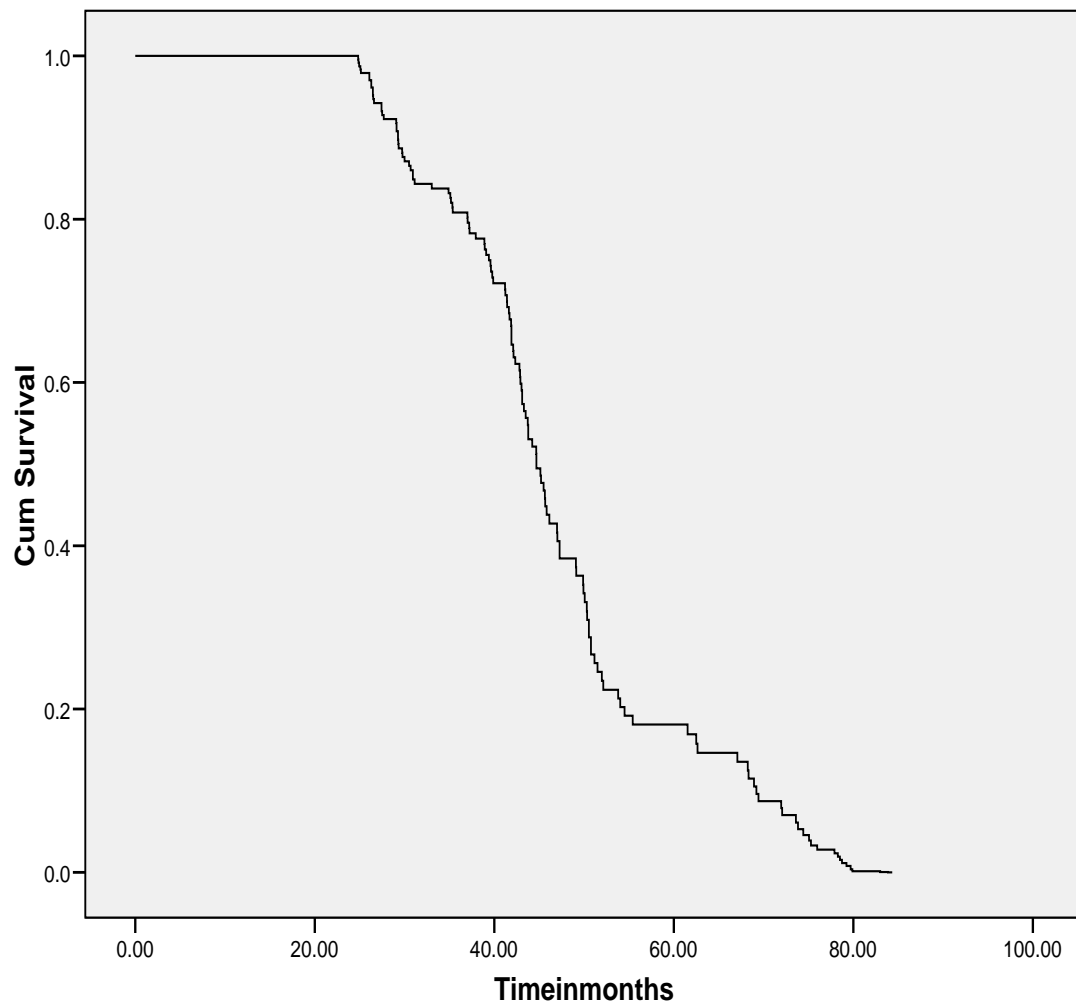
The results also show that working capital has a hazard ratio of 1.001. This indicates that a 1% increase in the firm working capital results an increase in the chance of survival.

Hypothesis 2a, which proposes that working capital will positively influence survival, is supported. Finally, the results show that a 1% increase in R&D slack led to a 25.1% increase in the probability of surviving, lending support to hypothesis 4b which proposes that R&D slack

will positively affect survival. It appears that the more a company invests in R&D projects, the greater the chances the firm will survive after IPO. The other four independent variables are not significant thus hypotheses 2b, 4a, 6a, and 6b are not supported. Thus, it appears that managerial slack (number of insiders slack and experience slack), cash reserves, and patent slack have little impact on a firm's chance of survival.

In Figure 2, I graph the cumulative survivor function for Model 1 while evaluating all covariates at their mean values. In the context of this study, the survivor function represents the probability that a randomly selected firm will remain alive versus time. The survivor function answers the question: How many weeks pass before the average firm fails? When the survivor function reaches .50, half the firms have failed and half have not. This midpoint indicates how much time passes before half the sample experiences the target event. As shown in Figure 1, the answer is 44.7 weeks.

**Figure 2: Survival Function at mean of covariates**

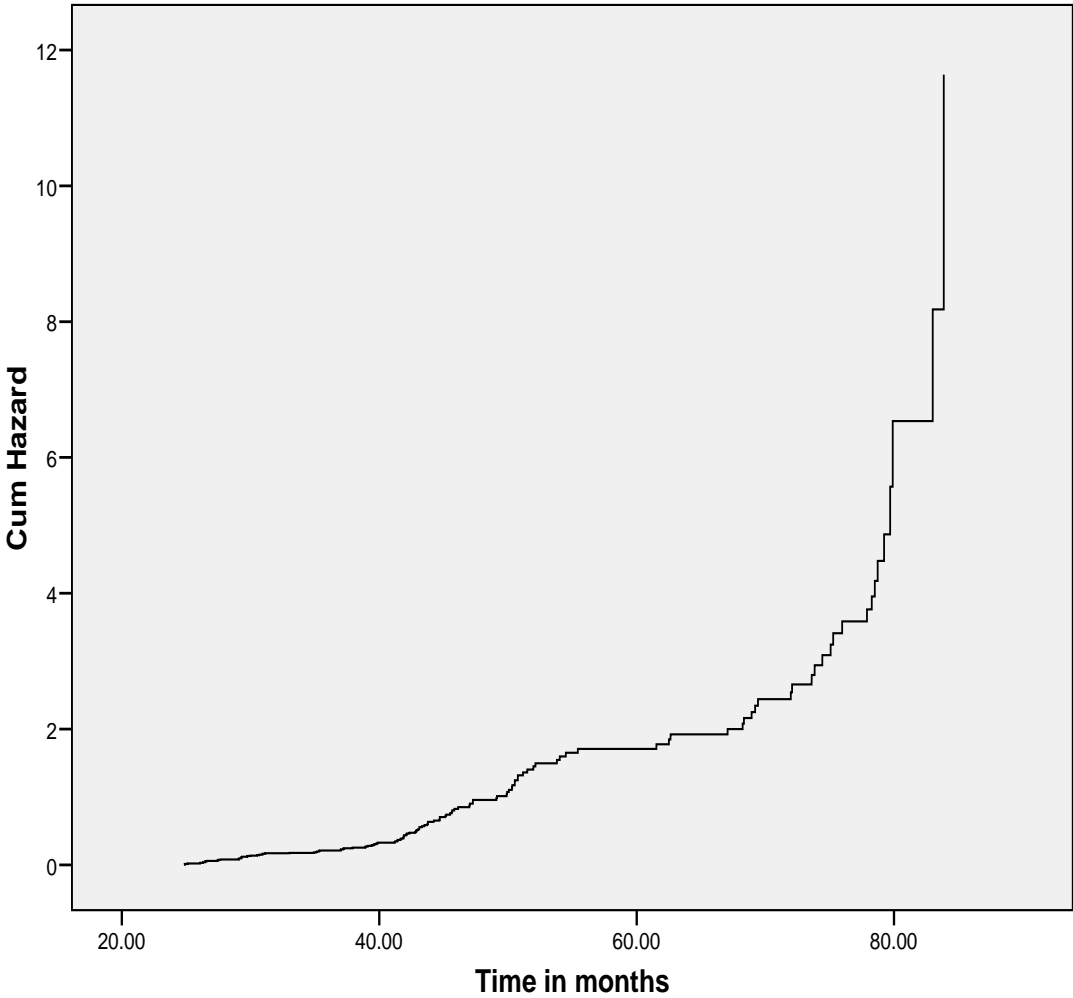


In Figure 3, I graph the cumulative hazard function for Model 1 while evaluating all covariates at their mean values. Here, the cumulative hazard function in effect captures the distribution of risk



across time. This function generally increases over time. As shown in figure 3, this hazard function peaks overtime. Thus, the risk of failure increases over time.

**Figure 3. Hazard Function at mean of covariates**



## **Robustness**

To check for the robustness of some of the results presented earlier, I ran a Cox regression using only the control variables and the IPO valuation variable (i.e., excluding the independent variables). The results of the regression were very similar to results shown in Table 10. Thus capital raised appears to have little impact on firm survival.

Because percent premium was uncorrelated with IPO value, I ran a Cox regression using percent premium instead of IPO value, while using the same control and independent variables used in the study. The results were very similar to the ones presented in Table 10. I ran another Cox regression using only the control variables and percent premium (i.e., excluding the independent variables). Again, the findings were robust (similar to those in Table 10). Hence, it appears that percent premium has very little impact on firm survival. Allison (1984) and other researchers (e.g., Spell & Blum, 2005) have commented on the robustness of the Cox method, therefore this result is possibly not so surprising.

Furthermore, to test the sensitivity of my findings to the addition of the acquisition variable, I ran a Cox regression excluding this covariate. Again, the results of the regression were similar to the ones shown in Table 10. Both the coefficients for working capital and R&D slack were positive and significant. The results for model 2 are also similar to those presented in Table 10. IPO value does not appear to have much impact on firm survival.

## **DISCUSSION AND CONCLUSIONS**

This study provides valuable insights into the accumulation and deployment of resources to achieve superior IPO performance. It enriches ongoing dialog on the importance of resources and provides a complex picture of the effects of organizational slack on short- and long-term IPO firm performance and longer-term survivability. A firm's ability to survive major transformation is an essential but under-studied area in the organizational literature (Fischer & Pollock, 2004). In this study, I examined whether firm-specific resources can help shield an organization during the possibly disruptive post-IPO period. I argued that possession of slack resources can help firms navigate this difficult transition, while continuing to apply the necessary resources to the ultimate goal of the firm—survival.

The theory and results suggest a new and important role for slack resources in the IPO process. I find that firms with a specific set of slack resources can signal to investors the high quality of their firm, and that some of those slack resources are important for survival of IPO firms.

### **Slack and IPO valuation**

The work examined the relationship between managerial slack and IPO value, financial slack and IPO value, and innovational slack and IPO value. The results indicate that managerial slack is significantly related to IPO valuation. Specifically, the number-of-managers slack was found to be negatively and significantly related to the capital raised through an IPO. Experience slack was not significantly related to the amount of capital the firm raised. It appears that

investors negatively value an excess of managers at the time of IPO. In addition, the study shows that financial slack is positively related to the amount of capital raised through an IPO.

Specifically, cash reserves and working capital were found to be positively and significantly related to the amount of capital the firm raised. It appears that investors positively value excess financial resources in firms undergoing an IPO. The results also indicate that innovational slack is significantly related to IPO valuation. Specifically, patent slack was found to be positively and significantly related to the capital raised through an IPO. R&D slack was found to be negatively and significantly related to the amount of capital raised. It appears that investors positively value an excess in patents and negatively value excess in R&D.

First, I found that the number of manager's slack was negatively and significantly associated with raising funds through an IPO. This contradicts my hypothesis. It appears that investors do not appreciate slack in the number of executives (recall that this excess is in comparison to industry averages). Previous research shows that issuing firms try to enhance their image and attract investor attention by managing earnings before an IPO (Teoh et al., 1998), and typically startup firms are known to add managers just before IPO, in the hopes of raising additional funds, and in order to ease investors concerns (Zimmerman, 2008). Investors might feel that adding many new managers to a team late in the game is only window dressing, and nothing more. Also, the specialized work of maintaining a firm requires the efforts of an entire team and not only an individual (Barnard, 1938; Hambrick, 1989). Perhaps investors do not feel that these new team members can actually become productive members of the team so rapidly. They also might feel that to really know and understand how a specific business operates, many of those managers had to be there from inception.

Second, I did not find managerial-experience slack to be significantly related to IPO value. Although the collective industry-specific management experience may contribute to the overall competence of the TMT, it was not found to be significant in raising funds at IPO. Because industry-specific managerial experience can be obtained in the labor market and deployed in many firms in the same industry, its value added to competitive advantage—when in excess, seems low. Investors may view a certain level of experience as sufficient. They may reason that small increases above that level add little value to the competitiveness of a firm.

I found financial slack, both cash reserves and working capital, to be positively and significantly related to the capital raised through an IPO. The results suggest that financial slack may provide a signal to investors about the quality of the firm and its future performance potential. A strong financial position may signal to investors a firm's expansion abilities because, according to Penrose (1959), a firm's future strategies (e.g., diversification) are mainly determined by its current portfolio of resources, particularly by its financial resources. Firms with financial slack could also be sending a signal about their ability to respond to shifting environmental demands (Cheng & Kesner, 1997). Bromiley (1991) reasoned that financial slack provides firms the ability to smooth over short-term disturbances in the environment and, thus, build and maintain competitive advantage.

Innovational slack was found to be significantly related to IPO value. More specifically, Patent slack was found to be positively associated with IPO value, while R&D slack was found to be negatively associated with IPO value. Patent slack, which reflects the number of patents above industry average, and is thus suggestive of a raft of patents, may signal the firm's ability to profit from an invention. Also, patent slack may indicate the size of a firm's stock of intellectual property, and therefore research productivity (Deeds et al., 1998). Patent slack could also mean

that a firm was first to patent and may have benefited from the advantages associated with being first such as market preemption, reputation effects, and experience-curve effects (Lieberman & Montgomery, 1988). It may also signal to investors that this firm is on the cutting edge of technology and that it leads its competitors in research productivity, and possibly the potential for innovation. This signal might be powerful given its possible effect on perceived prestige and innovation leadership. In the case of R&D slack, I found the opposite. R&D slack is significantly and negatively related to IPO value. This finding is interesting in so far as it suggests that investors do not perceive R&D slack positively. Even though R&D expenditures have been linked to an increase in market value (Chauvin & Hirschey, 1993; Doukas & Switzer, 1992), it seems that there might be an optimal amount of expected R&D investment. Also, large R&D investments in a younger firm might signal high risk. For more established companies, huge investments in R&D might be expected, but in the case of IPO firms—given the uncertainty surrounding R&D investments and the usefulness of the outcomes—such investments may be a red a flag—they may indicate that innovations are still far from being ready for commercialization.

These findings are interesting in light of the great uncertainty surrounding an IPO. This is especially important for young IPOs. The quality of an IPO firm is uncertain. The firm has no public history. Further, the profitability and growth of a young firm is uncertain, particularly after it transitions from being privately to publicly traded.

Two control variables (underwriter reputation and SIC 36) were found to be positively and significantly related to IPO value in the full model. The positive relationship between underwriter reputation and capital raised supports prior research that the reputation of the underwriter is beneficial to IPO performance (Beatty & Ritter, 1986; Higgins & Gulati, 2003).

The significance of SIC 36 (electronics and communication) suggests that being a part of electronics and communication industry is attractive to investors. Moreover, I caution that a boom or hype may have increased the popularity of firms in this industry.

Two control variables (venture capitalists and SIC 38) were found to be negatively related to IPO value. The negative relationship between venture capitalists and IPO value suggests that perhaps investors feel that VCs might have substantial influence on the strategic direction and operations of firms, and thus VCs could force a new IPO to focus on short-term profits that might not be in the best long-term interest of the firm (Fischer & Pollock, 2004). The presence of VCs could be considered “deleterious” as it relates to IPO firm performance, especially given that VCs often established ties with certain underwriters that proved to be dangerous during the Dot.Com bubble (Arthurs et al., 2008b). Underwriters established investments accounts for VCs for buy-in to hot deals in exchange for underwriting future deals. The significance of SIC 38 (medical equipment) might be that involvement in the medical equipment industry is perceived as risky. Or, perhaps, firms in this industry had not been performing well, thus increasing investor anxiety around this industry.

### **Slack and percent premium**

The results indicate that managerial slack is significantly related to percent premium. Specifically, number of managers slack was found to be positively and significantly related to the premium of stock over book value at IPO. Experience slack was not found to be significantly related to percent premium. It appears that investors positively value an excess in the number of managers at IPO but not in the total amount of experience those managers hold. In addition, the

findings show that financial slack is significantly related to a lack of investor enthusiasm for the firm. Specifically, cash reserves and working capital were found to be negatively and significantly related to the percent premium and thus the perceived potential value of a firm. The results also indicate that innovational slack is not significantly related to IPO valuation. It appears that patent slack and R&D slack have only a slight impact on percent premium.

As already noted, in hopes of raising additional funds at IPO, firms generally add top managers to assure investors of the firm's ability to succeed (Zimmerman, 2008). This research provides support for this contention and helps further identify the type and optimal number of managers to add. Obviously, the results here are opposite to those presented earlier, but as mentioned earlier, both DVs are uncorrelated. Therefore, the change in sign from a negative one to a positive one is not surprising given that both DVs measure a different dimension of firm performance. I found that the number-of-managers slack was positively and significantly associated with percent premium. Not only does this suggest that adding new managers leads to greater investor satisfaction and a premium at IPO (Zimmerman, 2008), but more specifically, it suggests the addition of new managers above the industry average is beneficial. Thus, the number of managers a firm needs in order to receive a premium at IPO must be among the highest in the industry. Number-of-managers slack may signal to investors that the management team can handle the demands associated with IPO, including the rapid growth expected from such firms. In addition, a firm with extra managers is better able to respond to the challenges and opportunities facing publicly held firms. Managers must learn to cope with decreased flexibility in managerial discretion, increased oversight from the board of directors, greater demands from investors for short-term performance, and less tolerance of negative press and performance instability (PriceWaterhouse, 1995). As the firm starts to grow after the IPO, management has to



deal with significant cultural changes, and changes resulting from employees new found wealth as stock is sold and options exercised (Fischer & Pollock, 2004).

I did not find experience slack to be significantly related to the amount of capital raised. This finding is similar to that of previous results. It confirms my conclusion that investors are satisfied with an industry average amount of experience in each firm. Investors may feel that because industry-specific managerial experience can be obtained in the labor market and deployed in many firms in the same industry, there is no need to accumulate excess experience. They also may feel that such general experience does not contribute directly to the competitive advantage of a firm.

I found financial slack, both cash reserves and working capital, to be negatively and significantly related to percent premium. It may be that investors believe that financial slack encourages managerial aversion to risk (Latham & Braun, 2008), especially given that managers bear the consequences of this overall firm risk (Bowman, 1982; Jensen, 1986) and as a result tend to choose strategic options with lower risk consequences at the expense of maximizing firm performance and owner's wealth (Latham & Braun, 2008). Or, perhaps, investors feel that financial slack makes management lazy. Managers in firms with financial slack might not be as motivated as those in a tighter financial situation. Simon (1997) argued that slack makes management "comfortable" by generating satisficing behavior. This suggests that managers may simply settle for strategies that are good enough instead of trying to exploit every possible opportunity. At the time of the IPO, such a perception might be deleterious to a firm given that management is expected to fight *pugnīs et calcibus* (tooth and nail).

Innovational slack was not associated with percent premium. The number of patents slack and R&D spending slack had a negligible impact on the ability of an IPO firm to collect a

premium of stock over book value at IPO. This indicates that IPO firms that maintain many patents and are heavily invested in R&D might not earn a premium. It appears that investors might view such firms as risky given investments in patents and R&D that are well above the industry average. Investors might feel that at the time of an IPO, managers should be investing their resources more wisely (maintaining patents is not cheap). Also, in order to accurately measure both innovational-slack proxies, I felt the need to follow the advice offered by prior researchers (e.g., Bromiley, 1991) to measure slack in relative terms. Thus, both measures compare R&D spending and number of patents to their industry averages and assumes that investors are aware of the different firms in the same industry and their specific investments in R&D and patents. Perhaps investors are not as tuned-in to the competition of the firms they invest in as I expected, or, in the eyes of potential investors, such large investments may give the impression of poor management. Alternatively, the lack of results for this measure may reflect the fact that the number of patents may contain more noise than other measures in this study. The measure is subject to firm-specific variations in the tendency to patent, given the costs required by the patent process (Pakes, 1985). Also, because of the substantial disparity in the value of individual patents, a simple patent count may fail to capture the value of a firm's patent library (Deeds et al., 1998).

These results are interesting even though a number of measures did not support my hypotheses. The uncertainty that surrounds an IPO is extremely high, the quality of IPO firms is unknown, limited or no previous performance information exists in regards to the firm before the IPO, the profitability of such firms after a difficult transition from the private to the public spheres is uncertain, and the top management team and founders of the firms might be untested. It appears that number of manager's slack is seen by investors as a signal that a firm is a good

investment. Having a significant number of qualified executives running the firm at IPO appears to signal that the firm is positioned to excel and to grow rapidly and steadily after the IPO. This is consistent with Penrose's (1959) contention that newer firms are faced with many difficulties, that focusing on growth while managing those difficulties is extremely challenging, and that managerial slack is crucial for growth to occur.

It is important here to note that one possible explanation for the less-than-robust results for some of the independent variables and their effect on percent premium might be due in part to limitations in interpretation that are known to surround this performance measure. A number of researchers argued that in reality this measure reflects the value of a firm's intangible assets (Rasheed et al., 1997; Welbourne & Andrews, 1996). Nelson (2003) maintained that such arguments have not been proven empirically and suggested that, in fact, percent price premium measures the difference in the value of the firm, as it is derived from two methods: 1) historical accounting measures, and 2) stock price. She pointed out that the difference in firm value assessment might be measuring intangible assets, monopoly control, investor over-enthusiasm, or some other factor that would disjoint stock price from accounting-based figures (Nelson, 2003).

Another clue that may guide us in understanding the results in this section is the fact that, as noted earlier, the measure of percent premium was not correlated with that of IPO value. This is logical even though both measures are proxies of performance, they measure a different dimension of performance. This suggests that variables correlated with IPO value might not necessarily be correlated with percent premium, thereby explaining why innovational slack was significantly related to IPO value whereas it was not significantly associated with percent premium.

Three control variables (SIC 48, prior sales, and firm size) were found, in the full model, to be positively and significantly related to the relative value of the firm as assessed by investors while controlling for the book value of the firm (i.e., percent premium). The positive relationship between SIC 48 (telephone equipment and communications services) and percent premium suggests that being a part of the telephone equipment and communications services industry is attractive to investors. Perhaps this is because the industry is perceived as having less competitiveness than other industries, and firms are thus perceived as having a greater chance of success than those in other industries. The significance of prior sales suggests that the performance of the company prior to IPO influences gaining a premium at IPO. This finding is logical because a strong sales record might indicate the quality of the issuing firm. The significance of firm size suggests that larger IPO firms will be valued higher than smaller firms. This is consistent with earlier research that suggests that size is related to the valuation of IPO firms (Deeds et al., 1998; Deeds et al., 2004; Mikkelsen et al., 1997). Ritter (1998) found that older firms outperform younger firms prior to and following the IPO. This finding is different than earlier results where firm size was not significantly related to IPO value. As mentioned previously, such a result is reasonable given that both short-term performance measures are not correlated.

Two control variables (founder effect and SIC 28) were found to be negatively related to IPO performance. The significance of founder effect suggests that potential investors may feel that these firms represent “untested” management, given that most founders who take their firms public are doing so for the first time (Wat & Deloitte, 1983). Also, potential investors might be skeptical about the ability of a founder entrepreneur to transform the company and management into a successful public company. It is one thing to run a privately held company, and quite

another to run a publicly held company. Tashakori (1980) found, based on interviews with venture capitalists, that the large majority of entrepreneurial owner-founders do not make the transition to a professional style of management. The significance of SIC 28 might be that involvement in the biotechnology and drugs industry is risky and might also indicate that, in the past, firms from this industry did not fare well (Pisano, 2006).

### **Slack and survivability**

The analyses reveal that the probability of post-IPO survival for high tech firms increases with an increase in innovational and financial slack. More specifically, R&D investment slack appears to be central to the survival of the firms in this study. These results are interesting and demonstrate that in order to survive firms must be dedicated to research and thus invest heavily in R&D. An interesting question that arises is what method is optimal for managing R&D investments. Recall that R&D slack was found to be negatively and significantly related to IPO value. Thus putting managers in a “damned if they do, damned if they don’t” situation. This work suggests that R&D investments cannot simply be determined using the traditional methods of preparing a budget for R&D expenditures a year or more in advance, and then readjusting these investments at the end of the year. These outcomes imply that R&D investments might need to be studied and planned very carefully. It seems that leading one’s industry in R&D investments could be damaging to a firm planning to go through an IPO—specifically in the period directly before the IPO. On the other hand, the results show that without being heavily invested in R&D, the probability of survival dwindles over time. This leaves managers with an extremely difficult choice to make at the time of an IPO.

Second, I find that working capital is important to the probability of survival. Thus, firms must have solid operating liquidity which represents a firm's ability to pay off its short term liabilities. If a company's current assets do not surpass its current liabilities, a firm may be unable to pay back its creditors in the short term, sending it into a downward spiral and possibly into bankruptcy. The results have shown that in the short-term investors strongly value a firm with a good working-capital position. This finding is replicated over the long-term with where survival is shown to be related to a strong working-capital position<sup>5</sup>.

The results show that managerial slack (number of manager's slack and experience slack), cash reserves, and patent slack are not significantly related to the probability of firm survival. Thus it appears that these variables have little impact on post-IPO survivability. It is interesting here to point out that although managerial slack was deemed extremely important in the short-term, given its positive influence on both short-term DVs, it seems that this variable has little effect on survival. One explanation could be that the formula for short-term success is different to that for long-term success. For instance, number-of-managers slack seemed critical for the short-term. Based on Penrose's (1959) work, I argued that managers who are busy fighting fires, as when the firm is going public, will not be able to focus on the growth of the firm. The need for sufficient managers to deal with the challenges of going public becomes obvious. However, once the firm has stabilized after an IPO, maintaining more than the industry average number managers might simply be inefficient. The growth requirements on these firms are great especially during the first few years after the IPO. Having a sufficient, but not

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<sup>5</sup> One finding, although significant, appears to conflict with both of those findings where working capital was found to be negatively related to percent premium. The reason behind such a finding could be that statistically both short term DVs (IPO value and percent premium) were not correlated. Thus it is logical that a variable that appeared to have positive significant influence on IPO value would change directions and appear to be negatively related to percent premium instead. For a more detailed discussion on this subject please refer back to the section titled slack and percent premium.

excessive, number-of-managers during that period will be critical. Such an explanation would contradict that of Penrose's (1959) and the need for slack for future growth. Second, cash reserves do not seem to be related to IPO survival. Cash reserves were found to be positively and significantly related to IPO value. Thus it appears that, for the short-term, cash reserves are a more important predictor for IPO value than for survival. Third, patent slack was not significantly related to survival. Although patent slack seemed to be an important predictor of IPO valuation, it also appears that the importance of this variable decreases in the long run. This finding indicates that having a stable library of patents does not automatically translate to firm survival. Perhaps, what is important for survival is the quality, not the number, of those patents. Future researchers might find it beneficial to take the number of patent citations into account as well (Deeds et al., 2004). Maybe the innovations and processes that have been patented did not translate into profitable products. If the technology is impressive and requires many patents to protect it, but the marketing department fails to correctly package and sell these innovations, then the firm is left with many patents that do not produce income. These end up being a financial drain on the firm. Patenting fees include: a number of filing fees (patent application fee, search fee, examination fee), attorney fees, a small entity fee (if you are a small company or an individual), issuing fee, patent drawings, and maintenance fees. Hence, patenting is expensive for small firms in which every penny counts. Further investigation is needed to better understand these phenomena.

The analysis reveals that the probability of post-IPO survival for high tech firms increases with an increase in firm age, VC backing, risk factors, and SIC 48 (telephone equipment and communications services). Alternatively, more specificity in the use of proceeds, underwriter reputations, SIC 38 (medical equipment), and acquisitions is associated with a higher

probability of post-IPO survival. It is logical that older firms are associated with survival. Older firms are known to outperform younger ones (Ritter, 1998). This finding supports prior research showing that as age increases so does probability of survival (Jain & Kini, 2000). Consistent with Jain and Kini (2000), I found that the role of VC is important in predicting firm survival. It appears that VCs can help firms survive although investors did not place a high value on VC backed firms, as shown earlier. The positive coefficient on the number of risk factors is consistent with other research findings (Bhabra & Pettway, 2003; Hensler et al., 1997). This was expected because firms with more risk factors would have a higher probability of failure. It also appears that firms in the telephone equipment and communications services industry did better than firms in other industries, thus, they had higher chances of survival. The results further indicate that although the extent of voluntary disclosure by an IPO firm has been found to be significantly related to short-term IPO performance (Leone et al., 2007), too much disclosure leads to higher failure rates. By being more specific about how it will use IPO proceeds, a firm can reduce its chances of survival. This could be because competitors benefit from such information, thus putting the firm at a higher risk of failure. The negative sign on the underwriter reputation is difficult to explain as it would suggest that firms associated with more prestigious underwriters will increase their likelihood of failure. Perhaps those results have to do with the behavior of underwriters during the IPO bubble period (end of 1990s). The underwriters established accounts for VCs to buy in on hot deals, while VCs allowed those banks to underwrite future deals (Arthurs et al., 2008b). This implies that some underwriters have only the short-term interests of the firm in mind and not the long-term. Both SIC 38 (medical equipment) and the acquisition variables have negative coefficients. This might signal that a firm in the medical equipment industry or a firm that has acquired at least one firm since IPO has higher



chances of failure. Perhaps the medical equipment industry has seen intensified competition lately thus affecting companies chances of survival. Also, it seems that where a firm, immediately after IPO, begins acquiring other firms, it will have a lower chance of survival. This is logical given the considerable evidence that many mergers and acquisitions (M&A) are unsuccessful (Homburg & Bucerius, 2006). Estimated failure rates are between 60 to 80 percent (Marks & Mirvis, 2001; Tetenbaum, 1999). Thus, newly public companies should focus on running the firm and growing it organically, while avoiding the trap of trying to grow too quickly.

The results also show that founder effect, SIC 28 (biotechnology and drugs), SIC 35 (computer and related), SIC 36 (electronics and communication), prior sales, firm size, and IPO value are not found to be significantly related to the probability of firm survival. Thus it appears that these variables have little impact on post-IPO survivability. Contrary to my expectations, IPO value does not appear to affect survivability. This implies that good management probably matters most. Simply having a highly-valued company does not guarantee survival. Thus it is reasonable to suggest that the management of those funds will be the key determinant of long term success.

### **Theoretical Implications**

I proposed that a firm that possesses rare, valuable, and difficult-to-imitate slack resources would signal to potential investors the ability of the firm to achieve a sustainable competitive-advantage, thus positively influencing the firm's valuation and survival. In addition, I examined the effects of financial, innovational, and managerial slack on different measures of short- and long-term performance.

The study makes a number of contributions to the literature. It develops a causal logic for the impact of different forms of slack resources on IPO firm success. While included in a few previous non-IPO studies, a rationale for the influence of slack has thus far not been the major focus of much theory building or empirical testing (Deepphouse & Wiseman, 2000; George, 2005). Also, within this domain, I have introduced the concepts of innovational and managerial slack which capture an aspect of slack resources that has not been examined before, thereby extending our knowledge of organizational slack by moving beyond the traditional emphasis on financial slack. By examining all three (financial, innovation, and managerial), this work provides a more complete understanding of the effects of excess resources on organizations.

This is the first study to test and find support for the effect of excess resources on the way investors evaluate the potential survival of IPO firms. For example, the finding that excess cash and working capital can positively impact the valuation of an IPO firm is meaningful and valuable to managers, investors, venture capitalists, and entrepreneurs.

This article further contributes to the literature by moving away from the traditional focus on well-established firms. By studying slack resources in a different context, I hope to add to our limited knowledge of slack resources and the role they play in organizations. The discussion between high-growth, pre-IPO firms and well-established post-IPO firms could increase the theoretical richness of the slack construct (George, 2005). The motivations and behaviors of managers are different for pre-IPO and post-IPO firms where market scrutiny and the need to deliver results every fiscal quarter are increased (George, 2005). George (2005) called for research to study slack in different contexts in order to help classify behavioral differences between these firms. He believed that this would lead to a refinement of the logic of the slack-performance relationship. By focusing on pre-IPO firms, this research helps to address this call.

I argue and find that resources can act as signals of quality, thus extending signaling theory in the IPO literature. Previous IPO-signaling research focused primarily on the external associations of a firm (e.g., underwriter reputation or VC backing) or firm-specific characteristics (e.g., firm size or TMT composition). For example, Megginson and Weiss (1991) found that because VC backing provides financial resources and expertise to a firm, it signals quality to investors. Higgins and Gulati (2006) showed that TMT composition can signal legitimacy along three dimensions: the ability of the TMT to fulfill critical roles, access resources, and attract endorsements from prestigious partners.

To summarize the implications of this research: different forms of slack resources exert different and sometimes conflicting influences on short-term versus long-term performance measures. This was shown through the key influences on IPO value, percent premium, and survivability.

### **Managerial Implications**

This study of organizational slack and high-tech IPO firms has significant implications both for managers who have recently undergone IPOs and for those whose firms are in an earlier stage of development. I also hope that entrepreneurs, VCs, and investors will benefit from this study. The work suggests that firms planning an IPO might benefit from structuring their TMT to signal the ability and commitment to see the IPO through. Specifically, increasing the number of top managers above the industry average prior to IPO is predicted to gain a premium at IPO. In addition to this, I found support for the hypothesis that large cash reserves and a better working-capital position will improve an IPO. I also am able to predict that firms with a lot of working capital will have better survivability because they are able to expand and grow their operations.

Executives of early-stage firms could benefit from knowing that a large patent portfolio will increase the amount of capital raised at IPO.

The results in regards to innovational slack might be of special interest to executives. The outcomes suggest that investors expect high levels of patenting slack and low levels of R&D slack at IPO. This implies that investors expect IPO firms to have a product developed and possibly be in the marketing stage, while R&D spending at IPO may only signal high risk to investors. After all, investments in R&D are very risky. These results have implications for when firms should go public. In the case of biotech firms, the results suggest that they should not go public until they have proof of concept (a.k.a. proof of principle). Up to that point, R&D investments are usually extremely high and may, therefore, negatively affect the firm's valuation. After that point, R&D investments do not need to be as high. Biotech firms that reach IPO without proof of concept may be considered high risk, given the large investments in R&D and very little proof of progress, thus explaining the negative relationship with capital raised at IPO.

In addition I found support to indicate that firms undergoing an IPO with a reputable underwriter, good size, and higher-than-average sales will raise more capital from an IPO. While firms associated with founders and venture capitalists at the IPO will raise less capital.

Another contribution made by this work is the simultaneous examination of both short- and long-term IPO performance measures. This is important given the deeper understanding gained in fully comprehending the effects of organizational slack on different performance measures. Without considering the impact of slack resources on survival, it becomes very difficult for managers to really understand what type of resources they need to invest in for their firms to prosper. For example, the finding that cash slack is important in the short run, but not

particularly important in the long run, informs managers that at IPO the firm must have a lot of available cash on hand. After the IPO, managers are free to invest excess cash in, for example, R&D.

### **Limitations and Future Directions**

Despite the care taken in data gathering and in doing the statistical analysis, the present research has some limitations. Because this study included a fairly broad range of firms from different industries, the results can be reasonably generalized to different time periods and other industries. But, there is the possibility that the unique characteristics of high-tech firms influenced the results. A focus on less technology-intensive IPO firms or firms in a more stable industry—although beyond the scope of this study—might reveal additional insights into the way resources are stored and deployed in those firms as well as how organizational slack influences short- or long-term success.

Also, because this study used secondary data, I relied on observable indicators, such as the number of managerial positions, to measure managerial slack constructs that involve tacit, experiential knowledge. Future research can benefit from an in-depth study into the process mechanisms that could explain the links between managerial slack and IPO value and survivability. In a general sense, future research could also use alternative methodologies, such as surveys, experiments, and simulations to test the theoretical assumptions underlying the arguments in this paper.

In addition, collection of data from the prospectus, which has been referred to as “cruel and unusual punishment” (Marino et al., 1989; Welbourne & Andrews, 1996), can be prone to errors in interpretation despite the best efforts to minimize potential problems.

Another limitation might have to do with the choice of control variables used in this study. As in any study, prioritizing which control variables to use becomes an important issue. Here, I selected the control variables based on theoretical rational and on precedent. Of course, other variables have been shown to have an effect on IPO valuation that were not controlled for in this study that might have an effect on the results.

For future research, other forms of financial, innovational, and managerial slack deserve to be examined. For example, tapping into managerial experience through the number of positions is a logical approach, with precedent (e.g., Kor, 2003). However, future research may find that examining the value of past IPO experience is critical because entrepreneurial firms may avoid startup mistakes by hiring managers with this experience (Dyke, Fischer, & Reuber, 1992). Managers’ experience in related industries perhaps could contribute to their competence (Castanias & Helfat, 1991). For example, knowledge of the Computer and Office Equipment industry might also be valuable in the Communication Equipment industry. Furthermore, managers’ experience on the boards of other startups might well contribute their problem-solving skills and capabilities in running a modern firm.

It will also be interesting to investigate the optimal levels of R&D investment through the various growth cycles of an IPO firm. This study suggests that R&D spending must be constantly managed and not forgotten. For example, it might be optimal to reduce R&D investments at the time of IPO in order to refocus spending on the essentials of managing the business and

guaranteeing a successful transformation to a public firm; directly after IPO, it might be more desirable to invest heavily in R&D.

### **Concluding Remarks**

In her dissertation offering a theory of the growth of the firm, Penrose (1959) highlighted a number of key issues that shed the light on the relationship between organizational resources, managerial perceptions and intent, and firm growth. In this study I have attempted to test and extend these arguments by exploring how the availability of resources influences the success and survivability of firms. In so doing, I have focused on slack resources and have demonstrated the importance of those resources especially in the context of firms with high-growth demands (i.e., those going public). I also have demonstrated that financial, innovational, and managerial slack resources have an effect on performance and survival.

Much discussion has taken place in the strategic-management literature regarding the question of whether slack resources are beneficial or detrimental to the success of a firm (e.g., Bourgeois, 1981; Cheng & Kesner, 1997; Cyert & March, 1963; Singh, 1986). This research aimed to demonstrate the importance of slack resources in a different context. In short, I would like to reiterate that recognizing the effect of slack resources on IPO firm valuation and survivability is not only theoretically important, but of great practical significance. Firms confront simultaneous demands to be innovative and efficient (Bartlett & Ghoshal, 1989); it can be extremely challenging to maintain the correct levels of slack resources to allow IPO firms to prosper. Hamel and Prahalad (1994) warned that during the 1980s firms invested mainly in cost-cutting programs (e.g., lean manufacturing and downsizing), sometimes at the expense of investing in the future. By 2007, according to the American Society of Quality, 82% of the

largest 100 companies in the U.S. have embraced Six Sigma (Hindo, 2007). These firms conceive of slack as wasted resources that hamper their success in a competitive global economy. At the other extreme are firms such as Google which actively build slack into their processes. I side with Bourgeois (1981) who argued that slack should be planned. I further argue that slack resources are important to firms with high growth requirements. I hope that this work will provide insight into the importance of slack resources for IPO firms and will serve as a warning against shortsighted conceptions of slack.



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