

The Impact of Internationalization on Post-IPO Performance of Firms

by

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AUTHOR'S DECLARATION

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by the examiners.

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ABSTRACT

This study examines the relationship between the degree of internationalization at the time of IPO (initial public offering) and post-IPO market performance of US and Canadian firms. This proposition derives its support from the synthesis of major theories of international business with signaling and information asymmetry theory. Theories of international business are developed from the perspectives of the behaviour and decision-making of managers of the firms, whereas signaling and information asymmetry theory are about communicating to external investors; and thereby incorporates the assessments of these investors. After the IPO, investors become substantial equity holders in the firms. Therefore, the integration of the two streams of theories will help us understand how investors evaluate the degree of internationalization at the time of IPO. The basic premise of this integration is that theories of internationalization have identified a number of benefits of international expansion of firms. In this research, I assume that these benefits of international expansion provide positive signals to potential investors. As signaling is related to information asymmetry, these positive signals reduce the information asymmetry of investors, inducing them to value firms with the most internationalization.

Further, drawing support from international new venture theory and the resource-based view (RBV) of the firm, this study explores the premise that international new ventures (INVs) go public earlier than other traditional firms. Rapid growth through international expansion requires substantial financial resources. One way to raise capital for this rapid international expansion is to go public earlier. As the speed of internationalization and early IPO might send strong positive signals to external investors, INVs would go public earlier.

Data on post-IPO returns, volatility of returns, underpricing, and other characteristics of the firm, including the scale and scope of international sales, was extracted from a number of secondary sources including different databases and company prospectuses. The sample is restricted to IPO firms in the manufacturing and service sectors, headquartered in the US and Canada, that issued initial public offerings from 2001 to 2011.

Post-IPO performance was measured in three ways: compound holding period returns, relative volatility of returns, and underpricing. The three measures of post-IPO performance are used to capture different aspects of performance, including the value assessed by external investors and insiders, and risk diversification.

Internationalization-performance relationships have been extensively evaluated using linear models. However, recent studies have found non-linear forms of the relationship. This study provides a theoretical rationale and evaluates the relationship between internationalization and post-IPO performance using both linear and non-linear models. Internationalization is a complex phenomenon and may not be appropriately evaluated using simple linear models. Therefore, this study assumes a U-shaped relationship between the degree of internationalization and compound holding period returns and an inverted U-shaped relationship between the degree of internationalization and relative volatility of returns and underpricing. Using least square regression, the results confirm the existence of non-linear relationships between internationalization and compound holding period returns and relative volatility of returns.

I find support for the idea that higher geographic scope provides a positive signal to potential investors. My findings indicate that higher geographic scope at the time of an IPO not only results in higher post-IPO returns, but also reduces the relative volatility of returns and underpricing. In the case of underpricing, higher intensity also leads to lower underpricing. The present study identifies an optimal point beyond which internationalization has a positive impact on performance. The implication is that management could signal future performance through both higher geographic scope and higher intensity of internationalization. In a similar way, investors can make more informed decisions using these signals. In contrast, at lower levels, internationalization is not related to compound holding period returns and underpricing, but it is positively associated with relative volatility. This implies that investors perceive lower levels of internationalization as more risky compared to higher levels.

The findings have implications for both investors and management. Investors can utilize the findings of higher geographic scope resulting in a desirable outcome of higher returns and lower risk to make decisions that are more informed. The results also provide a strong strategic message to management considering going public of the potential benefits of higher internationalization.

Contributions to the literature include: synthesizing theories of internationalization with signaling and information asymmetry theories, testing the non-linearity of the internationalization-performance relationship in the IPO context, evaluating the risk diversification aspect of multinationality in the context of IPO, and addition to the limited research on the link between internationalization and post-IPO performance. As simple linear and curvilinear approaches may not reveal the complexity of internationalization-performance relationship, this study introduces a dummy category approach in order to examine the relationship from different angles such as the impact of high and low internationalization, separating the effects of domestic firms, and identification of a threshold.

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DEDICATION

To almighty God Who blessed me with the strength and patience to come up with this dissertation.

To my mother, wife, kids, and my whole family and friends for valuable prayers and support. I strongly believe that your prayers have made this possible.

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Chapter 1

Introduction

1.1 Background

The objective of this study is to examine the relationship between the degree of internationalization at the time of IPO (initial public offering) and post-IPO stock performance. Examining this relationship is important to both management and investors. The extant internationalization-performance relationship has been examined from the perspectives of management. However, after the IPO, external investors become substantial equity holders of the firm. The knowledge of how external investors evaluate the degree of internationalization of a firm at the time of IPO will help managers make more informed decisions about going public and going global. In terms of signaling, management will be interested in the kinds of signals the degree of internationalization may send to potential investors. They may use this information in pricing their IPOs. The impact of internationalization on share price performance will be of interest to investors as they may utilize this information in making their investment decisions. Evaluating the decision on whether to go public earlier may inform the decision-making of the management of international new venture firms. The rationale that International New Ventures (INVs) go public earlier in order to fund their rapid growth may send a strong signal of future growth and performance to investors.

Internationalization is the tendency of companies to systematically increase the international dimension of their business activities (Cavusgil, Knight, & Riesenberger, 2014). In this study, internationalization is measured using both the intensity and geographic scope (scope) of international expansion (see Section 4.6.2.1 for details). Post-IPO performance is measured using three variables: compound holding period returns, relative volatility of returns, and underpricing (detailed descriptions of each variable are provided in Sections

4.6.1.1-3). In addition to examining the relationship between the extent of internationalization and post-IPO performance, I also evaluate the premise that international new ventures (Section 4.6.2.2) go public earlier. International new ventures are firms that have international sales within ten years of their founding.

In this research, I test and provide theoretical underpinnings for both linear and non-linear relationships between internationalization and post-IPO firm performance to find which rationale is most consistent with the empirical relationship observed in the data. The rationale for both linear and non-linear forms of the relationship comes from the integration of relevant theories of internationalization with signaling and information asymmetry theory. The core idea of this integration is that benefits identified by theories of internationalization provide positive signals to potential investors. These positive signals reduce the information asymmetry of investors with respect to the value and future performance of the firm, leading to higher performance and a reduction in risk and underpricing. These positive strong signals of quality induce external investors to buy shares of the internationalized firms at a premium price and thereby may result in higher stock returns and lower volatility (risk) of returns. In the case of underpricing, underwriters and the firm management set the offer price of their issue lower to induce external investors to buy shares of the firm. However, strong positive signals of internationalization, which reduce the uncertainty, influence underwriters to discount the offer price less than in the absence of these signals. Therefore, internationalized firms may have a lower underpricing compared to domestic firms. Spence (1973) introduced the concept of market signal when studying the labor market to explain an observable proxy that can be used to predict the unobservable attributes of the issue under examination. For example, Spence (1973) argued that employers could use the education level of job applicants as a signal of productive capability of the applicant. Similarly, the degree of internationalization (e.g., percentage of foreign sales, number of foreign geographic regions with sales) is an observable proxy that communicates the unobservable characteristics of future performance and value. Signaling theory focuses on the deliberate communication of the quality of the firm through the observable characteristic of the firm (Connelly, Certo, Ireland, & Reutzel, 2011). Like most signaling models, this study uses signaling as a means to communicate the inherent quality of the firm in order to reduce information asymmetry between outside investors and the management.

The argument behind the proposition that INVs go public earlier is to be able to raise capital for rapid internationalization. An early IPO may not only help INVs to fund their rapid growth, but may also enhance their reputation and visibility in the market. Therefore, going public earlier may send signals of future growth and performance to investors.

In my analysis, I find support that both the intensity and scope of internationalization is non-linearly related to the two measures of performance (e.g., return and volatility). High scope is positively associated with compound holding period returns, while both high scope and intensity is negatively associated with underpricing. High and low intensity and low scope is statistically significant, and is positively related to relative volatility. The findings also support the hypothesis that INVs go public earlier.

This research uses a sample of US and Canadian headquartered firms that went public from 2001 to 2011. The sample is further restricted to only manufacturing and service firms. In addition, the IPO research standard screening criteria is used to arrive at a sample of 459 for this study. Linear regression models are used to test the hypotheses of this study. The findings have implications both for theory and practice. The major theoretical and empirical contributions are the development and testing of the synthesis of theories framework, evaluating the non-linearity of internationalization and post-IPO performance, and evaluating the impact of internationalization on both returns and risk simultaneously. In terms of practice, management may time and signal their IPO more appropriately, whereas investors would be able to differentiate firms on the basis of the degree of internationalization.

1.2 Internationalization and Post-IPO performance

The relationship between the degree of internationalization and firm performance is a core issue in international business that is evident from the enormous amount of scholarly attention, resulting in a large number of empirical studies. However, the result is not conclusive; and the responses range from no relationship (Ebneith & Theuvsen, 2006; Gerpott & Jakopin, 2005), to a positive relationship (Zahra, Ireland, & Hitt, 2000; Ramirez-Aleson & Espitia-Escuer, 2001; Vernon, 1971), and even to a negative relationship (Morck & Yeung,

1991). In addition, researchers have postulated and empirically tested more complex forms of the relationship, ranging from a linear relationship (Kotabe, Srinivasan, & Aulakh, 2002), to non-linear relationships, including U-shaped (Capar & Kotabe, 2003; Gomes & Ramaswamy, 1999; Lu & Beamish, 2001), inverted U-shaped (Garinger, Beamish, & DaCosta, 1989), and S-shaped (Chiang & Yu, 2005; Contarctor, Kundu, & Hsu, 2003).

Theories of internationalization that argue for a positive internationalization-performance relationship draw their support from the benefits that a firm receives from internationalization. For example, the major benefit is economies of scale and scope: particularly, the efficient utilization of intangible assets across geographic markets (Caves, 1971; Ghoshal, 1987; Kim, Hwang, & Burgers, 1993). A similar argument can be made from the perspectives of resource-based and knowledge-based theories (Caper & Kotabe, 2003; Rugman & Verbeke, 1992, 2001, 2003). Hymer's foreign direct investment (FDI) theory is also based on efficient resource allocation and utilization (Hymer, 1976). Similarly, the network model draws its support for a positive influence of internationalization on firm performance from increased access to resources, capabilities, and learning (Etemad, 2004). However, researchers have also identified the disadvantages of internationalization, such as liability of foreignness (Hymer, 1976), increased coordination and control costs (Jones & Hill, 1988) and increased risks (Delios & Henisz, 2000). As mentioned above, extensive empirical studies have tested these different theoretical perspectives, but the empirical evidence is mixed (Hitt, Hoskisson, & Kim, 1997).

The extant empirical research has mainly focused on measures of financial and organizational performance. Initial public offerings (IPOs) provide an opportunity to test how external parties (e.g., investors) make judgements about the value or risk that internationalization presents to an organization. Share price performance represents multiple points of judgement (i.e., of shareholders and potential shareholders) and combines these into an indicator of the perceived ability of the firm to generate future revenue. Synthesizing internationalization-performance research and IPO research offers a different perspective: how external investors assess the role of internationalization in the ability of a firm to create value and returns to shareholders. This research investigates the extent to which internationalization may play a role and whether investors perceive internationalization as a source of additional value or risk.

The propositions of this study are also supported from research suggesting that the importance of financial information in determining equity values has decreased steadily over the last two decades. This information has motivated a stream of research indicating increasing attention of researchers to non-financial information (e.g., board composition, venture capital backing, underwriter prestige, innovation, etc.) in determining equity values (Amir & Lev, 1996; Lev & Zarowin, 1999). Kim & Ritter (1999) consider that the relationship between financial information and equity values is particularly weak in the context of IPO.

Recently, management scholars, particularly entrepreneurship researchers, have also focused on IPOs as an important domain of study. Certo, Holcolm, & Holmes (2009) conducted a comprehensive review of the IPO literature in the leading journals in management and entrepreneurship, and they found that studies have focused on four central themes: (1) corporate governance, (2) upper echelons, (3) social influence, and (4) innovation. In their review, Certo et al. (2009) identified important gaps in the IPO research. One of these gaps is the examination of international diversification in the IPO context. Addressing this gap, this study examines internationalization in the context of IPO using three dependent variables that measure different aspects of performance: compound holding period returns, relative volatility of returns, and underpricing. Recently, a few studies have started to look at internationalization in the context of IPOs. These studies include Mudambi, et al., (2012), LiPuma (2011), and Al-Shammari, O'Brien, & ALBusaidi (2013). One of the major limitations of these three studies is the temporal aspect of the data. The majority of their data comes from the pre-Internet bubble period (1999–2000). Since then, more stringent disclosure requirements have been implemented through Sarbanes-Oxley Act of 2002. This may have put more information in the hands of the public investors, thereby reducing the information asymmetry of the potential investors of public firms. The current study using more recent data (2001-2011) may thus be evaluating the impact of internationalization on post-IPO performance in a more recent and somewhat different environment.

In addition to the temporal aspect, these studies have considered only a linear relationship between internationalization and post-IPO performance, even though contemporary studies on internationalization-performance relationship have increasingly identified non-linear forms of the relationship. Addressing this gap, the current study

examines both linear and non-linear relationship between internationalization and post-IPO firm performance.

Studies have examined the internationalization-performance link using simple linear and non-linear models. However, the complexity of this relationship, evident from the conflicting findings, requires a different approach that allows for evaluating this relationship from different aspects. Following the approach of LiPuma (2011) and Walter, Kroll, & Wright (2010), this study uses dummy categories of the internationalization variable along with the continuous measure. The dummy categories approach not only allows for separating the effects of domestic firms but also evaluating the different slopes of the internationalization variable. Moreover, this approach offers simple classification of high and low internationalization, identification of a threshold of internationalization beyond which performance changes, offers simple interpretation of the effects, and summarizes the data more efficiently (Williams et al., 2006). However, there is a possibility of loss of information when categorizing a continuous variable. This loss of information may lead to less power and biased regression coefficients.

1.2.1 Synthesis framework

Hypotheses about both linear and non-linear relationships, developed for this study, derive their support from the synthesis of theories of international business, including portfolio theory with signaling and information asymmetry theories of finance. The core idea behind the synthesis framework is that international business theories, including portfolio theory, are developed from the perspectives of the management. These theories are based on the benefits of international expansion. After going public, external investors hold a substantial equity in the firms. In contrast, signaling and information asymmetry theory are developed from the perspectives of investors. Therefore, integrating these two streams of theories allows for assessing the perspectives of external investors. The core idea is that the benefits identified by international business and portfolio theory, emit positive strong signals to potential investors. These positive strong signals reduce the information asymmetry of

external investors, inducing them to give higher valuations to firms with higher internationalization at the time of IPO. Therefore, higher internationalization at the time of IPO is positively associated with returns, and negatively associated with relative volatility and underpricing.

The synthesis framework used to support the non-linear hypotheses suggests that an optimal level of internationalization is required to exploit the full benefits of international expansion. The benefits identified by theories of international business provide positive signals to potential investors only beyond a certain optimal level. Therefore, investors may not consider lower levels of internationalization at the time of IPO, or the lower level may even send a negative signal to investors. In addition, high and low internationalization at the time of IPO may be a strategy of the firm. It can be argued that higher internationalization may suggest that internationalization is a significant strategy of the firm. Therefore, higher internationalization may send a strong signal, whereas the signal in case of low internationalization may be too weak.

1.3 International New Venture firms and Time-to-IPO

International new venture firms are known for their rapid internationalization right from their foundation. However, international expansion especially at high pace and soon after foundation requires substantial financial resources. Therefore, the management of these firms faces the question of how to finance this rapid growth. One of the main reasons for firms to go public is to raise capital for growth (Brau & Fawcett, 2006). The IPO context of this study can be used to answer the question of financing the rapid growth. In addition, an IPO may help firms in many other ways. After the initial offering, firms can raise funds in the future by issuing more shares. Offering stock options to employees may motivate them to work hard as they own formal stake in the company. Share ownership may help firms to hire and retain high quality staff. Strategically, going public may enhance a firm's reputation and visibility, giving them an edge over its unlisted competitors. In addition to the benefits, issuing shares to the public has its disadvantages too. Public firms are required to disclose

more sensitive information in a more regular fashion. All this costs money and time. An IPO may also expose vital strategic information to the firm's competitors, and conducting an IPO is costly too (Khurshid, 2011).

International new venture firms are characterized by rapid internationalization from inception. These firms lack the financial resources needed for their rapid growth. Therefore, their early internationalization may require these firms to go public earlier to finance this rapid growth. In addition, going public may also enhance the reputation and visibility of these firms.

1.4 Purpose, Objectives, and Research Questions

Firm specific risk is critical in risk management. Understanding the factors that affect this firm-level risk is important. Contrary to economics and financial theory associating high risk with high return, Bowman (1980) has shown that firms with high returns can have lower risk. Researchers started to unfold this high return-low risk paradox (Bettis & Hall, 1982; Bettis & Mahajan, 1985) in order to find out what strategic position or characteristics are associated with this profile. Bettis & Mahajan (1985) suggested that firms with certain diversification postures might reduce risk and increase returns simultaneously. Kim et al. (1993) argued that global market diversification, which provides firms with unique opportunities not available to purely domestic firms, could explain this high return low risk profile.

A number of studies have been conducted attributing stock volatility to different factors such as research and development (R & D) expenditure, knowledge spillover (Fung, 2006), financial leverage (Schwert, 1989), political risk (Marie-Claude, Jean-Claude, & Naceur, 2005), and institutional ownership (Rubin & Smith, 2009). As none of the previous studies have evaluated the relationship between internationalization at the time of IPO and stock return volatility (as a measure of risk), in the context of IPO, this study examines this relationship in order to extend the theories of internationalization by including the volatility

(risk) of return. This is important because investors may prefer investments that have less volatility at the same level of return.

An IPO is a critical juncture in the life of a firm and underpricing is a common occurrence of firm undertaking IPOs (Daily, Certo, Dalton, & Roengpitya, 2003). A number of studies have investigated factors related to underpricing, but the result is inconclusive. For example, a series of studies that investigated the relationship between owner/management equity at the time of IPO and IPO underpricing produced little consistency in the findings (Kim, Krinsky, & Lee, 1995; Ritter, 1984). The dominant theoretical perspectives applied to study IPO underpricing are information asymmetry theory and signaling theory (Certo, Daily & Dalton, 2001). Higher information asymmetry means a larger gap in information between external investors and the firms that may lead to greater underpricing. Signaling theory suggests that certain indicators (variables) send signals to potential investors about the capabilities and future value of the firms (Deeds, Decarolis & Coombs, 1997). Signals can be of two types. Positive strong signals indicate positive information about the future value and performance of the firm. Therefore, positive strong signals induce external investors to buy shares and give higher valuations to firms. Weak or negative signals might either not convey any signal or convey information of negative performance and value. In both cases, information asymmetry between the firm and external investors is reduced. However, in the first case, strong positive signals induce external investors to give higher valuations to the firm. On the other hand, in the second case, negative signals may discourage external investors from buying shares of the firm. Therefore, in order to induce these investors to buy shares, the investment bank may have to set the offer price of the issue even lower than the domestic firms. The majority of IPO researchers obtain information about these indicators from IPO prospectuses. Studies have examined indicators such as retained earnings, underwriter prestige, auditor reputation, number of risk factors, firm size, firm age, uses of IPO proceeds, venture capital equity, IPO proceeds (Dalton, Daily, Certo, & Roengpitya, 2003), governance, upper echelons, social influence, and innovation (Certo et al., 2009). This study investigates the impact of another important firm specific factor: the degree of internationalization at the time of IPO on underpricing.

Some firms go public earlier than others. This may be especially true for international new venture (INV) and born global (BG) firms. These firms choose to go international early

in their life because they possess unique intangible assets (such as knowledge) that create superior long-term returns (Morck & Yeung, 1991). However, going international is costly and may require substantial financial resources. This is particularly true for INVs/BGs. They are usually small-to medium-sized firms that lack the capital needed for international expansion. A less expensive way to finance this growth is through going public. Therefore, it can be argued that international new venture firms may go public earlier in order to finance their existing international activities and their further expansion into more markets. This study examines whether INVs go public earlier than other firms.

The purpose of this study is to develop an alternative theoretical rationale, and empirical evidence, for examining the impact of the degree of internationalization on post-IPO performance of firms. In this research, I integrate relevant theories of international business with signaling and information asymmetry theory to develop, and empirically test, a model for examining the influence of internationalization on performance in the context of IPO.

The objective of this study is to examine the mechanism through which the degree of internationalization at the time of IPO influences the post-IPO performance of Canadian and US firms. A few studies (e.g., Al-Shammari, O'Brien, & AlBusaidi (2013); Mudambi, et al., (2012); LiPuma (2011)) have examined the relationship between internationalization and post-IPO performance. Therefore, this study adds to this limited research by examining the direct effects of internationalization on post-IPO firm performance. In addition, these few studies have only examined the linear form of this relationship. This study addresses this gap by examining the non-linear forms of the relationship. The shape of internationalization-performance relationship has been the subject of a number of studies. Most contemporary studies have evaluated non-linear forms of this relationship (Thomas & Eden, 2004).

Returns are generally evaluated with reference to risks associated with these returns. Higher returns are generally associated with higher risks and vice versa. However, researchers suggest that diversification may reduce the risks associated with high returns. This may be particularly true for diversification through international expansion (Bettis & Mahajan, 1985; Kim, et al., 1993). Researchers in the international business literature have mainly focused on higher returns without any reference to the risk associated with these returns. The present

study, addressing this gap in the literature, relates internationalization to both returns and risks simultaneously.

With the exception of two studies (LiPuma, 2011; Riahi-Belkaoui, 1996), researchers have evaluated internationalization-performance relationship using only continuous measures of internationalization. Using dummy categories of domestic, low, and high internationalization instead of a continuous measure may summarize the data more efficiently and from a different angle (Williams et al., 2006). In addition, the dummy category approach allows for separating the effects of domestic firms. This study examines the impact of internationalization on post-IPO firm performance using both continuous and dummy categories of internationalization.

In addition to testing the relationship between market performance and the extent of internationalization, this study takes a partial step to a more nuanced understanding of the impact of internationalization strategy of international new venture firms. In this context, this study tests the premise that international new ventures go public earlier than other traditionally internationalizing firms. Firms go public to raise capital necessary for financing growth and survival (Brau & Fawcett, 2006). In addition, going public enhances a firm's reputation and visibility, giving it a competitive edge over its unlisted competitors (Khurshid, 2011). International new ventures, characterized by rapid international expansion, may go public earlier in order to finance their rapid growth through the capital raised by issuing shares to the public. Moreover, early IPO may send signal of future growth and performance to potential investors.

Responding to the gap identified by Certo et al. (2009), this study examines the relationship between the degree of internationalization of a firm and post-IPO stock price performance using data from the US and Canadian firms that went public between 2001 and 2011. Compared to the few studies mentioned above, this study uses the most recent data on IPOs. This study argues that internationalization has an influence on several aspects of IPO performance. Therefore, this study uses three different dependent variables to get a more nuanced understanding of the relationship. Specifically this research addresses the following questions:

- How is the degree of internationalization at the time of IPO related to the stock return performance after the IPO?
- How is the degree of internationalization at the time of IPO related to relative volatility of returns (risk)?
- How is the degree of internationalization at the time of IPO related to underpricing?
- Do international new venture firms go public earlier than other traditionally internationalizing firms?

1.5 Methods

This study examines the impact of internationalization on post-IPO firm performance using three different measures. These three different measures address different aspects of the IPO performance. Compound holding period returns assess the perceptions of external investors whereas underpricing evaluate the assessment of both external and internal investors. The third measure-relative volatility assesses the diversification aspect of internationalization in the context of IPO.

Both linear and non-linear models are used to test the relationship between the degree of internationalization and post-IPO firm performance. In addition, two specifications of the linear regression are used to test the hypotheses generated in this research. In the first specification, internationalization is used as a continuous variable that also includes domestic firms. In the second specification, dummy categories of internationalization are used. The main purpose behind the use of dummy categories is to separate the effects of domestic firms and differentiate between low and high internationalization.

A different independent and dependent variable is used to address the question that INVs go public earlier than other firms. A dichotomous dummy variable of INVs (where INVs=1, others=0) is related to a continuous variable of Time-to-IPO (log of Time-to-IPO).

Considering the shortcomings of using secondary data, a control variable approach is used to deal with the issue of endogeneity. Issues of normality of residuals, homoscedasticity,

autocorrelation, influence of outliers, and multicollinearity are considered while conducting regression analysis.

1.6 Sample

The sample for this study includes Canadian and US manufacturing and service firms that issued their initial public offerings from January 2001 to December 2011. The initial list of firms was downloaded from two databases: Compustat North America and Bloomberg. As the focus of this study was Canadian and US firms, firms headquartered outside of Canada and the US were removed. In addition to the above restrictions, the standard IPO research screening criteria was used to arrive at the final sample of 459. Firms in mining, oil and gas, energy, and insurance sectors were also removed because the internationalization of these firms is fundamentally different from manufacturing and service firms.

A number of data sources, including databases, websites, and company prospectuses, were used to collect data for the variables of this study. In addition, an extensive data cleaning and validation process was pursued in order to include all potential IPO. Due to the use of a number of sources of data collection and extensive data cleaning process, the number of firms with missing data is only 12. As every effort was made to include all potential IPO firms, the sample of this study approximates the population in a restricted sense. Thus, the statistical power for this sample is high.

As the measurement of the three dependent variables of post-IPO performance is based on stock prices and offer prices, the majority of this data was obtained from Bloomberg database. Missing data was checked on both the Centre for Research in Security Prices (CRSP) and DataStream. The data for the independent variable-internationalization was mainly retrieved from the respective company prospectus.

1.7 Findings

The findings of this research confirm that internationalization is non-linearly associated to compound holding period returns. However, the direction of the curve is opposite between the intensity and scope of internationalization. In the case of intensity, compound holding period returns initially increase up to 50 percent intensity, but drops down after this mark. With respect to the geographic scope (scope), compound holding period returns decreases in up to three regions, but is sloping positive afterwards. A more fine grain analysis of the relationship using dummy categories of internationalization reveals two things. First, consistent with the above findings, the non-linearity with compound holding period returns is confirmed. Second, the most important finding is that only high scope is positively and statistically significantly related to compound holding period returns.

In the case of relative volatility, non-linearity with respect to the scope of internationalization is confirmed but the non-linear relationship is not statistically significant in case of intensity. The findings also reveal that both high and low intensity along with low scope are positively associated with relative volatility. In terms of underpricing, the non-linear hypotheses are not supported, but both the linear hypotheses are confirmed at high scope and high intensity. Both low intensity and low scope is not associated with underpricing. The findings with respect to the last hypothesis confirm that international new venture firms go public earlier than other traditionally internationalizing firms.

1.8 Limitations

The major limitations of this study are related to the generalizability and the sampled firms used. Restricting the sample to the US and Canadian IPO firms in the manufacturing and service sectors limits its generalizability to other environments and industry sectors. The small numbers of Canadian firms question its generalizability into the Canadian environment. The uniqueness of the US market may have an effect on the results. The findings of this study may be an artifact of the sample firms used, as the number of firms with high scope is few.

1.9 Extension

Both theoretical (synthesis of theories) and empirical (non-linear and dummy category) approaches used in this study may be adopted in future research. Both of these approaches are not limited to internationalization-performance relationships, but can be utilized in a broad range of studies relating other aspects of firms with performance. This study is based on archival data assessing the perceptions of external investors using stock price performance. Potential future research may assess the perceptions of investors directly through primary data to confirm the findings of this study.

1.10 Contributions

This study contributes to the theories of internationalization in general by extending their applications into the initial public offerings context. In addition, this study brings information asymmetry (Beatty & Ritter, 1986; Loughran & Ritter, 2004; Ritter & Welch, 2002), Signaling (Anderson, Beard, & Born, 1995) and portfolio diversification (Markowitz, 1959) theories to the international business literature.

Internationalization-performance relationship has been studied extensively but this literature has been developed from the perspectives of management. This may be due to the use of accounting and organizational measures of firm performance in these studies. The different forms of this relationship are based on the benefits/costs of internationalization. This study extends this approach to how internationalization at the time of IPO signals to external investors. Synthesis of theories of international business with signaling and information asymmetry theory is used to develop this new rationale. Therefore, a major contribution of this study is the introduction of the synthesis of theories approach to the international business literature.

So far, only a few studies have evaluated internationalization in the context of IPO using simple linear models. This study adds to the limited research and extends the application of non-linearity in the context of IPO by examining both linear and non-linear models of this relationship.

In addition, considering the complexity of this relationship as evident from conflicting findings, this study introduces a new approach of using dummy categories of both the intensity and scope of internationalization.

The few contemporary studies that evaluated internationalization in the context of IPO have only focused on higher returns. However, investors should be interested in higher returns at lower risks. A lower risk not accompanied by higher returns is not a benefit (Brewer, 1981). Unlike the few contemporary studies, this study evaluates both returns and the risk associated with returns. In addition, this study evaluates the diversification aspect of internationalization from the perspectives of investors.

In addition to the empirical and theoretical contributions, the outcomes of this study will be of interest to practitioners-managers, entrepreneurs, and investors. The findings of this study may help managers and entrepreneurs to time their IPO more appropriately. The findings confirm that managers can obtain higher valuations and lower underpricing, even lower risk, if the firm has sufficient geographic scope (scope) at the time of IPO. The findings may also help investors make more informed decision when investing in an IPO. The management of international new venture firms would benefit from the finding that going public earlier is a positive signal to external investors. This finding will help management in deciding how to raise the capital needed for rapid growth.

1.11 Structure of the Thesis

This thesis is organized into six chapters. The first chapter introduces the topic with a brief description of the methodology, findings, and contributions of the study. The second chapter reviews theories of internationalization that provides a rationale for the hypotheses developed in the next chapter. In addition, this chapter discusses empirical research on

internationalization-performance relationship and the relationship between internationalization and post-IPO performance of the firms. Chapter 3 discusses the theoretical rationale based on the synthesis of the two streams of theories. Using the synthesis framework, this chapter develops the hypotheses with respect to each dependent variable. Chapter 4 provides a description of the methodology that includes sample, sources of data, variables, descriptive statistics, statistical models, and the issue of endogeneity. Chapter 5 discusses the findings from this research. Chapter 6 presents a discussion of the results, conclusions, contributions of this research, limitations, and recommendations for future research.

Chapter 2

Literature Review

2.1 Introduction

As the theoretical underpinnings for the hypotheses developed in this study are based on the integration of the major theories of internationalization and portfolio theory, with signaling and information asymmetry theory, this chapter first reviews these theories. Theories of internationalization are reviewed because they provide a rationale for the expected internationalization-performance relationship. This rationale is based on the benefits that international expansion provides to a firm. For example, efficient resource utilization and allocation is a core benefit identified with FDI theories (Hymer's FDI, internalization, and eclectic paradigm). Similarly, resource-based view emphasizes the intangible resources as a source of competitive advantage. The network model explains access to more resources and learning as a benefit of international expansion. Likewise, portfolio theory can be used to explain the diversification benefit of international expansion.

In order to understand how investors see these benefits of international expansion, theories of internationalization are integrated with signaling and information asymmetry theory, because these later theories are developed from the perspective of investors. International new venture theory and resource-based view are also reviewed because they provide support to the premise that international new ventures go public earlier than other internationalizing firms.

Finally, the chapter reviews empirical work on the influence of internationalization on firm performance and post-IPO performance. Initially, studies evaluated only linear relationships between internationalization and firm performance. But, more recently, different forms of the non-linearity including U-shaped, inverted U-shaped, and S-curve, have been revealed by researchers. Although studies in the context of an IPO have mainly focused on

four themes: corporate governance, upper echelons, social influence, and innovation, a few studies have recently started to look at internationalization.

2.2 Theories of Internationalization

Traditional theories of internationalization explain the foreign expansion of large firms. These theories can be divided into two streams. The first stream is based on the work of Stephen Hymer (1960, 1976). His work explains that firms have some intrinsic characteristics that help them overcome the difficulties of expanding into foreign markets. The second stream, broadly known as the “Scandinavian School” or “Stages Model”, is based on the process of internationalization as a gradual and careful accumulation of foreign market knowledge over time. The major theories from the two streams relevant in the context of this study are reviewed in the following sections.

2.2.1 Hymer's FDI

Hymer's seminal work (1960, 1976) shifted the focus of international trade theory from country to firm level. He attempted to explain why firms engage in foreign direct investment. According to Hymer (1976), the goal of the firm is profit maximization through efficient resource allocation and utilization. Once an organization has developed its firm specific advantages, it can exploit these advantages in foreign markets even though there are additional costs involved in foreign expansion. He further elaborated that firms expanding abroad face unfavourable market conditions as compared to domestic firms that understand the market conditions, language, legal system, and consumer habits. Caves (1971) and Hymer (1976) were the first to suggest that multinational enterprises (MNEs) owe their existence to market imperfections. Scarce exchange opportunities, excessive competition in domestic markets, firm specific advantages, and mature industry are the drivers of foreign expansion. Thus, it can be concluded that to overcome foreign market imperfection, an MNE should possess firm specific assets (FSAs) that are hard for rival to replicate and are readily

transferable within the MNE system from parent to subsidiaries. The implication of Hymer's theory is that foreign direct investments of firms with high firm specific assets would increase firm performance because MNEs would have the necessary resources to overcome market imperfections.

2.2.2 Internalization theory

Coase (1937) was first to define “transaction cost”. He argued that due to the transaction cost of foreign activities, it is more efficient for a firm to internalize export transactions, substituting them with foreign direct investments (FDIs). Following the work of Coase, Buckley & Casson (1976) formulated “internalization theory”. This theory suggests that a firm internalizes a transaction whenever the costs of using markets are higher than those of organizing them internally. Internalization theory is also related to market structure. In efficient markets, characterized by a large number of buyers and sellers, strong competition, and agents with necessary information for optimal decisions, the transaction costs are close to zero. However, in the real world, markets are rarely perfectly competitive, and internalization is likely to be an efficient choice. This theory focuses on MNEs’ attempts to create and control internal markets by establishing subsidiaries. This internal market derives its resources from the parent company. In addition to market imperfections, Buckley & Casson (1976) identified other factors determining the internalization decision, in particular with respect to internal market organization and coordination. They identified knowledge as one of the most important factors in driving foreign investment decisions. The implication of internalization theory for internationalization-performance relationship is that higher FDI would lead to higher performance because firms operate more efficiently in internal markets. However, this higher performance may decline at a certain stage when the level of complexity increases. Operating in more countries leads to higher costs of coordination and organization as compared to market transactions. This might be the reason for the inverted-U shaped relationship between multinationality and performance observed in some studies (Goertzen & Beamish, 2003).

2.2.3 Dunning's eclectic theory

In order to explore international production and examine foreign direct investment decisions, John Dunning (1993), developed this general framework. According to the eclectic paradigm, a firm needs to possess one or more of the following three advantages in order to establish successful business in foreign markets: ownership, location, and internalization advantages.

Owner specific advantages

Owner specific advantages are specific assets that are capable of generating future income that competitors do not possess. There are two types: asset ownership advantages and transaction ownership advantages. Asset ownership advantages are available to every firm, but they are specific in their origin at particular locations. They can be tangible or intangible, such as firm-specific technology, natural resources, labour, proximity to market, market structure, or laws and policies. Transaction ownership advantages arise from the governance of assets spread throughout various locations. Examples include the ability to create new technology or organizational skills and to take advantage of economies of scale or synergies in production, purchasing, marketing, research, finance or transportation. Ownership-specific advantages must be strong enough to overcome production costs and doing business in a foreign market.

Location specific advantages

These are assets specific to certain locations, which a firm might find convenient to exploit. They may include the availability of low cost production factors, such as, labour, energy, or material.

Internalization specific advantages

These advantages deal with the benefit of undertaking relevant activities inside the organization. According to Dunning, ownership and internalization advantages are closely

related to each other. Internalization advantages arise when the potential returns from ownership advantages are higher if they are transferred across borders within the firm's organization rather than sold in external markets. Firms undertaking foreign production internalize ownership advantages in foreign markets. Internalization is a pivotal component of the advantage not available to other firms. This advantage allows corporate family members access to resources at privileged prices based on the nature of their special relationship with the corporate family at the time. A typical local subsidiary has access to a pool of technical and financial resources available at the MNEs' headquarters and other sister subsidiaries at privileged prices not available to non-members. As long as firms possess these three advantages, they will benefit from higher internationalization, which may lead to higher performance (Etemad, 2004).

The above three theories have been criticised for their focus on foreign direct investment as a preferred mode of internationalization. In addition, these theories are based on large established firms and thus may not explain the internationalization of small and medium sized firms' particularly international new ventures. One of the major criticisms of the eclectic paradigm is that it includes so many variables that it has lost its operationality. Addressing this criticism, Dunning argued that this was the result of integrating the different motivations behind the FDI into a single theory (Nayak & Choudhury, 2014).

2.2.4 Second stream of theories of internationalization

According to the stages model, companies start selling products in their home markets and sequentially enter into other markets. Two main stage models can be identified: the product life cycle theory by Raymond Vernon (1966; 1971; 1979) and the Uppsala internationalization model (Johanson & Vahlne, 1977, 1990, 2006; Johanson & Wiedersheim-Paul, 1975).

2.2.4.1 Product life cycle theory

According to Vernon (1966, 1971), the internationalization process of firms follows the development of the product life cycle. In particular, during the 1960s Vernon observed that products in their introductory phase were initially produced in the US (the home market) and exported to other countries. When products become mature, production was started in other advanced countries, serving local markets. Finally, when products became standardized, production facilities were opened in less developed countries to meet local demand. However, Vernon (1979) himself criticized some of the starting assumptions of the product cycle hypothesis since differences among many countries (at least developed countries) had significantly reduced or disappeared and the geographical reach of many enterprises had increased. Reduction in trade barriers, globalization, and advancement in communication technologies have enabled companies to launch new products in several markets at the same time. In particular, in industries characterized by a high level of innovation (e.g., electronics), innovating firms limited to their home countries are no longer very common. However, even though Vernon's product cycle hypothesis has lost its explanatory power in recent years, it may still provide guidance for the internationalization of some enterprises. The implication for internationalization-performance relationship is that firms will benefit from international operations if internationalization is done according to the product life cycle.

2.2.4.2 The Uppsala model

The Uppsala internationalization model (Johanson & Wiedersheim-Paul, 1975; Johanson & Vahlne, 1977, 1990, 2006) considers internationalization of firms as a process where firms gradually increase their international involvement. The central idea of the model is the learning process of the firm and how this learning affects its international behavior. The model is based on the notion of risk avoidance, where risk and uncertainty related to foreign markets are influenced by psychic distance and experience. This model posits that firms begin their operations abroad in psychically close markets, which pave the way for penetrating into

markets that are more distant. This step-wise progression leads to gradual accumulation of resources and experiential knowledge that in turn empowers the internationalizing firm to gain a footing in the host market (Eriksson et al., 1997). Understanding the difference between experiential knowledge and objective knowledge is important. Objective knowledge can be taught, while experiential knowledge is only acquired through personal experience. Experiential knowledge is more relevant to reducing psychic distance (Johanson & Vahlne, 1990). According to this model, foreign engagement is made in small, incremental steps, extending commitment with every new step. Johanson & Wiedersheim-Paul (1975) identified these four different steps: non-regular exports, exports via agents, sales subsidiary, and production subsidiary.

Studies have criticised both the Product Life Cycle and Uppsala models with respect to the phenomenon of international new venture and born global firms (Andersson, Gabrielsson, & Wictor, 2004). These theories have mainly focused on large multinational firms and may not be able to explain the rapid international expansion of small and new firms. The implication for internationalization-performance relationships is that both these theories focus on learning and the accumulation of resources that would help firms establish in foreign markets successfully, and thus leads to better performance gradually.

2.2.5 Born globals (BGs) and international new ventures (INVs)

The traditional theories of internationalization (especially the stages theories) described above cannot explain the recent emergence of so-called born globals (BGs) and International New Ventures (INVs) (Knight & Cavusgil, 1996; Oviatt & McDougal, 1994). BGs and INVs are used interchangeably (Knight & Cavusgil, 2005). These are firms that internationalize at the start or soon after they are created (Cavusgil, 1984; Knight & Cavusgil, 1996; McDougal & Oviatt, 1994; McDougall, Shane & Oviatt, 1994; Oviatt & McDougall, 1994, 1997). These firms possess neither the accumulated experiential knowledge and resources stipulated by the “Scandinavian School”, nor the internal sister-subsidiaries network explained in Hymer’s theory. However, compared to traditional organizations, they are different, particularly in terms of their internationalization strategy. Traditional firms are

much more reactive and need a push into international markets by adverse domestic market conditions or other reasons. In comparison, BGs are proactive and have global vision from inception (Bell & McNaughton, 2000). The existence of this new form of organization is supported by empirical findings. For example, McDougall, Shane & Oviatt (1994) conducted research on 24 born global firms. None of these firms followed the traditional stages of internationalization. Moen (2001) conducted research on Norwegian firms classified as born global, of which 74 percent had their most important single market outside the Nordic countries, in places that are not geographically or culturally similar to Norway. Jones, Coviello, & Tang (2011) conducted a comprehensive review of International Entrepreneurship (IE) literature have revealed that majority of IE studies talks about the increasing number of INVs.

2.2.6 Network model

The network model can better explain the phenomenon of born global and international new venture firms (Johanson & Mattsson, 1988). According to this model, internationalization depends on network relationships rather than on firm-specific advantages or the psychic distance of the target market. In this type of relationship, externalization of transactions is more likely than internalization. In the Network model, new forms of collaboration develop in which inter-firm relationships are based on interdependence and mutuality of benefits as compared to traditional forms of collaboration in which the locus of relation lies in formal control, hierarchy, and common ownership (Etemad, 2004). This new and emerging model represents a departure from traditional theories towards a new competitive paradigm in which the unit of competition is no longer an individual firm but a network of firms, collaborating for mutual benefits. In the older paradigms, SMEs were thought to depend on their own set of capabilities, competencies, knowledge, and skills. However, in the new paradigm, they need a different strategy in which they develop a focused and specialized set of capabilities in support of a common value chain shared with network partners. SMEs rely on network relations when selecting the market and mode of entry (Coviello & Munro, 1997). There is a convincing body of evidence associating higher benefits

with the partner-based paradigm than the traditional one. The emerging paradigm is becoming more potent compared to older models as partners learn how to pool resources, amass experiential knowledge, learn from one another, and accumulate network-based resources at a much faster rate as they evolve (Etemad, 2004).

Networks can assist new ventures to overcome the challenges of knowledge and experience in foreign markets (Johanson & Vahlne, 2009). A firm's network is a great source of market information and knowledge. A substantial amount of time and resources is needed to obtain market information and knowledge otherwise (Chetty & Campbell-Hunt, 2004). The network approach suggests that entrepreneurs can have access to valuable resources from networking activities in a cost effective way (Gabrielsson & Kirpalani, 2004).

The implication for an internationalization-performance relationship is that firms, especially new ventures, will benefit from internationalization because firms have access to more, and diverse, resources and learning available from the partners.

2.2.7 Resource-based view of internationalization

The entrepreneur's decision to go international has also been attributed to the availability of resources, or the lack of them (Westhead, Wright, & Ucbasaran, 2001; Almeida, Sapeinza & Michael, 2000; Ibrahim & McGuire, 2001). This approach is based on the work of Penrose (1959) that views entrepreneurial firms as a collection of resources. This has led to the emergence of the resourced-based view (RBV) of the firm (Barney, 1991; Barney, Wright, & Ketchen Jr., 2001), a framework for explaining the internationalization of SMEs. Resourced-based view of the firm is particularly more appropriate for SMEs internationalization, as small firms internationalize in order to exploit their unique assets on a global scale (Manolova & Manev, 2004). According to RBV, these resources are used to create value-creating strategies for competitive advantage (Wernerfelt, 1995). These resources are comprised of assets, capabilities, processes, routines, and knowledge possessed by the firm (Covin, Slevin, & Covin, 1990). The phenomenon of born globals can be explained by this theory. According to RBV, firms possess unique resources and capabilities, which can explain their rapid internationalization (Knight, Madison, & Servais, 2004). Almeida et al.

(2000), argued that the more resources the entrepreneurial firm has, the more likely it will engage in international activities. Moreover, the choice of entry mode to a foreign market is driven by the availability of resources (Burgel & Murray, 2000).

According to RBV, firm heterogeneity and firm-specific resources create a sustainable competitive advantage. These resources are valuable, rare, inimitable, and non-substitutable (Barney, 1991). They include financial, physical, technological, and human resources. This theory emphasizes the importance of skills and resources within the firm that allow the development of sustainable competitive advantage, particularly in international environments. Possessing a particular combination of skills and resources provides the firm with the ability to perform more effectively and efficiently than the competition. Resources and capabilities enable firms to deliver new products and solutions that are essential for gaining competitive advantage. Although RBV has provided insight into understanding how firm resources lead to sustainable competitive advantage, it has received a number of criticisms from scholars. First, RBV is criticized for a lack of substantial managerial implication or operational validity (Priem & Butler, 2001). It gives management the responsibility of identifying, developing, and deploying these resources, but does not describe how to do it. Second, RBV entails an infinite regress (Collis, 1994; Priem & Butler, 2001). This means that this theory suggests an endless search for higher order capabilities. Third, researchers criticizing the generalizability of RBV argue that the notion of resource uniqueness denies this theory of any potential for generalization (Gibbert, 1996, 2006). One cannot generalize about uniqueness. Fourth, RBV is focused on achieving sustainable competitive advantage (SCA). The assumption that SCA is actually achievable has become a source of criticism. These advantages do not last forever. Inimitability is progressively compromised by “spillovers” as the firm’s products and services reveal strategic information about the processes that produce them (Eisenhardt & Martin, 2000). Fifth, RBV is not appropriate as a theory of the firm. Foss (1996a) concluded that RBV is insufficient as a theory of the firm. Discussions about RBV as a theory of the firm being the focus of a dialogue in *Organization Science* (Barney, 1996; Conner & Prahalad, 1996; Foss, 1996a, 1996b; Kogut & Zander, 1996) and a special issue of the *Strategic Management Journal* (Grant, 1996; Liebeskind, 1996; Spender, 1996) five years later provide support to this criticism. However, Kraaijenbrink, Spender, & Groen (2010) argued that RBV stands well to the above five criticisms. Criticisms on three more aspects have provoked suggestions

for further theorizing and research. These three points of criticism include whether valuable, rare, inimitable, and organizationally non-substitutable (VRIO) is a necessary or sufficient condition of SCA (Armstrong & Shimizu, 2007; Newbert, 2007), the value of resources (Lockett, Thompson, & Morgenstem, 2009) and, the definition of resources (Priem & Butler, 2001). However, in spite of the above criticisms, RBV has become the most influential and cited theory in the history of management theorizing (Kraaijenbrink et al., 2010).

The implications for internationalization-performance relationships are that firms that possess these differentiated resources and capabilities will enjoy higher performance benefits from higher internationalization (Goerzen & Beamish, 2003) because higher internationalization allows firms to utilize their resources and capabilities efficiently.

2.2.8 Knowledge-based view of internationalization (KBV)

Resources are classified into tangible and intangible (Wernerfelt, 1984). Tangible resources may include plant, land, equipment, capital deposit, and more. These resources are easy to measure, transparent, and are relatively easy to duplicate. However, the intangible resources are most critical for competitive advantage because they cannot be easily replicated or developed (Grant, 1991, 1996). Knowledge is one such resource, which has the highest ability of all the resources to serve as source of sustainable differentiation because of its immobility (McEvily & Chakravarthy, 2002) and general applicability (Miller & Shamsie, 1996). Knowledge-based view is based on this crucial resource. This view is an extension of RBV and is a dominant theory used to explain the internationalization of firms, particularly knowledge-intensive ones (Saarenketo, Puumalainen, Kuivalainen, & Kylaheiko, 2004). According to KBV, knowledge is a key factor contributing to firm internationalization (Autio, Sapienza, & Almeida, 2000). Researchers have confirmed that knowledge, an intangible resource, can create a competitive advantage on an international scale (Eisenhardt & Martin, 2000; Grant, 1996; Kogut & Zander, 1992; Teece & Pisana, 1994; Teece, Pisano, & Sguen, 1997).

2.2.9 Portfolio diversification theory

The basic idea behind the portfolio theory is that investors can reduce the risk of their portfolios by investing in stocks that are not perfectly correlated (Markowitz, 1959). Applied in the context of international diversification, it can be argued that investors can reduce the risk of their portfolios by investing in the stocks of firms whose returns are not perfectly correlated. The degree to which diversification can reduce risk depends on the correlations among security returns. If returns are perfectly correlated, then no amount of diversification can affect the risk. However, returns may not be perfectly correlated. This less than perfect correlation allows for the reduction of risks through diversification (Markowitz, 1959). Researchers studying the effects of international diversification on return and risk argue that investing in firms that have operations in many different countries that are not economically integrated would experience lower risks compared to investing in firms operating in economically integrated regions. Therefore, it can be argued that international diversification not only provides firms with opportunities and benefits for increasing returns, it can reduce the risks of returns at the same time. Risk reduction from international diversification can be achieved through two ways: investing in firms of other nations and investing in stocks of multinational firms with operations in many different markets.

Grubel (1968) was the first to apply portfolio theory in the context of international diversification. He confirmed that an investor could reduce the risk of returns by holding an efficient portfolio of international stocks. Levy & Sarnat (1970) and Lessard (1974) followed Grubel by applying portfolio theory in the context of international diversification. However, these studies have focused on investing in stocks of corporations of other nations. An indirect way of international diversification is through investments in stocks of a multinational firm. Rugman (1976) and Severn (1974) shifted this focus to the multinational firm. Since then, the original work of Markowitz (1959) has been applied in many areas outside finance. Portfolio theory has been applied in business and management (Levy & Lim (1994; Levy & Sarnat, 1970), economics (Litman, Skrikhande, & Ahn, 2000), environmental science (Roques, Newbery, & Nuttal, 2008), and agricultural sciences (Figge, 2004; Barkley, Peterson, & Shroyer, 2010).

Applied in the context of a multinational firm, this theory posits that a multinational

firm will have a lower risk compared to a similar domestic firm. In addition, the diversification benefit may also lead to higher valuations for the firm. However, the empirical evidence on the predictions that international diversification reduces the risk of returns is inconclusive. Rugman (1979) found that international diversification is negatively related to variance in profits. This implies that international diversification reduces the risk associated with profits. Hughes, Logue & Sweeney (1975) confirmed that multinational firms have a lower total risk compared to domestic firms. Agmon & Lessard (1977) indicated a reduction in the systematic risk from international diversification. Shaked (1986) also found a total lower risk for multinational firms. However, Brewer (1981) did not observe any statistical difference in risk-adjusted performance of the stocks of multinational firms and domestic corporations. He further elaborated that a lower risk is not beneficial when accompanied by a lower return. This implies a limitation of portfolio theory when used in isolation of higher returns.

Although portfolio theory has been extensively used in diversification, it is not without criticisms. This theory has been criticised to rely the assumption that the future will look like the past (Wind, Vijay, & Swire, 1983). Markowitz (1959) suggested to use three types of data in order to construct a properly diversified portfolio. The three types of data included are: the expected returns of each component of the portfolio, the expected volatility of each component of return, and the expected correlation of each component with every other component. The criticism is based on how to construct these three types of data. Addressing this criticism, Markowitz suggested using observed values for some period of the past. Day (1977) also suggested caution in using portfolio theory. He criticised that the assumptions are not satisfied in many situations.

It can be concluded from the above discussion, that these theories provide a rationale for a positive internationalization-performance relationship and support the argument that financial performance of a firm benefits from internationalization due to some resource based and market based advantages (Annavarjula & Beldona, 2000). For example, Hymers' FDI states that multinational firms must possess certain intrinsic advantages that give them competitive advantage over their domestic counterpart (Etemad, 2004). Similarly, OLI theory posits that in order to be successful in international markets, firms must have three advantages (owner specific, location specific and internalization). The stages model builds around the

concept of gradual accumulation of experiential knowledge and resources over time. Resourced-based view more specifically states that resources and capabilities drive firm internationalization. Knowledge-based view, an extension of RBV, talks about knowledge as source of competitive advantage allowing firms to exploit this intangible resource more efficiently in international markets. Similarly, the network-based model states that firms benefit from higher internationalization by having access to more resources and capabilities. This theory tells that knowledge can be acquired through networks of relationships. A summary of the theories that provides rationale for a positive internationalization-performance relationship is presented in Table 1.

2.3 Synthesis of Theories from IPO with IB Research

International Business theories are developed from the perspectives of insiders (management). These theories are either based on use of firm's specific advantages or resources and their deployment in international markets. They provide guidance to management decision-making about the use of resources or advantages in international markets. However, these theories do not incorporate the perspectives of external investors (shareholders). Shareholders have a substantial equity (ownership) in publicly held firms but do not have enough information about the firms compared to insiders. These public investors are operating with a very small amount of information about the firms leading to higher information asymmetry between the investors and the firm. In contrast, information asymmetry and signaling theories are based on the perspectives of external investors. These theories propose that firms' specific factors (e.g., innovation, ownership structure etc.) reduce the information asymmetry between external investors and the firm by signaling the future value of the firm. Nevertheless, these theories do not incorporate the concept of internationalization.

The present study, which looks at internationalization from the perspectives of external investors, integrates information asymmetry and signaling theory with IB theories. This integration will help in understanding how internationalization is related to information asymmetry between external investors and the firm and what signals it gives to external

investors. For example, the stages theories show how long the firm took to internationalize but not what signal this information gives to investors. Similarly, RBV, KBV, and network theories are based on resources, their deployment and access to more resources from international markets. However, these theories do not address how these resources, their deployment, and access to more resources is perceived by investors. Do these resources reduce the information asymmetry between external investors and the firm and give signals for the future value of the firm. In addition, external investors cannot easily recognize these unique resources (especially intangible) or cultural distances, but may easily recognize the extent of internationalization. Therefore, it can be argued that the extent of internationalization might send positive signals to external investors about the future value of the firm and thereby reduce the information asymmetry between external investors and the firm.

Past research in strategy and international business provides strong theoretical reasons for a positive association between multinationality and firm performance. However, the empirical evidence is mixed and incomplete (Mudambi, et. al., 2012). The mixed findings of empirical research can be attributed to using different measures of internationalization and firm performance used by researchers (Sullivan, 1994a; Li, 2007). The next section discusses this empirical work on the relationship between internationalization and firm performance.

2.4 Empirical Research

2.4.1 Internationalization-Performance Relationship

The theories described in the previous section are commonly used to provide theoretical underpinnings for the studies of the internationalization-performance relationship. Based on these theories, international expansion is predicted to have a positive effect on the performance of a firm. However, empirical evidence is not conclusive. Researchers have investigated the internationalization-performance relationship from simple linear forms (Kotabe, Srinivasan, & Aulakh, 2002; Ramirez-Aleson & Espitia-Escuer, 2001; Qian & Li, 2003; Qian, Yang, & Wang, 2003) to increasingly complex non-linear forms, including

Table 1: A Summary of the Theories of Internationalization

Theory	Authors	Arguments	Implications for Internationalization-Performance Relationship
Product Life Cycle	Vernon (1971, 1996)	Internationalization is incremental and is based on the product life cycle.	Internationalization leads to higher performance if based on the life cycle of the product.
Uppsala Model	Johanson & Wiedersheim-Paul (1975); Johanson & Vahlne (1977, 1990, 2006)	Internationalization is based on gradual experiential knowledge about foreign markets.	Gradual internationalization leads to higher performance because it is based on gradual accumulations of knowledge and resources.
FDI	Hymer (1960, 1976)	Based on the efficiency of resource allocation.	FDI will lead to higher performance.
Internalization	Buckley & Casson (1976)	Firms internalize transactions when the costs of using markets are higher. It is more efficient for firms to internalize export transactions, substituting them with FDI.	Higher FDI will lead to higher performance because firms operate more efficiently in internal markets.
Eclectic Paradigm	Dunning (1993)	Firms engage in internationalizations if it has three advantages: Ownership, location, and internalization.	Firms benefit from higher internationalization if they have these three advantages.
INVs and BGs	Oviatt & McDougall, 1994	Firms internationalize from inception or soon after their establishment. Concept emerged due to evidence of many firms going international right from birth.	Early internationalization allows firms to efficiently exploit their unique resources in multiple markets and access to more resource and learning which leads to better performance
Network Model	Johanson & Mattsson (1988)	Internationalization depends on the network of relationship than firm-specific advantages. In this relationship externalization is more likely instead of internalization of transaction	There is a convincing body of evidence associating higher benefits with network approach than traditional one. In network model, firms have access to more resources and greater opportunities for learning.
RBV	Barney (1991)	Firms have heterogeneous resources that enable them to achieve competitive advantages. It is a framework for explaining the rapid internationalization of firms because these firms have unique resources.	Firms possessing these resources will enjoy higher performance benefits from higher internationalization because it allows for efficient exploitation of these heterogeneous resources in more markets.
KBV	Barney (1991) Grant (1996)	Extension of RBV. Consider knowledge as a critical resource for competitive advantage. Knowledge is considered a key factor contributing to firms internationalization	Knowledge-based resources are difficult to replicate and socially more complex. Heterogeneous knowledge-based resources lead to sustained competitive advantage and superior performance.
Portfolio Diversification	Markowitz (1959)	Risk of a portfolio of securities can be reduced by investing in stocks that are not perfectly correlated	International diversification provides firms with a number of benefits along with risk reduction, leading to increase returns and lower risks.

U-shaped (Capar & Kotabe, 2003; Gomes & Ramaswamy, 1999; Lu & Beamish, 2001), inverted U-shaped (Garinger, Beamish, & DaCosta, 1989), and S-shaped (Chiang & Yu, 2005; Contractor, Kundu, & Hsu, 2003). Sullivan (Sullivan, 1994b) categorized seventeen empirical studies on the relationship between internationalization and financial performance of firms into three categories with positive, intermediate, and negative relationships (Table 2).

Table 2: Direction of Internationalization-Performance Relationships

Positive	Indeterminate	Negative
Vernon (1971)	Horst (1973)	Siddharthan & Lall (1982)
Dunning (1985)	Hughes, Logue & Sweeny	Kimar (1984)
Grant (1987)	(1975)	Michel & Shaked (1986)
Grant, Jammine &	Buckley, Dunning &	Shaked (1986)
Thomas (1998)	Pearce (1977)	Collins (1990)
Daniels & Bracker (1989)	Rugman, Lecraw & Booth	
Geringer, Beamish &	(1985)	
daCosta (1989)	Yoshihara (1985)	
	Buhner (1987)	

Source: Sullivan (1994b)

Contractor, Kundu, & Hsu, (2003) have categorized studies on the link between performance and the degree of multinationality based on direction and linearity. In terms of linearity, they identified three categories: linear, U-shaped, and inverted U-shaped. In terms of direction, studies were categorized into positive, negative, and no relationship. Early on, studies assumed a positive relationship between internationalization and MNE performance due to many benefits from international expansion, such as increased market power (Hymer, 1976), access to cheaper resources (Rugman, 1979), greater learning opportunities (Vernon, 1971), and more. However, the inconclusive results of these studies led researchers to consider other forms of the relationships. These studies found both U-shaped and inverted U-shaped relationships. The proponents of the U-shaped relationship argued that the full benefits of internationalization could only be realized after achieving a certain optimal level of internationalization. Insufficient economies of scale, liability of foreignness, and initial learning costs at low levels of internationalization may not allow firms to reap the full benefits from international expansion (Lu & Beamish, 2001; Ruigrok & Wagner, 2003). On the other hand, the proponents of inverted U-shaped relationship argue that internationalization increases performance up to an optimal point,

but beyond that point, performance declines due to increasing complexity of internationalization (Gomes & Ramaswamy, 1999; Hitt et al., 1997).

In order to explain these contradictory results, Contractor, Kundu & Hsu (2003) have proposed a three stage sigmoid (S-curve) model (Figure 1). In this model, the liability of foreignness, initial learning costs of foreign markets, and insufficient economies of scale explain the initial negative slope. Internationalization at the initial stage may have huge learning costs because of unfamiliarity with foreign markets, cultures, and environment (Contractor, Kundu, & Hsu, 2003). In the second stage, where the slope becomes positive, firms are able to exploit their market-seeking and resource-seeking behavior. Resource-seeking enable companies to access low cost inputs while market-seeking enable firms to scan the market for opportunities. Companies at this stage also reap the benefits of global market power and extending their product cycle (Contractor, Kundu, & Hsu, 2003). At the third stage, the slope becomes negative. The reason for this negative slope is the increasing cost of further expansion that exceeds the benefits. At a certain point of expansion, the cost of coordination and management surpass the benefits.

The three-stage S-model combines the rationale of the U-shaped and inverted U-shaped hypotheses (Farnhaber, 2013). In addition, this three-stage S-model has two forms: the regular S-shape for knowledge-based sectors and the inverted S-shape for capital-intensive sectors. Contractor et al. (2003) argued that capital-intensive service sectors do not over extend to the suboptimal stage because these firms have higher fixed asset risks and capital costs. Consequently, the management of capital-intensive sectors will be more cautious in their international expansion and thus less likely to enter the suboptimal stage of declining performance. In contrast, firms in knowledge-intensive sectors may easily over extend into the suboptimal stage.

Sullivan (1994b) and Gomes & Ramaswamy (1999) found an inverted U-shaped relationship between internationalization and firm performance. Gomes & Ramaswamy (1999) argued that the initial phase of overseas growth generates high level of marginal performance benefits because of increased efficiencies enabled through the use skills and

resources the organization possesses. However, Capar & Kotabe (2003), Chiao, Yank & Yu (2006), & Lu & Beamish (2001, 2006) proposed a U-shaped relationship between

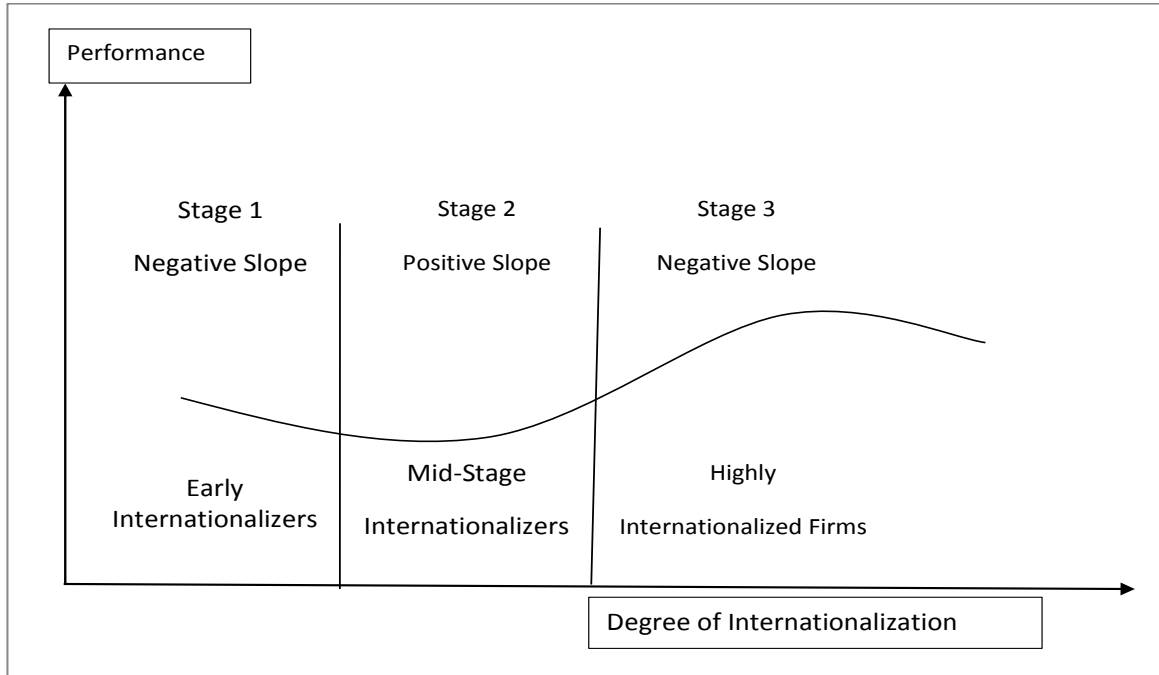


Figure 1: A Three Stage Sigmoid (S-curve) Hypothesis

internationalization and performance. Chiao, Yank & Yu (2006) and Manolova & Manev (2004) have also found inconclusive results for the relationship between internationalization and firm performance. Chiao, Yank & Yu, (2006) reported that the relationship between internationalization and firm performance in three studies (e.g., Dhanaraj & Beamish, 2003; Qian & Li, 2003; Qian, Yang, & Wang, 2003) was positive and linear. Christophe & Lee (2005) have also mentioned the mixed evidence from prior studies on the relationship between internationalization and firm performance but reiterated that for new start-ups or small and medium-sized enterprises, most of the studies have found a positive relationship between internationalization and firm performance (McDougall & Oviatt, 1996; Zahra et al., 2000). The differences in the results of these inquiries can be attributed to different strategies and perspectives utilized in undertaking these studies and the metrics selected for both internationalization and firm performance. Pangarkar (2008) argues that the literature addressing internationalization-performance

relationship is replete with problematic measures for the key constructs (internationalization and firm performance) leading to inconclusive results. They proposed a new measure for the degree of internationalization (DOI) based on sales by geographic regions and a multi-item measure for performance of the firm. Using these measures, they found a positive association between DOI and firm performance. Similarly, Chen & Hsu (2009) concluded that an optimal level of internationalization as well as the level of investment in advertisement is necessary for positive impact on firm performance.

2.4.2 Internationalization-Post-IPO Performance Relationship

Initial research on IPOs was mainly concentrated in finance; however, literature in management and entrepreneurship has examined a number of diverse topics in the IPO context. Certo et al. (2009) produced a comprehensive review of the emerging literature on IPOs in the area of management and entrepreneurship. Certo et al. (2009) show that 75% of the research on IPOs published in management and entrepreneurship is clustered around one of four themes; corporate governance (e.g., executive compensation, ownership, board composition, and structure), upper echelons (e.g., strategic leadership, CEO or top management demographic characteristics, managerial discretion, executive job demands), social influence (e.g., social comparison, network composition and structure, prestige and tie strength), and innovation (e.g., research and development expenditure and new product development). In addition, Certo et al. (2009) brought two important contributions to the literature. First, their study provided a comprehensive review of the emerging literature on IPOs in management and entrepreneurship. Second, their study identified a number of areas of research that have not yet been explored. One area, in particular, mentioned in their review is the post-IPO performance of firms with respect to internationalization, which is the topic of this research.

A few studies that have recently looked at internationalization in the context of IPO includes: Al-Shammari, O'Brien, & AlBusaidi (2013), Mudambi et al., (2012), and LiPuma (2011). The first of these studies examined the impact of internationalization at the time of IPO on underpricing using a sample 298 firms that made their IPOs in years

1997, 1998, 2001, and 2002 on the US stock exchanges. They used the ratio of foreign sales to total sales (intensity) as a measure of internationalization. The performance measure-underpricing is calculated by subtracting the initial stock price from the closing price on the first day of trading, then dividing this figure by the initial offer price.

Using new venture internationalization, agency, and signaling theories, this study argues that there is high uncertainty and information asymmetry about an IPO firm's growth and success. Due to this uncertainty, investors may be reluctant to buy stocks of the IPO firms. Therefore, underwriters may undervalue the price of the stock. In contrast, international sales give investors expectation of future growth. The combination of these two effects will result in a lower initial stock price followed by rapid increase in the value of the firm. Therefore, their study proposed a positive association between internationalization and underpricing. In addition, they proposed that blockholder and CEO ownership moderates this association. The findings of their study confirmed that intensity is positively associated with underpricing and that higher level of blockholder and CEO ownership strengthens this relationship.

Mudambi et al., (2012) examined internationalization in the context of IPO using 240 UK IPOs of non-investment trust companies listed from January 1991 to June 1995 on the UK Official List. Unlike the previous study, this study measured multinationality using geographic scope of internationalization. In this study, IPO performance was measured using both short-run and long-run market adjusted abnormal returns. Short-run returns were calculated using first day closing price and offer price, whereas long-run returns were based on the 36 months following the first month of trading.

The theoretical rationale used to support the proposition of positive association between multinationality and IPO performance is based on theory and evidence from finance and entrepreneurship. They argued that past empirical research have indicated the positive impact of internationalization on post-IPO firm performance. Leveraging of intangible knowledge and market opportunities is the main source of value from multinationality for both newly public and established firms. However, these entrepreneurial firms possess unique intangible assets that create superior long-run returns. The study found a strong positive association between multinationality and long-

run returns. However, it did not find a statistically significant association between multinationality and short-run returns.

The third most recent study (LiPuma, 2011) evaluated the internationalization-performance relationship in the context of IPO using a sample of 184 US VC-backed technology-based new ventures that issued their IPOs from 1997 to 2003. A firm is considered new venture if it is ten, or fewer years old with foreign sale. Unlike the other two studies, LiPuma (2011) used a different measure of internationalization: five dummy categories of the ratio of foreign sales to total sales. IPO performance was measured using valuation of the IPO and Time-to-IPO. IPO valuation is the venture's pre-money market valuation based on the final IPO subscription price, shares outstanding, shares offered, and valuation just prior to the first day of trading. Time-to-IPO is the number of years between the venture's founding date and its IPO date.

LiPuma (2011) argued that international new ventures possess a set of unique resources and capabilities that increases as the degree of internationalization increases. Investors value higher internationalization as a source of greater future performance. The author also makes counter arguments based on agency theory that greater international intensity may decrease the IPO performance. Therefore, the study develops and tests both a positive and a negative association between internationalization and IPO performance. The study found that solely domestic new ventures receive higher valuations at IPO compared to new ventures with high intensity. In addition, the study confirmed that high intensity new ventures execute IPO later than solely domestic ventures.

2.5 Summary

In this chapter, I reviewed relevant theories of internationalization, along with signaling and information asymmetry theory, in order to create a basis for the synthesis of the two streams of theories. This is important because the theoretical model for this study is based on the integration of these two streams of theories. The chapter also reviewed the empirical work on the relationship between internationalization and firm performance, as

well as the influences of firm-specific factors including internationalization on post-IPO firm performance.

The chapter that follows develops the hypotheses based on the literature review presented in this chapter.

Chapter 3

Hypothesis Development

This chapter deals with the development of the key hypotheses for this research. These hypotheses are derived from the integration of the major theories of internationalization with two theories of finance, signaling and information asymmetry. These hypotheses examine the relationship between:

1. The degree of internationalization at the time of IPO and post-IPO compound holding period returns;
2. The degree of internationalization at the time of IPO and post-IPO relative volatility of returns;
3. The degree of internationalization at the time of IPO and underpricing; and
4. International new ventures and Time-to-IPO

3.1 Introduction

The international business strategy of a firm is defined as the effective and efficient matching of an MNE's internal strengths with opportunities and challenges found in geographically dispersed environments that cross international borders (Verbeke, 2013). In other words, internationalization brings both opportunities and challenges. Theories of internationalization provide a strong theoretical base for a positive internationalization-performance relationship (Contractor, 2007). This positive association is based on the benefits identified by these theories. These theories include: FDI theories (e.g., Hymers' FDI theory, internalization theory, and eclectic paradigm), resource-based view of the firm (RBV), knowledge-based view of the firm (KBV), the network theory, Uppsala model, product life cycle theory and portfolio diversification theory.

Although the cost aspect is also important, the existence of a multinational firm is due to the effective utilization of the benefits from international operations. In other words, international expansion would make sense only if firms could get some or of all of the benefits from international involvement. Goerzen and Beamish (2003) suggest that international diversification enhances a firm's ability to appropriate value from proprietary assets. Table 3 provides a brief summary of these theories and their respective benefits of internationalization identified by these theories.

Table 3: Summary of Benefits/Signals of Theories of International Business

Theory	Authors	Benefits/Signals
FDI Theories (Hymer's FDI, internalization & eclectic paradigm)	Hymer (1976); Dunning (1993); Buckley & Casson (1976)	Efficient utilization of firm specific assets (FSAs)
Resource-based view /knowledge-based View of the firm	Barney (1991); Wernerfelt (1984) / Grant (1991)	Exploitation intangible resources / knowledge as source of competitive advantage
Network theory	Johanson & Mattsson (1988)	Access to more resources and learning
Portfolio diversification theory	Markowitz, (1959)	Risk reduction
Uppsala model	Johanson & Vahlne, (1977)	Experiential Learning
Product life cycle theory	Vernon, 1971	Competitive advantage by shifting production location relevant to product life cycle.

There are numerous other benefits of international expansion besides those mentioned in Table 3, such as economies of scale and scope, new market opportunities, cost reduction, extension of innovative capabilities, location advantages (Hitt, Hoskisson, & Kim, 1997), and more. In addition, international diversification offers new means for value creation through access to foreign stakeholders, resources, and institutions (Hitt, et al., 2006). Therefore, internationalization is hypothesized to bring positive effects to firm performance (Delios & Beamish, 1999; Goerzen & Beamish, 2003; Lu & Beamish, 2001; Zahra et al., 2000). Due to a number of advantages of international expansion, the core international business theory argues for a positive relationship between firm performance and the degree of multinationality (Contractor, Kundu, & Hsu, 2003).

Analyzing the link between internationalization and firm performance in the IPO context allows for integrating these theories with signaling and information asymmetry.

Signaling theory (Spence, 1973) implies that certain firm attributes and characteristics serve as signals to potential investors about the quality, capability, and future performance of the firm (Deeds, Decarolis, & Coombs, 1997; Dalton et al., 2003). Information asymmetry implies the existence of an information gap between two parties. Signaling theory is fundamentally concerned with reducing information asymmetry between the two parties (Spence, 2002). Firm characteristics that signal quality will thus reduce the information asymmetry between the firm and investors.

The extant literature on the internationalization-performance relationship initially focused on the linear form of this relationship. However, contemporary studies have identified non-linear forms of this relationship (Hitt et al., 2006). The findings of both linear and non-linear studies are inconclusive. In this study, I am testing both linear and non-linear forms of this relationship, in the context of IPO, in order to find the best fit for the data and rationale that is most consistent with the empirical relationship observed in the data. The few contemporary studies conducted in the context of IPO have only evaluated the linear form of this relationship.

In addition, the extant literature on the internationalization-performance relationship has generally used the benefits/costs of internationalization as a theoretical framework. This is probably due to the use of accounting and organizational measure of firm performance. In this study, utilizing the context of IPO, I am extending the benefits/costs rationale to a different theoretical perspective—how internationalization signals to external investors. This perspective is based on the synthesis of theories of international business with signaling and information asymmetry theory. Hitt et al. (2006) also suggested the use of more advanced framework of integrating theories for examining the complex internationalization-performance relationship. A major benefit of this new perspective is that it allows for including the assessment of external investors. These external investors are generally concerned with two aspects of investing: appreciation of stock value (higher returns) and the risk associated with these returns. Therefore, this new perspective, being tested on stock performance measures, is different than the organization's performance.

The existing literature on financial performance has rarely looked at the risk associated with performance as evident from the comprehensive review of literature of Hitt et al., (2006). Even the few contemporary studies conducted in the IPO context (e.g., Al-Shammari, O'Brien, & ALBusaidi, 2013; Mudambi, et al., 2012; LiPuma, 2011) did not include the risk aspect of international diversification. As return and risk are both important to investors, this study measures performance using both risk and returns.

The extant literature examining both the linear and non-linear forms of the internationalization-performance relationship has mainly focused on the use of a continuous measure of internationalization. Considering the complexity of this relationship, evident from both theory and empirical work, this study uses a somewhat different empirical approach—dummy categories of internationalization. In this case, the variable internationalization (both intensity and scope) is converted into three dummy categories: domestic, low internationalization, and high internationalization. This new approach not only allows for separating the effects of domestic firms, but also allows for evaluating the different slopes of internationalization.

As theories of international business have identified a number of benefits from international expansion, integrating these theories with signaling and information asymmetry, it can be argued that international expansion at the time of IPO provides positive signals to potential investors. Therefore, drawing support from the synthesis of theories of international business and finance, this study examines the influence of internationalization on post-IPO performance. Internationalization is measured using both the intensity and scope of internationalization, whereas post-IPO performance is measured using three variables: compound holding period returns, relative volatility of returns, and underpricing. Hypotheses developed with respect to each performance measure are discussed in the following sections.

3.2 Internationalization and Compound Holding Period Returns

Firms internationalize for a variety of reasons. The traditional theories of internationalization, such as Hymers' FDI (1976), Dunning's eclectic paradigm (Dunning, 1993), internalization theory (Buckley & Casson, 1976), & the Uppsala model (Johanson & Vahlne, 1977) explain the "why" and "how" aspects of internationalization. However, the main motive behind the international expansion of a firm is to boost profit and performance (Coase, 1937; Caves, 1980).

International management literature recognizes three unique opportunities of global market diversification. First, global market diversification allows for the economies of scale and scope. Second, international diversification exposes firms to multiple stimuli that allow for broader learning opportunities compared to purely domestic firms. Third, global market diversification allows firms to benefit from factors of production such as lower cost of labour, materials, energy, and more. These unique opportunities may lead to increased returns for internationalized firms (Kim et al., 1993).

An IPO is a critical juncture in the development of a firm. At this stage, uncertainty and information asymmetry with respect to the performance of the IPO firm is at its highest (Daily et al., 2003). Therefore, at this critical juncture, management in general, and investors in particular, will be interested in the characteristics of the firm that could reduce this uncertainty with respect to post-IPO performance of the firm. Due to this higher information asymmetry and uncertainty about the future performance of the firm, investors will be less willing to buy the stocks of the IPOs. However, as signaling theory is concerned with reducing the information asymmetry between the two parties (Spence, 2002), there are firm specific indicators that could provide signals to potential investors about the future performance of the firm.

Investors may respond positively to international diversification because international diversification may provide firms (especially new ventures) with access to growth opportunities, innovations, and efficiencies not available to purely domestic firms (Zehra, Ireland, & Hitt, 2000). Theories of internationalization that provide a rationale for

the expected relationship between internationalization and firm performance also point to a positive performance outcome of internationalization (Annavarjula & Beldona, 2000).

As evident from Table 3, international business theories have identified a number of benefits that could provide strong signals to potential investors about the future performance of the firm. Integrating these theories that provide positive signals in the form of benefits with signaling and information asymmetry, it can be argued that international diversification at the time of IPO sends a positive signal to potential investors. This positive signal, in return, reduces the information asymmetry between the firm and investors. Therefore, investors may buy stock at a premium price for the IPO firms with a higher level of internationalization.

In line with the above arguments, this study proposes the following two hypotheses in order to examine the linear effects of international diversification at the time of IPO on compound holding returns (CHPR12M).

H1a: The Intensity of Internationalization is positively associated with Post-IPO Compound Holding Returns.

H1b: The Scope of Internationalization is positively associated with Post-IPO Compound Holding Period Returns¹.

Although the theory suggests a positive influence of both the intensity and scope of internationalization on post-IPO firm performance, intensity and scope addresses different aspects of international diversification. Therefore, investors may assess them differently as they may provide different information about the focal firm. For example, a high intensity in only one foreign market may imply more country (single market) specific risk. On the other hand, spreading over many markets, a higher scope may provide the diversification benefit. However, a high scope may also increase costs (administrative, logistics, and cultural), and require more learning to do business in many locations. Higher scope may also bring organizational changes such as increased complexity and exposure to new stakeholders.

¹ A detailed description of Intensity, Scope, and Compound Holding Period Return is provided in Sections 4.6.2.1 and 4.6.1.1 respectively. Equation 1a is used to test these two hypotheses.

While the argument for a positive and linear relationship between internationalization and performance seems compelling, empirical studies have confirmed mixed findings (Ramaswamy, 1995; Tallman & Li, 1996). Some researchers argue that international diversification does not always create value for the firm because of the liability of foreignness (Zaheer, 1995). This implies the existence of a more complex relationship between international diversification and firm performance. The conflicting findings of internationalization-performance relationship have led researchers to test more complex forms of this relationship. In a meta-analytic study, Ruigrok & Wagner (2003) identified three forms of the relationship between internationalization and firm performance. The curvilinear relationship is assumed to result from the potential trade-off between the benefits and costs of international expansion.

Researchers first tested a quadratic form of the relationship. This resulted in the identification of two forms of this relationship: U-shaped (e.g., Capar & Kotabe (2003); Lu & Beamish, 2001) and inverted U-shaped (Garinger, Beamish, & DaCosta, (1989); Gomes & Ramaswamy (1999)). The argument in support of the initial drop in performance of a U-shaped relationship is that initial learning costs outweigh the benefits from internationalization. However, the experiential knowledge gained from the initial phase of international expansion lead to higher performance later on (Capar & Kotabe, 2003). In contrast, an inverted U-shaped relationship suggests that performance rises initially up to a certain threshold of internationalization, beyond which further international expansion leads to a decline in performance. The argument supporting this form of the relationship is that companies can deploy their home country-based skills and resources to achieve economies of scale and scope without huge learning costs during the early stage of international expansion. However, beyond a certain threshold, due to the increasing complexity of the organization, the costs of coordination and monitoring outweigh the benefits (Garinger, Beamish & DaCosta, 1989).

To reconcile the conflicting propositions of the quadratic models, researchers (e.g., Lu & Beamish, 2004; Contractor, Kundu, & Hsu, 2003) have recently tested an S-curve hypothesis. In the context of an S-curve hypothesis, the initial decline in the performance at early internationalization is attributed to liability of foreignness, initial learning costs, and insufficient economies of scale (Figure 1). Supporting the argument for a U-shaped

relationship, Capar & Kotabe (2003) also argued that the early stage of internationalization is associated with insufficient profit due to low levels of foreign market knowledge and international business experience. However, firms at a higher level of internationalization may reap the benefits of economies of scale and scope.

In line with the above arguments, it may be argued that at low levels of internationalization or early internationalization, the economies of scale and scope will not be sufficient to reap the full benefits of international expansion. Incorporating this argument within the framework of the integration of theories of internationalization with signaling and information asymmetry, it can be argued that low levels of internationalization may not provide positive strong signals to investors because of insufficient economies of scale at such levels; as a result, the full benefits of internationalization could not be utilized.

In addition, investors may differentiate between high and low internationalization on the basis of the strategy of the firm. Low levels of internationalization may not influence investors. The signals here may be too weak or even negative because low internationalization may suggest that these firms do not consider internationalization as a significant component of their strategy.

It can be concluded from the above discussion that the argument for a non-linear relationship between internationalization and post-IPO performance not only comes from the analogy with past empirical work but also from the integration of theories of internationalization with signaling and information asymmetry theories. Therefore, the following two hypotheses are framed.

H1c: The relationship between the Intensity of Internationalization and Post-IPO compound holding period returns is non-linear, with the slope initially negative up to a certain level of the Intensity of Internationalization but positive thereafter.

H1d: The relationship between the Scope of Internationalization and Post-IPO compound holding period returns is non-linear, with the slope initially

*negative up to a certain level of the Scope of Internationalization but positive thereafter*².

3.3 Internationalization and Relative Volatility of Returns

The initial stimulus for the internationalization-performance literature came from the theory of portfolio diversification in finance (Hennart, 2007). Portfolio diversification theory (Markowitz, 1959) posits that investors can reduce the risk of their portfolios by investing in stocks that are not correlated. Applying this theory in the context of internationalization, it can be argued that firms should experience lower risk at a given level of return if they had activities in countries that are not economically integrated. Kim et al. (1993) argued that firms with operations in many diverse countries would have a lower risk compared to firms that have operations in less geographically diverse countries. Grubel (1968) was the first to apply portfolio theory in the context of international diversification followed by Levy & Sarnat (1970), Lessard (1974) and more. Grubel (1968) demonstrated that individual investors could reduce the risk of investments by holding an efficiently diversified portfolio of international assets. Jacquilat & Solnik (1978) found that investing in appropriately diversified portfolios of international stocks reduced the unsystematic risk by 50–70 percent. However, these studies have focused on financial investments for international diversification. A financial investment means investments in the shares of corporations of various nations. This is different from diversification through investment in a multinational corporation. Rugman (1976) and Severn (1974) applied the principles of international diversification through investments in a multinational firm.

In addition to reducing the risk, international diversification provides a number of benefits to the firm that may lead to better performance. First, global market diversification offers possibilities of economies of scale and scope, which allow a firm to spread the fixed costs over a larger market, leading to increased profitability. Contractor,

² Equation 1b is used to test these two hypotheses.

Kundo, & Hsu, (2003) also argued that international diversification allows firms to spread common and central overheads over more nations. Similarly, Hitt, Hoskisson, & Kim, (1997) maintained that international diversification provides greater opportunities to achieve economies of scale and to amortize investments in critical functions such as R & D and brand image over a broader base. Second, international diversification allows firms to have access to more resources compared to domestic firms. Internationally diversified firms may have access to cheaper and idiosyncratic resources in foreign countries such as cheap labour, better technology, or any country specific resource (Contractor, Kundo, & Hsu, 2003). Third, international diversification benefits firms with access to broader learning opportunities that may help them to develop more diverse capabilities as compared to purely domestic firms (Kim et al., 1993). Contractor, Kundo, & Hsu, (2003) also argued that international diversification provides greater learning and international experience. In addition to learning and access to more resources, international diversification provides the opportunity for new and diverse ideas from a variety of markets and cultural perspectives (Hitt, Hoskisson, & Kim, 1997).

Global market diversification provides firms with three unique options over purely domestic firms, which are reasoned to reduce corporate risk. First, operating in many different markets allow firms to retaliate against aggressive moves by competitors. This will reduce the risk of the firm having to face aggressive challenges from the competition. Second, operating in multiple markets allow the multinational firms to minimize the effects of adverse changes in a country's interest rates, wage rates, and raw material prices because such firms can shift production and sourcing sites to more favourable markets. Third, global market diversification protect firms from fluctuations in supply and demand of a single national market (Kim et al., 1993).

Applying portfolio theory (Markowitz, 1959) in the international diversification context, risk-averse investors can diversify their portfolios in two ways. First, investors can achieve the benefits of international diversification by buying shares of corporations of various nations. However, this is only possible if the capital markets in the world are perfectly integrated (correlated) and there are no barriers to the flow of capital. Researchers have confirmed that international capital markets are not perfectly integrated. Rugman (1979) found support for lack of perfect positive correlation in the international

goods and factor markets (industrial production and wages). He found high correlations for interest rates between countries, but correlation for equities was not so high. Eun & Resnick (1984) also found low correlations between the individual stock returns of different countries. In addition, research suggesting the existence of unexploited profit opportunities implies that markets are not perfectly integrated (Hughes, Logue, & Sweeney, 1975). The low international correlations between international capital markets imply that investors should be able to reduce portfolio risk if they diversify internationally rather than domestically. In addition to the imperfect integration, there are various barriers to the flow of capital between various countries. The principal barriers include transaction costs, access to information, and host country regulations (Mathur & Hanagan, 1983). In addition, an investor in the United States investing in a multinational firm will need to have the knowledge of the US reporting standards and institutional structures. In contrast, an investor investing in firms of other countries will have to understand the reporting standards and institutional structures of each of these countries. Furthermore, investors generally prefer proximity to their invested ventures to facilitate monitoring (Sorenson & Stuart, 2001). Wright, Pruthi, & Lockett (2005) argued that the majority of the venture capitalists invest in ventures of their home country.

Second, investors can achieve international diversification through investment in a multinational firm. Mathur & Hanagan (1983) concluded that barriers to investments in firms of other nations imply that multinational firms possess unique advantages and may thus be superior vehicles for achieving international diversification. Rugman (1979) empirically demonstrated that foreign operations reduce the risks of a firm's profits. Multinational diversification has been shown to be helpful in stabilizing the profit/risk relationship (Heston & Rouwenhorst, 1994). Both the firm specific advantages of the market-imperfections approach, and the risk-diversification approach, suggest that a multinational firm is at an advantage compared to a domestic firm. The two approaches demonstrate that multinational firms achieve higher level of profits as well as higher stability of these profits compared to domestic firms (Rugman, 1979). Strategic management research has extensively studied diversification across business units. Hitt et al. (2006) argued that diversification across different markets provide an effective alternative strategy. It can be concluded from the above discussion that besides other

benefits, risk diversification (reduction) is a major benefit that investors of a multinational firm enjoy.

In addition to the theoretical support from integration, some IPO firms in my sample have provided signals about risk reduction through presence in geographically diverse markets. These signals are specifically mentioned in the IPO prospectus of these firms under the heading: Competitive Strengths-Diverse Customer Base. For example, Nalco Holdings Inc. signals the benefits of risk diversification in the following words:

“Our business is diversified geographically with sales from North America, Europe, Africa, Middle East, Latin America, and Pacific Region. We believe that this diversification minimizes the potential impact of volatility from any one customer, industry or geographic region”. Similarly Aeroflex Holding Corp provides the diversification signal in these words “Our geographic and product diversification helps mitigate against volatility in any particular region or market segment”.

The implicit assumption of portfolio theory is that risk can be diversified when there is no correlation or a weak correlation of assets within a portfolio. Applying this concept to internationalization of firms, it can be argued that firms with higher internationalization are assumed to be operating in markets that are not highly correlated. Therefore, a higher degree of internationalization is believed to reduce the risk of an investment. In contrast, a domestic or low internationalized firm may not provide the diversification benefits because returns are highly correlated. Therefore, drawing support from the integration of portfolio theory (Markowitz, 1959) with signaling and information asymmetry theory and past empirical work, this study argues that the degree of internationalization at the time of IPO emits a positive signal in the form of risk diversification. This positive signal would thus reduce the uncertainty, or information asymmetry, that surrounds initial public offerings. This contention is tested with the following hypotheses.

H2a: The Intensity of Internationalization is negatively associated with Post-IPO Stock Return Volatility.

H2b: The Scope of Internationalization is negatively associated with Post-IPO Stock Return Volatility³.

However, as discussed in the previous section, the two measures, intensity and scope, address different aspects of international expansion. High intensity in a single market may imply higher risk compared to international diversification through higher scope. Although higher scope may provide a number of benefits including risk reduction, it may lead to increased costs and may require more learning to do business in many different geographic locations.

Theoretical underpinning for proposing a non-linear relationship between the degree of internationalization at the time of IPO and relative volatility of returns is similar to that provided for relating internationalization and post-IPO compound holding period returns in Section 3.2. In fact both the measures, compound holding period returns and relative volatility of returns, are calculated from post-IPO monthly returns. Therefore, it is argued that an optimal level of geographic spread is required for firms to obtain the full benefits of international diversification.

According to portfolio theory (Markowitz, 1959), investors can reduce the risk of their portfolios of securities by investing in stocks whose returns are not perfectly correlated. The degree to which diversification can reduce risk depends on the correlations among security returns. Applying this logic in the internationalization context, it is argued that the less correlated the markets in which firms operate; the larger will be the risk reduction through diversification. The theory implies that international expansion into very similar markets should have limited risk reduction effects compared to expansion into more distant markets because geographically distant markets will be less correlated than the initial similar markets. The assumption of incremental internationalization is central to the stages' models: Uppsala model of internationalization (Johanson & Vahlne, 1977) and product life cycle model (Vernon, 1971). According to this assumption, firms internationalize initially into geographically and culturally similar and closer markets. These initial international markets are similar to the home market in aspects such as

³ A detailed description of relative volatility is provided in Section 4.6.1.3. Equation 2a is used to test these two hypotheses.

consumer tastes, market segments, institutional settings, etc. Therefore, the entry into these initial international markets may provide very limited or no diversification benefits.

Synthesizing portfolio theory (Markowitz, 1959) with signaling and information asymmetry, it can be argued that the lower levels of initial expansion into foreign markets may not provide a positive signal of risk diversification to potential investors. Therefore, drawing support from this synthesis, the current study suggests that low levels of international diversification at the time of IPO may not provide a strong signal to potential investors; but, at a higher level, the signal is stronger and positive, as the benefits of diversification become clearer. In addition to the theoretical support, the argument for testing a non-linear relationship between internationalization and relative volatility also stems from the analogy with previous research that has found non-linearity between multinationality and firm performance. In line with the above arguments, the following hypotheses are framed.

H2c: The relationship between the Intensity of Internationalization and Relative Volatility is non-linear, with the slope initially positive up to a certain percentage of the Intensity of Internationalization but negative thereafter.

H2d: The relationship between the Scope of Internationalization and Relative Volatility is non-linear, with the slope initially positive up to a certain level of the Scope of Internationalization but negative thereafter⁴.

3.4 Underpricing and Internationalization

Substantial evidence suggests that initial public offerings are often underpriced. Underpricing is the difference between the price at which a firm's stock is initially offered (offer price) and the stock's closing price on the first day of trading. The offering is underpriced when the offer price is below the closing price at the first trading day and the firm is considered to have 'left money on the table' (Ritter, 1998). The firm leave money on the table because it agrees to sell the block of shares to the public, in collaboration with

⁴ Equation 2a is used to test these two hypotheses.

its underwriters, at a discounted initial offer price. The level of underpricing has changed over time (Loughran and Ritter, 2004). Since 1980, the average level of underpricing has increased from 7 percent to 15 percent in 1990-98. The highest jump was in the bubble years (1999-2000) when the average underpricing reached to 65 percent. However, it reverted to 12 percent in the post-bubble period of 2001-2003 (Loughran & Ritter, 2004).

Three primary theoretical explanations for the underpricing of IPOs are information asymmetry (Beatty & Ritter, 1986; Loughran & Ritter, 2004; Ritter & Welch, 2002), signaling (Anderson, Beard & Born, 1995) and litigation risk (Lowry & Shu, 2002; Tinic, 1988; Certo, Daily, & Dalton, 2001). Although, Khurshid (2011) have identified a few more theoretical explanations for the underpricing of IPOs from an academic survey of research on IPO underpricing, the majority of the hypotheses and arguments are framed within information asymmetry theory (Gunther & Rumber, 2006) and signaling theory (Daily et al., 2003).

The most enduring explanation associated with public investors' valuation of the IPOs is Rock's (1986) argument that information asymmetry exists about the value of the IPO firm. The majority of explanations of IPO underpricing are based on asymmetric information in terms of expected uncertainty (Gunther & Rumber, 2006). According to information asymmetry theory, when investors cannot evaluate the value of shares accurately due to information asymmetry, the issuing firm provides a premium by discounting offer price to attract investors and to reduce the information asymmetry. Firms and underwriters underprice IPOs in order to induce investors. The higher the information asymmetry between public investors and the firm, the higher is the underpricing. Researchers have evaluated the role of different firm related factors such as innovation (Heely, Matusik & Jain (2007), and ownership structure (Durukan, 2006) under the explanations of information asymmetry. An important implication of the Rock's argument is that information available about the firm value prior to an IPO will reduce the information asymmetry and thus reduce the underpricing. Firm specific factors such as prestigious underwriter, venture capital backing and legitimacy of the organization, interpreted as evidence of firm quality may reduce underpricing (Barry et. al., 1990; Carter & Manaster, 1990; Certo, 2003).

A second important theoretical perspective applied to examine the underpricing of IPOs is signaling theory (Certo, Daily, & Dalton, 2001). This theory suggests that certain variables or indicators send signals to potential investors about the capabilities and the future value of firms (Deeds, Decarolis, & Coombs, 1997). Investor's assessment of the future value impact the price at which they purchase the IPO shares. Information about these indicator variables is communicated through the company prospectus. The Prospectus is one of the documents the Securities and Exchange Commission (SEC) requires of firm undertaking IPOs (Deeds, Decarolis, & Coombs, 1997; Welbourne & Andrews, 1996). These documents are highly accurate and consistent in format (Tinic, 1988; Welbourne & Cyr, 1999). The majority of IPO research relies on information from prospectuses. Signaling theory is based on the information asymmetry theory because the issuers want to convey important information about the future value of the firm to potential investors, which would reduce the information asymmetry between investors and the firm. Indicator variables that have been investigated include retained equity, underwriter reputation, auditor reputation, number of risk factors, firm size, firm age, uses of proceeds, venture capital equity, offer price, and gross proceeds. These indicators serve as information to the potential investors about the future prospects of the firm (Daily, Certo, & Dalton, 2003).

Signaling theory has been applied in recent research in financial economics, strategic management, and entrepreneurship more frequently, but has received little attention in international business (Reuer & Ragozzino, 2014). Reuer & Ragozzino (2014) suggest that signaling theory holds considerable promise for advancing our understanding of firm's cross-border activities and internationalization. So far, only two studies (e.g., Al-Shammari, O'Brien, & AlBusaidi, 2013; Mudambi et al., 2012) have utilized signaling theory for evaluating the influence of internationalization on IPO performance.

Empirical evidence on the profitability of international diversification is mixed. However, the bulk of evidence supports the positive impact of international diversification on firm performance (Markides & Ittner, 1994). Particularly, theories of internationalization have provided a strong support for a positive influence of international expansion on firm performance. Firms invest abroad in order to exploit intangible firm-specific assets, the market for which are characterized by various imperfections including

immobility, limited information, and monopoly. These assets include superior marketing skills, product differentiation, patent-protected technology, superior managerial skills, economies of scale, and government regulations (Errunza & Senbet, 1981). Rugman (1979) argued that firm-specific advantages of the market imperfection approach and the new risk-diversification approach suggests that a multinational firm is at an advantage compared to a domestic firm. The two approaches suggest that a multinational firm is not only able to achieve higher profits but also these profits are more stable than those of a domestic firm. Firms are increasingly seeking out new markets outside their domestic markets (Delios & Beamish, 1999; Geringer, Tallman, & Olsen, 2000). This increasing interest in the internationalization implies that firms realize the benefits of international diversification.

This study argues for an inverse relationship between internationalization at the time of IPO and underpricing drawing support from the integration of theories of internationalization with signaling and information asymmetry theory. The theoretical logic is similar to that provided for relating relative volatility with internationalization in the previous section. According to this logic, theories of internationalization have identified a number of benefits. These benefits will be received by the potential investors as positive signals to the future performance of the firm. These positive signals would thus reduce the uncertainty that surrounds the IPO. This reduction in uncertainty implies a reduction in information asymmetry between the firms and external investors. Less information gap means less underpricing. Investment bank and firm management work together to set the initial price for the offering. Thus the first purchasers (both institutional investors and retail investors) are 'price takers'. Investment bank and management of the firm underprice the issue in order to induce external investors to buy shares of the firm. However, in the presence of strong positive signals of value and performance (e.g., internationalization) underwriters may not have to underprice their issue by as much as they would in the absence of these signals. Strong positive signals may induce these external investors to buy shares of the firm.

Synthesizing theories of internationalization with information asymmetry theory and signaling theory suggest that the degree of internationalization at the time of IPO sends a positive signal to investors about the future value of the firm. This positive signal

reduces the information asymmetry between investors and the firm, resulting in lower underpricing of the IPO firm. Therefore, I frame the following hypotheses as such:

H3a: The Intensity of Internationalization is negatively associated with Underpricing.

H3b: The Scope of Internationalization is negatively associated with Underpricing⁵.

Likewise the previous two measures (e.g., compound holding period returns and relative volatility of returns), the theoretical underpinning for a non-linear relationship between internationalization and underpricing stems from both the integration of theories of international business with signaling and information asymmetry and the analogy with the past empirical research on internationalization and firm performance. Drawing support from the synthesis of international business theories and signaling and information asymmetry theory, I argue that the initial low level of internationalization may not provide a strong positive signal of future value and performance to potential investors. Rather, this initial low level of internationalization may signal negative value and performance of the focal firm due to insufficient economies, liability of foreignness, and initial learning costs (Contractor et al., 2003). Therefore, a low level of international expansion may discourage investors to buy shares of the firm. In this case, the underwriters may have to set the offer price even lower to induce external investors to buy shares. However, beyond a certain optimal point, firms are considered to reap the full benefits of internationalization. Therefore, beyond the optimal level, internationalization exhibits positive signals of performance and value to potential investors. This, in turn, will reduce the information asymmetry of investors with respect to the future performance of the firm. As information asymmetry is directly related to underpricing, a reduction in information asymmetry will lead to a decrease in underpricing because underwriters may not have to underprice their issue by as much as they would in the absence of a strong positive signal. Certo et al. (2003) argued that IPO managers must find a mechanism to communicate their firm's

⁵ A detailed description of underpricing is provided in Section 4.6.1.2. Equation 3a is used to test these two hypotheses.

quality in order to reduce the uncertainty and thus reduce the need to discount the offer price to attract less-informed investors.

In line with the above arguments, the following two hypotheses are framed to test the non-linearity between underpricing and degree of internationalization at the time of IPO.

H3c: The relationship between the Intensity of Internationalization and Underpricing is non-linear, with the slope initially positive up to a certain percentage of the Intensity of Internationalization but negative thereafter.

H3d: The relationship between the Scope of Internationalization and Underpricing is non-linear, with the slope initially positive up to a certain level of the Scope of Internationalization but negative thereafter⁶.

Walter, Kroll, & Wright (2010) argue that the exploration of only linear or curvilinear relationship between board composition and performance is not sufficient to reveal the complexity of this relationship. They believed that an appropriate approach would be operationalizing Top Management Team (TMT) board composition over three distinct ranges. The majority of the empirical studies on internationalization and firm performance relationship have also examined only a linear or a curvilinear relationship using a continuous measure of internationalization. Internationalization is more complex compared to TMT board membership. Analogic to the above argument of Walter, Kroll, & Wright (2010), this study examines the relationship using dummy categories of both the intensity and the scope of internationalization in addition to continuous measures,. This approach has three advantages. First, as almost half of the firms in my sample are domestic, using internationalization as a categorical variable will help in separating the effects of domestic only firms. Second, as discussed above, this approach may be more appropriate to reveal the complexity of the relationship. Third, non-linearity with a single continuous variable is difficult to interpret compared to a simple linear relationship using two categories. Therefore, this study evaluates all the linear hypotheses (H1a, H1b, H2a,

⁶ Equation 3b is used to test these two hypotheses.

H2b, H3a, and H3b) with respect to the three performance measures using categorical dummy variables of both intensity and scope of internationalization.

The intensity of international competition, the integration of world economies, and advances in communication technologies has reduced the costs of venturing abroad. These trends make it easier for firms to internationalize earlier and faster than ever before (Cavusgil, Knight, & Riesenberger, 2014). The implications are that firms will be increasingly internationalized earlier in the life cycle resulting in the emergence of increasing number of INVs. An important aspect of INVs is the speed with which these firms internationalization. One of the major issues that INVs face is how to finance their rapid growth. Going public is one route for INVs to raise capital needed for rapid growth. The next section develop hypothesis to test if INVs raise this capital through going public earlier. This is the first step towards more nuanced understanding of the impact of internationalization strategy on performance.

3.5 International New Ventures and Time-to-IPO

Theories of internationalization explaining the “why” and “how” of internationalization elaborate one or more aspects of the firm’s internationalization. However, the overall conclusion from these theories is that a firm internationalizes to improve its performance and enhance its profitability. Zehra, Ireland, & Hitt (2000) stated that international activities might provide the firm with access to growth opportunities and innovations, which may not be available to purely domestic firms. INVs may go public earlier than traditionally internationalizing firms because international new ventures are characterized by the need for rapid growth in order to sell their product/service in more markets quickly before their product/service becomes obsolete, or is imitated. International New Ventures possess unique resources and capabilities. According to RBV, unique resources and capabilities provide firms with higher competitive advantage and thus lead to better performance. Therefore, these firms internationalize early and rapidly in order exploit their intangible resources more efficiently and effectively. However, entry

into foreign market is costly and may require substantial investment, particularly when establishing subsidiaries abroad. One way to finance this growth and expansion is through public capital. International new venture (or born global) firms may go public earlier not only to finance their existing international activities but also their further international expansion. In addition to the lack of financial resources needed for growth, these firms need branding and legitimacy. An IPO would not only provide funds for their growth but may also enhance its image and legitimacy.

As INVs may go public earlier to finance their rapid growth, the early timing of IPO would produce strong signals of growth and future performance to potential investors. For new firms, Time-to-IPO can be used as a measure of performance as conventional measures of performance may not appropriately assess the potentials of rapidly growing new ventures (Deeds, DeCarolis, & Coombs, 1997; Chang, 2004). Research on international entrepreneurship has focused mainly on how and why international new venture firms internationalize earlier (Jones & Coviello, 2005), the context of IPO allows for evaluating a different characteristic of these firms—the timing of IPO.

Therefore, to raise capital and signal growth to external investors, I hypothesize that rapidly internationalizing firms (INVs) go public earlier than other (traditional) firms.

H4: INVs go public earlier than traditional internationalizing firms⁷.

However, the opposite of the above rationale may be true because going public earlier can be more risky as firms may have to deal with the liabilities of newness and as well foreignness simultaneously.

3.6 Summary

The introduction section discussed the development of the theoretical model for the specific hypotheses of this research. This theoretical model is based on the integration of theories of international business with signaling and information asymmetry theory.

⁷ A detailed descriptions of INVs and Time-To-IPO is provided in Sections 4.6.2.2 and 4.6.3.3 respectively. Equation 4 is used to test these two hypotheses.

This integration proposes that the benefits identified by theories of internationalization provide positive signals to potential investors. Higher internationalization at the time of IPO reduces the information asymmetry of investors with respect to the future performance of the firm. These positive evaluations by the investors lead to better stock performance and reduction in risk and underpricing. Both linear and non-linear propositions are developed with support from the synthesis of theories and empirical research. The last proposition related to the question that INVs go public earlier drew its support from the synthesis of RBV and international new venture theory with signaling theory. As this study evaluates the hypotheses with respect to post-IPO performance using both continuous and categorical measures of the internationalization, a discussion on this transition from continuous to categorical dummies is presented.

After establishing the theoretical framework for the development of hypotheses for this research, the process for conducting their empirical evaluation is explained in the next chapter “Methodology”.

Chapter 4

Methodology

4.1 Introduction

This research is concerned with how the degree of internationalization at the time of IPO is related to post-IPO performance of the firms. In order to answer the research questions of this study, a list of Canadian and US firms that issued their initial public offerings between 2001 and 2011 was downloaded from Compustat North America and Bloomberg databases. However, to include all potential Canadian IPOs, lists of firms were obtained from the Investcom.com and the Toronto Stock Exchange (TSX) website. The reason for obtaining the additional lists is that Compustat and Bloomberg predominantly tracks US IPOs. In addition to the above sources of data, a number of other sources of data were used including company prospectuses, HooversOnline, Ritter's data, VentureXpert, DataStream, CRSP, Electronic Data Gathering, Analysis and Retrieval (EDGAR), and System for Electronic Documents Analysis and Retrieval (SEDAR). The main point in using a number of sources is to include all potential IPOs. As every effort is made to include all IPOs that occurred during the period, the final sample approximates the population of IPOs in manufacturing and service sectors. Extensive manual searches were used during the data cleaning process as data was missing for a number of variables. Data for the independent variable-internationalization was obtained from the respective prospectus of the firm. In addition, prospectuses were also used to locate missing data and to cross-validate data on a number of variables such as offer price, venture capital backing, year of IPO, industry etc. Data for the dependent variables was mainly downloaded from Bloomberg and CRSP.

The analysis is conducted using least square regression models for both linear and non-linear hypotheses. The relationship between internationalization and post-IPO

performance is tested using both continuous and categorical dummy variables for both the intensity and scope. The final model tests the proposition that international new venture firms go public earlier than other traditionally internationalizing firms. The last proposition uses different variables than used in the previous hypotheses. A dichotomous variable of INVs is used as an independent variable whereas Time-to-IPO is the dependent variable for this final hypothesis.

This chapter consists of five sections. The first section describes the process of sample selection, a discussion on data cleaning and missing data and an argument in support of considering this sample as representing the population of IPOs. The second section presents a discussion on the sources of data used to obtain the final sample. The third section contains descriptions of the variables used in this study. The chapter concludes with the explanations of the statistical models utilized in testing the hypotheses developed in Chapter 3.

4.2 Sample

The sample for this research includes firms from Canada and the United States within the manufacturing and service sectors that completed their initial public offerings from 2001 to 2011. In order to avoid the effects of the Internet bubble period of 1999-2000, 2001 is chosen as the base year as recommended by Lowry, Officer, & Schwert, (2010). Year dummies are included in all the models to control for the global financial crisis of 2008. The initial dataset, downloaded from Compustat North America fundamental annual files, resulted in a sample of 2045 firms.

As the focus of this study is Canadian and US IPOs, firms headquartered outside of Canada and the US were eliminated. This step eliminated American Depository Receipts (ADRs). ADRs are firms that are listed in the US stock exchanges but are incorporated in other countries. Similarly, firms listed on Canadian exchanges (TSX and TSX venture) but incorporated in other countries are considered ADRs. In addition, the sample was restricted to manufacturing (SIC code 2000-3999) and service (SIC code

7000-8800) sectors. This screening resulted in a reduction in the sample to 673 firms. Restricting the sample to manufacturing and service sectors eliminates firms in industries such as mining, oil and gas, energy, and insurance. This is important because the internationalization of these specific industries is quite different from that of manufacturing and service firms. These sectors are more regulated and their prices are determined by the world supply and demand. In addition, mining, oil and gas, and energy sectors have a long business cycle. In contrast, manufacturing and service sectors are more mobile and changeable. This might be the reason why the mainstream international business literature on the drivers of internationalization has primarily focused on manufacturing and service sectors (Kraemer and Tulder, 2009).

A list of firms that went public between January 2001 and December 2011 was also downloaded from the Bloomberg database. This database allows for screening data on a number of variables such as specific country, exchanges, industry sectors, and offer types. It has a built-in Excel function that can be programmed to extract data on variables of interest for a specified period in a format of interest. Figure 2 shows results of running the search query on Bloomberg for IPO firms restricted by the years of IPO (2001-2011), sectors (manufacturing and service), and country of domicile (US and Canada).

The dataset obtained from Compustat (673 firms) is combined with the dataset from Bloomberg (543 firms), resulting in a total of 987 IPOs after removing duplicates and firms that withdrew their initial public offerings. Prospectuses for all the 987 firms were checked on Bloomberg, EDGAR, and SEDAR. While searching for prospectuses, company tickers, offer price, listing exchange, number of shares offered, IPO date, and the type of public offerings were validated with my sample. Prospectuses could not be obtained for 10 firms out of 987. Similarly, firms with missing return data were checked on CRSP and DataStream and data was downloaded wherever available. Only two firms were found to have no return data. During the process of downloading prospectuses for all the 987 firms, a number of firms were removed for either being ADRs, belonged to sectors outside of manufacturing and service, had an IPO offer price less than \$5, not an IPO, listed on exchanges other than New York, NASDAQ, AMEX, TSX and TSX Venture, and subsidiaries of other firms (Walters, Kroll, & Wright, 2010). This resulted in a sample of 471 IPOs. It is a standard practice in IPO research to exclude best efforts,



Figure 2: Bloomberg Screening Process

ADRs, closed end mutual funds, Real Estate Investment Trust (REITs), and partnerships (Loughran & Ritter, 2004). Firms with offer price less than \$5 were removed to rule out penny stocks (Ritter, 2013a; Wang, 2010) and be consistent with the extant IPO research. Data on internationalization (intensity and scope) is obtained by reading the prospectus of each of the 471 firms. In addition, data partially missing for a number of variables was also obtained from the respective prospectus. This screening (including the removal of 12 firms for which prospectus or return data was not found) resulted in a final sample of 459 firms. Figure 3 graphically shows the screening process for obtaining the final sample.

In order to calculate the IPO underpricing using offer price and first day closing price, first day closing prices were pulled using the IPO dates. These IPO dates obtained from Bloomberg were sometimes different from the first day of trading. Therefore, daily closing prices were extracted for one month, 15 days before the IPO date and 15 days after

the IPO date. The first day closing prices were checked with the daily closing prices from this range. To validate, firms with very high first day closing prices (e.g., Cornerstone, Oculus Innovations, etc.) and firms with equal offer price and first day closing price (e.g., Methylegene, Avigilon, Trius, Bridgeline, Imris, PositiveID, etc.), were cross-checked on CRSP and DataStream. Offer prices for all the firms obtained from Bloomberg were confirmed with their respective prospectuses.

IPO underwriter ranking data was obtained from Loughran and Ritter's update (2004) of the underwriter reputation ranking (Ritter IPO Data, 2013b) developed by Carter & Manaster (1990). Ranking for some Canadian lead underwriters (GMP, National Bank Financial, Canaccord Capital, Orion Securities, and Wellington West Capital Markets) was not found on the Carter & Manaster ranking. Ranking for these underwriters was obtained from Bloomberg underwriter ranking. In this case, ranking was based on the relative position of the underwriters for which ranking is available on Carter & Manaster. For example, GMP Securities is ranked 42 in Bloomberg's underwriter ranking for the year 2005, while Piper Jaffrey & Co is ranked 45. As Piper Jaffrey & Co is ranked 2 according to the Carter & Manaster ranking, GMP Securities is also ranked 2.

In order to identify venture capital backed IPO firms, data for venture capital backed IPO firms was downloaded from VentureXpert of the SDC Platinum Database. An IPO firm that has been primarily funded by venture capital is called venture capital backed IPO firm (See Section 4.6.3.1 for details). This data was combined with my sample. Firms for which no match was found in my sample were considered to be non-venture capital backed firms, but each of the non-venture capital backed firm was subsequently checked with the IPO prospectus.

To calculate the age of the firm, the founding year of the firm is required. This data is not available on Bloomberg. Founding years for firms that issued IPOs from 2001 to 2011 were downloaded from VentureXpert. To pull founding years for my sampled firms, my sample and founding year data obtained from VentureXpert were matched-merged. Data for firms with no matching was obtained from the IPO prospectus.

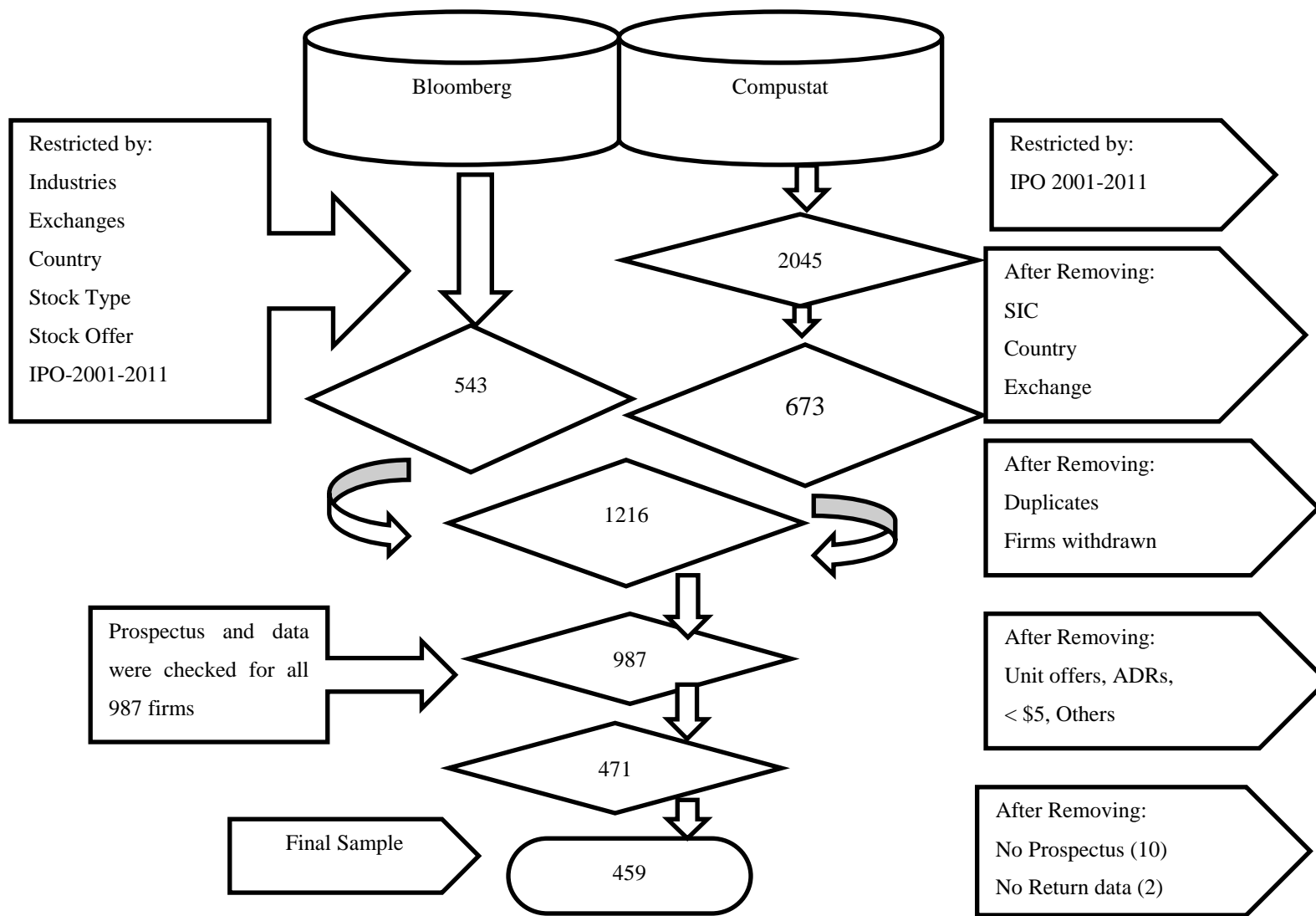


Figure 3: Sample Selection Process

The sample is organized into 16 industry sectors based on the Bloomberg Industrial Classification System (BICS). The name of each sector and the number of firms within each sector is provided in Table 4. The average industry standard deviation of returns is based on the BICS industry classifications. Average industry standard deviation is used to calculate the relative volatility of returns.

Table 4: Firms by Industry Sector

No.	Industry Sector	Number of Firms	Percentage
1	Basic Materials	12	2.6
2	Communication	9	2.0
3	Communication-Internet	43	9.4
4	Communication-Telecommunication	24	5.2
5	Consumer-Cyclical	29	6.3
6	Consumer-Non-Cyclical	8	1.7
7	Biotechnology (Consumer-Non-Cyclical)	22	4.8
8	Commercial Services (Consumer-Non-Cyclical)	38	8.3
9	Healthcare Products (Consumer-Non-Cyclical)	52	11.3
10	Healthcare Services (Consumer-Non-Cyclical)	17	3.7
11	Pharmaceuticals (Consumer-Non-Cyclical)	29	6.3
12	Industrial	46	10.0
13	Others	11	2.4
14	Computers (Technology)	24	5.2
15	Semiconductors (Technology)	28	6.1
16	Software (Technology)	67	14.6
Total		459	100.0

Internationalization is the main independent variable for this study. One of the major issues in internationalization research is the availability of data on international sales and locations. Compustat's segment files provide sales data by geographic regions. Similarly, the prospectus of a firm also provides geographic sales data in the geographic segment section. According to regulation 101(d) of the Securities and Exchange Commission (SEC), when filing registration statements (e.g., S-1 form or prospectus), the registrant is required to disclose information about revenues from all countries from which

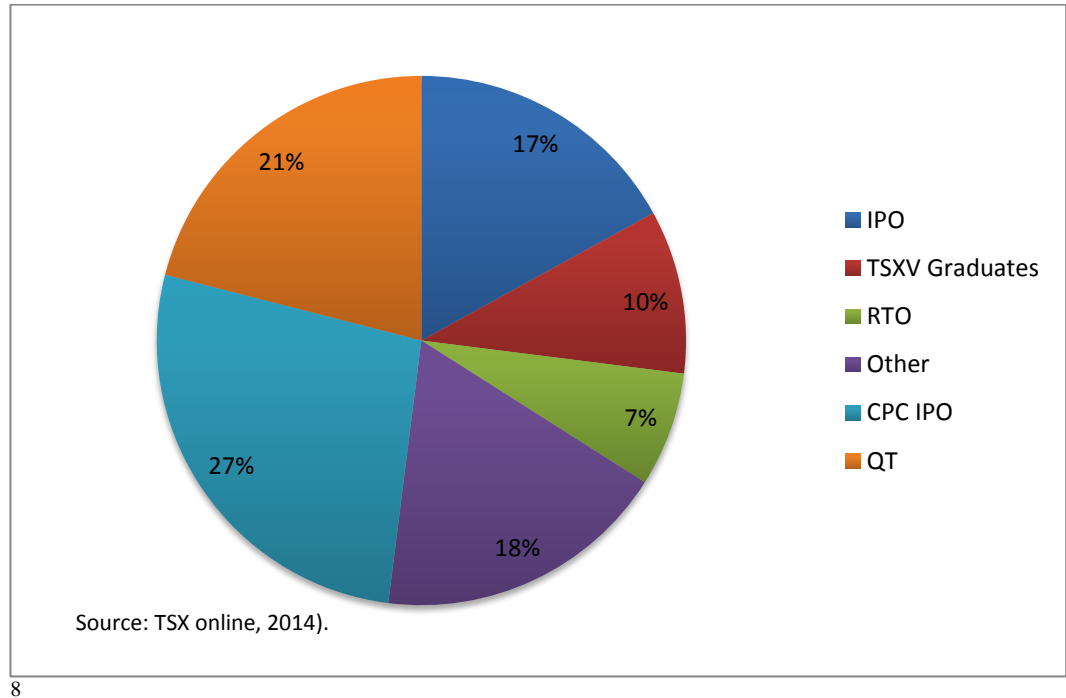
the firm derives its revenue (Cornell University Law School, 2012). According to the SEC's segment reporting rule, Statement of Financial Accounting Standards No. 131, companies must report operating segment information separately if the segment revenue is 10% or more of the total revenue for the year (SEC, 2013). Prospectuses for all the firms that did not report sales by geography were checked with keywords such as international sales, foreign sales, or sources of revenue. Firms would mostly provide some information in the geographic segment of the prospectus about why they did not provide geographic sales. Examples of the statements that firms reported in their prospectuses are: "All of our revenue is from within the US"; "We provide services in the US"; "Operates in one geographic segment"; or "Revenue outside of US is not material".

Datasets of IPO firms that went public from 2001 to 2011 were also downloaded from Hoovers.com (for US firms) and Investcom.com (for Canadian firms). In addition, data on IPOs were also obtained from J. Ritter's website, which carries data on founding year of IPO firms from 1975 to 2011. Return data for some Canadian IPO not available on Compustat North America and CRSP was found on DataStream.

Based on my sample selection criteria, every effort was made to include all potential IPOs. However, out of a sample of 459, only 24 firms are from Canada. Therefore, 95 percent of the sample represents US IPOs. The lower number of Canadian IPOs in my sample could be due to the following reasons:

1. Small number of IPO listing compared to other ways of listing on TSX and TSX Venture as evident from Figure 4. A large fraction of the Canadian IPOs consists of Capital Pool Companies (CPC) (Shi, Pukthuanthong & Walker, 2013). These are very small companies trading on the TSX Venture exchange that do not have any commercial operations and assets except cash. These companies evaluate promising businesses for acquisition using their cash holdings. They can be listed as a standard tier 1 or tier 2 issuer on TSX Venture exchange after completing a qualifying transaction (QT) (Carpentier & Suret, 2006). Majority of the Canadian IPOs

removed from my sample were CPCs with offer price of less than \$1.00.



8

Figure 4: Ways of Listings on TSX / TSXV (2011-2012)

2. Highest listings in mining and oil and gas sectors on TSX and TSX Venture compared to other sectors (Figure 6). Based on my sample selection process, firms in mining, oil and gas, financial services, utilities were removed.

Downloading data from a number of sources was undertaken particularly due to the low number of Canadian firms. The sample is also comparable with IPO firms obtained from Kenny & Patton (2013). Kenny and Patton have put together a database of the US IPOs from June 1996 through 2010. A total of 2287 firms are included in this database. Restricting Kenny and Patton data on SIC codes (2000-3999 and 7000-8800), the three major US exchanges (NYSE, NASDAQ, and AMEX), and incorporation in the US, resulted in 465 firms. This number is similar to 435 US firms

⁸ RTO: Reverse Takeover; QT: Qualifying Transaction

included in my final sample even though, compared to my data, the Kenny & Patton (2013) data was screened on limited criteria.

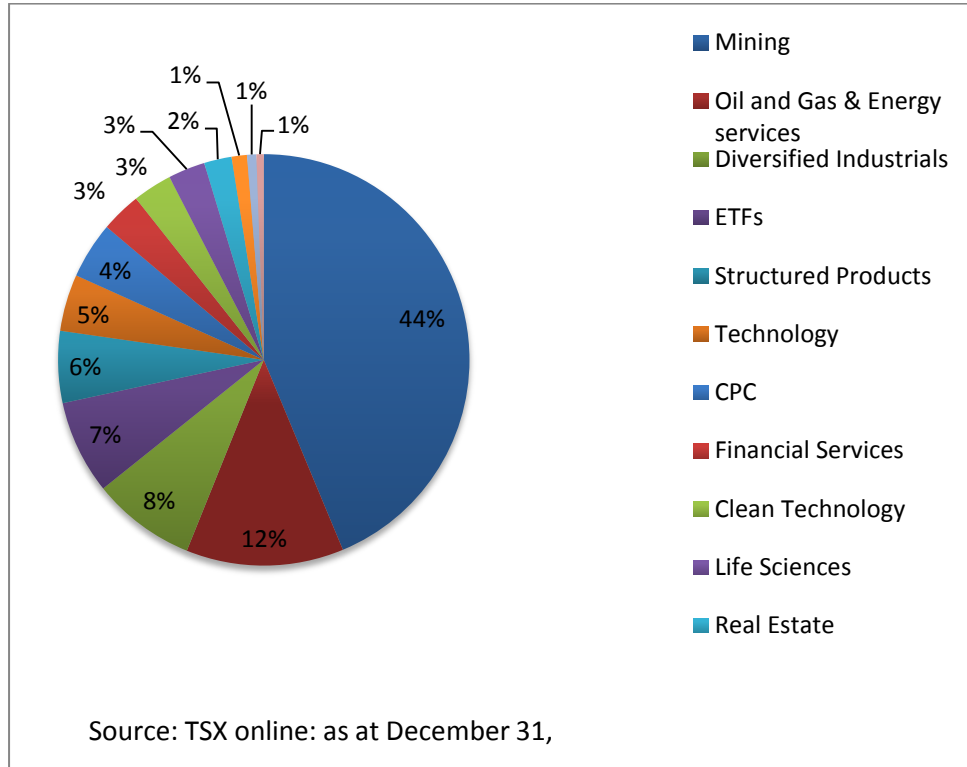


Figure 5: Issuers by Sectors

The number of IPOs in my sample for each year resembles the population of total IPOs for that year obtained from Ritter's database. Figure 6 shows a comparison of the IPOs between my sample and total number of IPOs (US) issued in that year.

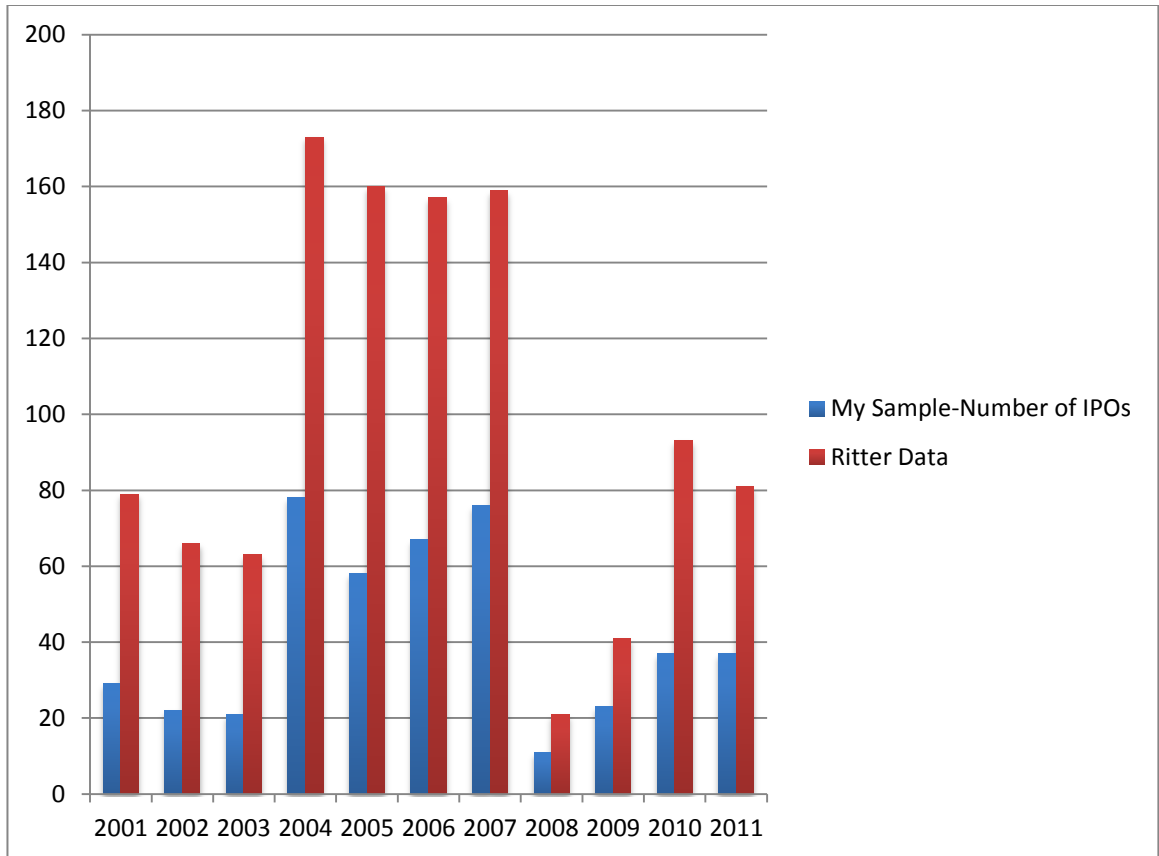


Figure 6: Number of IPOs Per Year Compared to Ritter’s Data

4.3 Data cleaning and missing data

Although the process of data downloading from a few databases seems easy and quick, data validation and cleaning for this study was extremely extensive and time consuming. It took me almost two semesters to create the final sample. The following points provide a description of the data checking and cleaning process.

1. The bulk of the data for all the variables were extracted from Bloomberg. Although, the number of screening available on Bloomberg allows for filtering data based on the specific variable and period, downloading price and return data required significant training for programming the built-in Excel function. I had to go

through a number of tutorials available on Bloomberg interface in order to understand the screening process. As these tutorials were not enough to get the required data on each variable, I used the technical support through the on-site web help and direct phone calls extensively. On a number of occasions, my inquiry was referred to the developer of the program when frontline technical support was not able to help me. The reply from the developer sometime took more than a day or two.

2. The first step in cleaning the data was to remove duplicate entries. Duplicate entries were recorded probably due to combining the data from two different databases (Bloomberg and Compustat). Removal of duplicates should generally take a single click provided firms are identified with a single standard code in all the databases. As Compustat and Bloomberg did not use a single standard code, I had to use company names to remove duplicates. However, the names of the firms were also not recorded in a standard way. Bloomberg recorded firms with all capital letters while Compustat used standard capitalization. Microsoft Excel treats these two formats as different. Therefore, the single click of “remove duplicates” button did not remove most of the entries. These duplicates were thus removed manually by checking each entry.
3. After removing the duplicate entries, return data was downloaded from Bloomberg. A large number of firms reported “Invalid Security” for the return data. As Bloomberg uses company tickers to retrieve data, the first step was to check tickers for each firm that resulted in retrieving an invalid security status. A number of issues with the tickers were identified including an extra word or number with the ticker, a dot after the ticker or a totally different ticker. As issues with a large number of tickers were found, each ticker was checked manually using the name of the firm. This also allowed me to use the most up-to date ticker.

4. After confirming all the tickers, monthly data for the majority of the firms, previously resulted in invalid security status, was downloaded. However, still return data for a number of cases were missing either for the whole period or for a specific month. Firms with missing data were checked on CRSP and DataStream. Missing return data for US firms were usually found on CRSP whereas missing return data for Canadian firms were retrieved from DataStream.
5. Prospectuses for each of the 987 firms were downloaded after completing checking and downloading monthly return data and data on other variables available on Bloomberg. Although the majority of the data was downloaded from Bloomberg, data on firm internationalization was obtained from each prospectus manually. In addition, the international sale data provided in the prospectus had to be converted manually from dollar amount to percentage. Furthermore, data on offer price, venture capital backing, lead underwriter, year of the IPO, and founding year was confirmed with each prospectus.

4.4 Sample or population

Every effort was made to include all firms in the manufacturing and service sectors, headquartered in US or Canada and that issued initial public offerings between 2001 and 2011. In order to accomplish this, I downloaded the initial frame of firms from a number of data sources including Compustat North America, Bloomberg, Hoovers.com, Investcom.com, VentureXpert, Ritter's Database and Kenny & Patton (2013) IPO Data. A List of Canadian firms that issued IPOs on TSX and TSX Venture exchanges, between 2001 and 2011 was also downloaded from TSX website. After finalizing the list of firms based on the screening criteria (discussed above) used by the majority of IPO researchers, data for each variable and the respective prospectus was downloaded from Bloomberg.

Prospectuses not available on Bloomberg were downloaded from EDGAR and SEDAR Databases. After downloading the initial data on all variables, an extensive data cleaning process (discussed above) was undertaken due to the missing data. The result of this extensive data cleaning and validation process is that only two firms had missing returns and prospectuses for only ten firms were not available. Therefore, in one sense the number of IPO firms included in this study represents the population IPOs in manufacturing and service sectors. However, technically, the number of firms in this study should be called a sample of IPO firms because it does not represent all of the IPO firms for the period in question. Therefore, for the purpose of this study I will use the word “sample” for the firms included in the analysis.

However, the use of a very large sample that approximates population has a challenge. A very large sample implies that the study has a very high statistical power. Statistical power is the ability of a statistical test to detect a relationship between variables. Alternatively, it is the probability of rejecting the null hypothesis when it is false (Newton & Rudestam, 1999). There are issues with both underpowered studies and overpowered studies. A genuine effect can go undetected in an underpowered study. However, in case of very high statistical power, everything is statistically significant (Ellis, 2010b). This implies that interpreting only P-values in a study with high power may not be enough. The solution is to examine the effect size directly. In order to elaborate this point, Ellis (2010b) gives an example of a study that examined the effect of market liberalization in China. Due to the large number of observations--100,000 firm year observations, everything was statistically significant. However, the effect sizes were so small that the performance effects of the industrial policies were negligible. This is why journal editors, academy presidents and American Psychological Association ask researchers to evaluate the substantive significance of their results (Campbell, 1982; Rynes, 2007; Shaver, 2006; APA, 2010).

4.5 Data Sources

In order to include all potential IPOs, I used a number of data sources. A brief description of each data source is provided in the following sections.

4.5.1 Compustat (North America)

The initial data set for this study was downloaded from Standard and Poor's Compustat (North America) database using the interface of Wharton Research Data Services (WRDS). Compustat North America provides extensive financial, statistical and market information for publicly traded companies in the United States and Canada. Compustat North America contains twenty years of annual, twelve years of quarterly, seven years of business and geographic segment, and 240 months of stock prices and dividend data. The database provides financial and market data for over 10,300 US and Canadian firms (Yale University, 2013). However, the drawback of using this database is the lack of advanced capabilities for screening data. For example, for this study, using Compustat, I could filter data only on a single variable (e.g., year of IPO).

4.5.2 Bloomberg

Bloomberg database carries current and historical financial and market data for over 52,000 companies worldwide (Columbia University, 2013). Unlike Compustat, Bloomberg provides advanced capabilities for screening data. This database is more interactive and allows restricting data in many different ways. This is why I obtained the bulk of my data from Bloomberg terminal. This database also contains prospectuses and other documents of the firms. In addition to data on variables, I was able to download a large number of prospectuses from this database.

4.5.3 DataStream

DataStream is a worldwide financial information service that covers all aspects the security industry. DataStream Equity Research provides current and historical data for over 30,000 securities (Boston University, 2010). This database was especially useful for getting stock prices for Canadian IPOs not available on Bloomberg and CRSP.

4.5.4 Centre for Research in Security Prices (CRSP)

This database contains security-level historical pricing, returns, and volume data on more than 20,000 stocks (inactive and active companies) from NYSE, AMEX, and NASDAQ markets (Boston University, 2010). Monthly data goes back to 1925. Daily data goes back to 1962 depending on exchange traded. CRSP also carries US market indices, treasuries, and mutual funds, and a merged database with S&P's Compustat data (Harvard Business School, 2013). For this study, first day closing prices and return data not available on Bloomberg were downloaded from CRSP.

4.5.5 VentureXpert

VentureXpert provides data on more than 33,000 private equity backed companies including venture capital backed firms. VentureXpert is a part of the SDC Platinum Database. Researchers have extensively used it for identifying venture capital backed firms (Kaplan and Schoar, 2005). I have used it, particularly, for downloading venture capital backed IPO firms.

4.5.6 Electronic Data Gathering, Analysis and Retrieval (EDGAR)

Every firm going public in the US must file a prospectus with the US Securities and Exchange Commission (SEC) before going public. This database contains the prospectuses and other filings of the IPO firms. In 1980, the SEC began to provide online access to these filings through its EDGAR program (Kenny & Patton, 2013). Prospectuses for the US IPOs not available on Bloomberg were downloaded from EDGAR.

4.5.7 System for Electronic Documents Analysis and Retrieval (SEDAR)

SEDAR is the official website providing access to most public securities documents and information filed by the public companies and investment funds with the thirteen provincial and territorial securities regulatory authorities (Canadian Securities Administrators (CSA) in the SEDAR filing system. SEDAR is a filing system developed for the Canadian Securities Administrators to:

- Facilitate the electronic filing of securities information as required by the Canadian Securities Administrator;
- Allow for the public dissemination of Canadian securities information collected during the securities filing process; and
- Provide electronic communication between electronic filers, agents and the Canadian Securities Administrator (sedar.com).

Prospectuses for the Canadian IPOs not available on Bloomberg were downloaded from SEDAR.

4.5.8 Prospectus

A prospectus is a document provided to the Security and Exchange Commission (SEC) prior to a public offering. According to the SEC, firms are legally liable for any

information that might mislead investors (O’Flaherty, 1984). Top management is accountable to the SEC and stakeholders regarding the contents of the prospectus (Beatty & Zajac, 1994). Studies have used prospectuses as a source of data. I used firm prospectuses as the main source of data for international scale and scope, venture capital backing, and the lead underwriter. In addition, missing data is obtained from the respective prospectus. Moreover, data obtained from databases was confirmed with the respective prospectus.

A company undertaking an IPO discloses required information in the final prospectus (denoted as 424B4 or 424B3), registration statements (identified as Form S-1), and its amendments (denoted as S-1/A) filed with the SEC. These documents are publicly available through the SEC’s EDGAR database. To issue an IPO, a firm is required to register the offering with the SEC. In the first step, the IPO firm files a registration statement (Form S-1) with the SEC. The SEC reviews the registration statement to check compliance with applicable disclosure requirements. This usually results in a number of revisions. To address reviewer’s comments, the IPO firm amends its S-1 statements (denoted as S-1/A). Once the reviewer’s comments have been addressed and the SEC declares the registration statement effective, the IPO firm files the final prospectus identified as 424B4 or 424B3 in the EDGAR database. Figure 7 shows this process graphically.

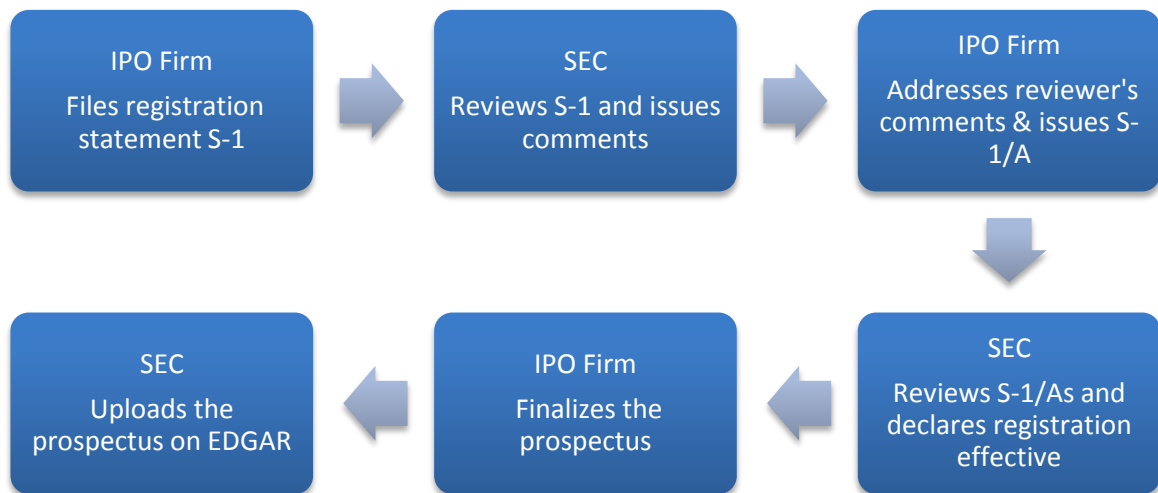


Figure 7: IPO Prospectus Filing Process

4.5.9 Toronto Stock Exchange (TSX) website (tsx.com)

The TSX website provides information about firms listed on the TSX and TSX Venture exchange. Therefore, data on initial public offerings by sector was downloaded from this website to check firms missing from my dataset. This search allowed me to add five more Canadian firms to my dataset.

4.5.10 Investcom Group

Investcom is a financial company providing online information and data about companies listed on Canadian exchanges. This site also allows for a list of IPOs by year, starting from 2000. Therefore, a list of firms that issued IPOs from 2001 to 2011 was also downloaded from Investcom.com. This list was cross-checked with my dataset in order to find any missing firms.

4.5.11 Ritter's database

It is a website created by Professor Jay R. Ritter, professor of finance at the Warrington College, University of Florida. This website contains historical data such as number of IPOs, founding years for IPOs, underwriter ranking, underpricing, and more. As founding year was not available from Bloomberg, I used founding year data from Ritter's database.

Table 5: Summary of Data Sources

Data Source	Description	Data Obtained
Bloomberg	Carries historical and current financial and market information and data for companies worldwide	Initial sample Data for majority of variables Prospectuses
Compustat (North America)	Provides financial and market information for publicly traded companies in North America	Initial sample
DataStream	Contains current and historical data for securities	Return data for some Canadian firms
CRSP	Carries current and historical data for security prices, returns, and indices	Return Data for firms not found on Bloomberg.
VentureXpert	Provides data on private equity and venture capital backed IPO firms	Venture Capital Backing Year founded
EDGAR	SEC's filing service and database for US public companies	Prospectuses for US IPOs
SEDAR	Filing service and database for Canadian public companies	Prospectuses for Canadian IPOs
Prospectus	A document submitted by public companies to the Security and Exchange Commission before going public	International sale, scope, venture capital backing, underwriters, and missing data for other variables
TSX Website	Information and data on companies listed on TSX and TSX Venture exchange	Five Canadian IPO firms not found on Bloomberg or Compustat North America
Investcom	A Canadian investment company that provides information and data for firms listed on Canadian exchanges	List of Canadian IPOs that went public from 2001 to 2011
Ritter's Database	Provides data and publications on US IPOs	Carter and Manaster's Underwriter ranking and founding years

4.6 Variables

4.6.1 Dependent Variables (Post-IPO performance)

A stock performance measure is used as the market performance indicator for this study. The use of stock prices as a measure of performance is appropriate because it reflects the attitudes of external investors regarding the firm's future prospects. A stock-based performance measure was chosen for several reasons. First, stock-based performance measures are not influenced by financial reporting rules compared to accounting-based measures. Second, the use of stock-based performance is consistent with an important principle in finance—that is, a firm's manager should act in a way to maximize the market value of the firm. Lastly, a stock-based measure incorporates and controls the differences in risk as investors assign value to stocks based on the risk involved (Jayaraman, Khorana, Nelling, & Covin, 2000). In addition, market-based measures reflect the intangible assets of the firm (Richard, et al., 2009).

IPO researchers have used many different measures of performance for the dependent variable because these different measures capture the perception and motives of different stakeholders (Donaldson & Preston, 1995). For instance, measures that incorporate the offer price (e.g., underpricing) represent the perceptions and motives of founders, executives, investment bankers, pre-IPO investors, and institutional investors. In contrast, measures that incorporate the closing prices (e.g., holding period returns, volatility of returns) at the end of the trading day represents the perceptions and motives of the stock market as a whole (Dalton, et al., 2003). Therefore, in order to include the assessment of different stakeholders, this study uses three measures of market performance: compound holding period returns for 12 months post-IPO (CHPR12M), relative volatility of returns, and underpricing as dependent variables. Underpricing is a short-term performance measure (first day), whereas compound holding period return comparatively captures long-term performance. Diversification is one of the major benefits of international expansion. Compound holding period returns captures the performance of returns while relative volatility captures the stability of these returns. Diversification brings stability (risk reduction) to the returns.

4.6.1.1 Compound Holding Period Returns (CHPR12M)

Examining the closing price at the end of the trading day incorporates the assessment of the entire stock market that is presumably more efficient than actors who set the offer price (Fama, 1998). In order to incorporate the assessment of the whole market, this study, following the work of Jayaraman et al. (2000), Ritter, (1991), and Walters, Kroll, & Wright (2010), examines the effect of internationalization of the firm on the post-IPO performance using a market-based measure called compound holding period returns. Monthly closing prices for up to twelve months after the IPO were used to calculate compound holding period returns (CHPR12M). A twelve-month period is short enough for any significant change in the degree of internationalization of a firm. In addition, Mudambi et al. (2012) did not find any significant difference between the returns from twelve-months and twenty-four months. One year post-IPO holding period returns (Borghesi & Pencek, 2013; Ghosh, 2006) are calculated using the following formula:

$$HPR_i = [\prod_{t=1}^n ((1 + r_{it}))] - 1 \dots \dots \dots (1)$$

In the above equation, HPR_i represents the holding period return for each firm *i*, by compounding monthly stock returns where *r_{it}* is the return on the stock of firm *i* in month *t* and *n* is the number of months for which HPR is calculated. Monthly stock returns (*r_{it}*) are calculated as the difference between the closing price on the last trading day of the current month and the closing price of the last trading day of previous month, divided by the closing price of the last trading day of the previous month:

$$r_{it} = \frac{(Current\ Month\ CP - Previous\ Month\ CP)}{Previous\ Month\ CP} \dots \dots \dots (2)$$

CP means closing price. In order to avoid the influence of underpricing, following Walters, Kroll, & Wright (2010), for seventeen firms, I used second day closing prices when the first day trading fell on the last day of the first month. In addition, to meet the assumption of normality of the residual distribution, the log of CHPR12M is used.

4.6.1.2 Underpricing

In addition to measuring performance using compound holding period returns, this paper also uses underpricing as a measure of performance. The reasons for measuring performance using underpricing separately are:

- Underpricing is a well-known phenomenon in the initial public offerings context (Fernando, Krishnamurthy, & Spindt, 2004; Jenkinson & Ljungqvist, 2001; Boelen & Hubner, 2006).
- One of the major reasons why firms undertake IPOs is to raise capital (Pagano, Paneta, & Zingales, 1998) and underpricing plays an important role in the amount of capital raised.
- It represents the expectations of the public investors as well as the management and institutional investors as the calculation of underpricing includes both the offer price and the closing price. During the IPO process, offer price is set by underwriters and thus represents the expectation of a select group of stakeholders such as founders, top management, underwriters, and institutional investors (Certo et al., 2009), whereas closing price represents the expectations of the public investors.

IPO underpricing is usually calculated as the difference between per share offer price and the closing price on the first day of trading, expressed as a percentage of the offer price (Ritter, 1987; Ritter & Welch, 2002; Arthurs, Busenitz, Hoskisson, & Johnson, 2009; Certo et al., 2001; Filatotchev & Bishop, 2002; Ljungqvist & Wilhelm, 2003). This study measures underpricing by subtracting offer price from the first day closing price expressed as a percentage of offer price.

$$\text{Underpricing} = \frac{\text{First Day Closing Price} - \text{Offer Price}}{\text{Offer Price}}$$

Kryzanowski & Rakita (1996) concluded that most newly issued stocks adjust by the time of the first trade and almost certainly within the first day of trading. Khurshed (2011) argued that it is common for IPOs all around the world to show a jump in their share

price on the first day of trading. These might be the reasons for why measuring underpricing using first day closing prices has become a standard in IPO literature. This study measures underpricing using first day returns in order to be consistent with IPO research and be able to compare the findings with the results of other studies.

4.6.1.3 Stock return volatility

Risk is defined as the volatility in an organization's performance and is measured in two ways: variation in a firm's income stream and variability in a firm's stock market returns (Bloom & Milkovich, 1998). Risk can be divided into two major groups: systematic risk and unsystematic risk. Systematic risk is the variability in prices due to the influence of external factors on an organization. It is also called undiversifiable risk or market risk. Unsystematic risk is the variation in prices due to the influences of internal factors within an organization. This type of risk can be reduced by appropriate diversification. Volatility is the most basic statistical measure of risk. Volatility of an asset indicates the variability of its returns. In day-to-day practice, volatility is calculated for all sorts of financial variables such as stock prices, interest rates, exchange rates, the market value of a portfolio, and more (Kaur, 2004). Volatility is the relative dispersion of changes in the prices or rates of return. Measuring volatility (risk) by the standard deviation of the returns is an accepted practice in diversification research (Kim et al., 1993). The most commonly used statistical measure of volatility is the standard deviation of returns because it is used as a standard measure of risk in theories of portfolio selection and asset pricing (Kaur, 2004).

Poterba & Summers (1986) used daily percentage stock price changes to measure the monthly standard deviation. Campbell, Lettau, Malkiel, & Xu (2001) analyzed volatility using both daily and monthly data and did not find any qualitative difference (in trend). Therefore, this study calculates volatility using post-IPO monthly returns for up to twelve months. Firm-specific volatility varies widely across industries (Campbell et al., 2001). Investors, analysts, brokers, dealers, and regulators care about stock return volatility because it is perceived as a measure of risk (Karolyi, 2001). Mazzucato &

Tancioni (2012), Zou & Adams (2008), Campbell et al. (2001), and Schwert (1989) measured volatility (risk) as the standard deviation of monthly stock returns. I calculated relative volatility as the log ratio between the standard deviation of a firm's returns and standard deviation of average industry returns.

$$Relative\ Volatility = LN \left\{ \frac{St\ Dev\ of\ Returns}{St\ Dev\ of\ Average\ Industry\ Returns} \right\}$$

Mazzucato & Tancioni (2012) argued that measuring volatility relative to industry is important because firms compete with other firms in their own industry and so their growth potential should be valued in comparison with their immediate competitors. In another study, Mazzucato & Tancioni (2008) found that the reaction of returns to R&D is very high for innovative firms in non-innovative industries because they stand out compared to their competitors. In fact, a relative measure compares a firm to its competitors and not the whole market.

4.6.1.4 Transformation of the dependent variables

One of the basic assumptions of the least square regression is that residuals of the dependent variable are normally distributed. This assumption is usually violated when the dependent variable is highly skewed. Transformation of the dependent variable is the most common tool for improving the normality of the variable (Osborne, 2014). Osborne further states that logarithmic, square root, and inverse are the three most common transformations discussed in the literature.

In addition to the above three common transformations, George Box and David Cox developed the Box-Cox transformations. This transformation searches for the appropriate exponent (Lambda) used to transform data into normal shape (Buthmann, 2010). Most of the analytical tools such as SAS, SPSS, and Minitab include the Box-Cox transformation function.

In this study, I transformed the dependent variables (compound holding period returns, relative volatility, and Time-to-IPO) and some control variables (Gross Proceeds,

TMT Size, and Total Assets) using all the transformation procedures including Box-Cox transformation. However, as the variables were positively skewed, logarithmic transformation is used for improving their normality. Logarithmic transformation is the most widely used transformation in regression analysis (Chatterjee, Hadi, & Price, 2000).

4.6.2 Independent Variables

4.6.2.1 Degree of internationalization

International diversification (ID), or the degree of internationalization (DOI), refers to the expansion into countries outside of a firm's home market (Hitt et al., 2006). Researchers have measured the degree of internationalization using both single item measures and composite measures. Sullivan (1994a) attempted to come up with a new index measure of the degree of internationalization called DOI_(INTS). Both the one-dimensional (e.g., foreign sales/total sales) and multi-dimensional (Sullivan: DOI_(INTS)) measures used for measuring the degree of internationalization have been criticized (Contractor, Kundo, & Hsu, 2003). The composite index for measuring DOI encompasses the three dimensions: Foreign Sales over Total Sales (Intensity), Foreign Assets over Total Assets (FATA), and Overseas Subsidiaries over Total Subsidiaries (OSTS). Gomes & Ramaswamy (1999) claim that all the three measures loaded on a single component, and that component loading were treated as weights in deriving the combined multinationality index. Each of these components of the composite index has its own merits and captures different facets of internationalization (Gomes, & Ramaswamy, 1999).

This study operationalizes internationalization using two different measures--intensity (foreign sales/ total sales) and scope (number of geographic markets) (Gaba, Pan, & Ungson, 2002). Intensity and scope are two different aspects of internationalization (Gomes, and Ramaswamy, 1999). Although a majority of studies have used intensity as a measure of internationalization, in order to capture the international diversification aspect of firms, the number of regions with sales is used as a measure of the geographic scope of internationalization. The geographic scope of internationalization is measured using the

number of regions instead of countries because Compustat and company prospectuses provide segment sales by regions (e.g., Asia, Europe). This is more relevant in the context of IPO where investors may value the geographic spread of a firm's sales. In addition, portfolio diversification theory in finance (Markowitz, 1959) posits that investors can reduce the risks of their portfolios by investing in stocks that are not correlated. Therefore, it can be argued that firms should experience lower risk at a given level of returns if they had activities in regions that are not economically integrated. Furthermore, as discussed above in the theories of internationalization, international diversification can help firms use selective advantages of multiple countries (Hitt, Hoskisson, & Kim, 1997) and provides opportunities for new and diverse ideas from a variety of markets and cultural perspectives. This suggests that international diversification leads to greater organizational learning (Miller, 1996).

Data for the variable internationalization is based on the year of the IPO. Although the IPO prospectus provides geographic sales data for three years including the year of IPO, I chose the year of IPO to be consistent with previous studies (e.g., Al-Shammari et al., 2013; Mudambi et al., 2012; Fernhaber, Gilbert, & McDougal, 2008). A firm is considered international if it reports foreign sales in at least one geographic sector. The geographic scope of internationalization ranged from one to six for this study. One means that the firm is generating revenue from at least one region of the total six regions; while six means that the firm is generating revenue from all the six regions. This range of the scope of internationalization is consistent with that of Mudambi et al. (2012). The geographic regions identified are: North America, South America, Europe, Asia, Africa, and Australia. This information is usually provided in the prospectus under "Geographic Segment". Although for the majority of the firms, sales from foreign regions were provided under the "Geographic Segment" section of the prospectus, for some firms this data is provided elsewhere. For firms with no foreign sales data under the geographic segment, keyword searches with find command for "geographic", "foreign", "international", "revenue", and "sales" were conducted. These steps helped me in identifying data provided elsewhere in the prospectus. Firms with no foreign sales are considered domestic.

4.6.2.2 International new ventures (INVs)

International new ventures are business organizations that from inception derive significant competitive advantages from the sale of outputs in multiple countries (Oviatt & McDougal, 1994). However, in reality, few of these firms are international right from inception; but most of them begin to sell their products in foreign markets within the first few years after foundation (Knight & Cavusgil, 2005). Oviatt & McDougal (1994) and Shrader, Oviatt, & McDougal (2000) defined these international new ventures / born global firms as firms that initiate international activity within six years of founding. Although, the operational definition of a new venture within the entrepreneurship literature ranges from six to eight years of age, Fernhaber, Gilbert, & McDougal, (2008), Knight & Cavusgil (2005) suggested a ten years cut off as the most reasonable conceptualization of international new ventures / born global firms. This study defines international new ventures as firms that have international sales within the first ten years of foundation. A dummy variable is created to operationalize INVs: (1 for INVs, 0, otherwise).

4.6.3 Control Variables

A number of factors can affect Post-IPO performance. Past research (Certo et al., 2009; Yang, Zimmerman, & Jiang, 2011) has identified a number of factors that affect IPO performance. Therefore, following Yang, Zimmerman, & Jiang, a number of control variables discussed below are included in the analysis.

4.6.3.1 Venture capital backing

A number of studies have found that venture capital may influence IPO firm performance (Zimmerman, 2008; Daily et al., 2003; Higgins & Gulati, 2003; Jain & Kini, 2000). Researchers have also suggested that the certification and monitoring role of the venture capitalist diminishes underpricing (Barry et al., 1990). However, recent work has found that the relationship between venture capital backing and underpricing is more complex. For example, Lerner (1994) suggested that venture capitalists try to time their IPOs such that the firm benefits from the market conditions whereas Bradley & Jordon (2002) found no difference in underpricing between IPOs with and without venture capital backing after controlling for market exchange and underwriter.

Data for venture capital backing for this study is obtained from VentureXpert database and company prospectuses. VentureXpert defines a firm as venture capital backed if one or more of the principal stockholders are representing a venture capital firm. The data obtained from VentureXpert was matched with my sample in order to identify venture capital backed firms from non-venture capital backed firms. Data for firms that did not find a match was obtained from their respective prospectuses (Lange et. al., 2001).

Control for venture capital backing is maintained with a dummy variable indicating whether a firm is backed by venture capital or not. Firms with venture capital backing are coded as “1” and “0” otherwise.

4.6.3.2 Top management team (TMT) size

Prior research suggests that TMT size may affect the performance of firms (Finkelstein & Hambrick, 1997). Team size has been used frequently as a control measure in management team related research (Sanders & Carpenters, 1998). A larger management team may allow firms to have access to more resources, knowledge, skills, financial resources, and networks compared to a smaller team size (Mudambi & Zimmerman, 2005). Deeds, Decarolis, & Coombs (1997) have found that management team size

positively influences the performance of the firm at the IPO. A larger top management team is more likely to represent a more talent-rich resource for a firm, which may result in better performance (Walter, Kroll, & Wright, 2010). Therefore, following the work of Yang, Zimmerman, & Jiang (2011) and Walter, Kroll, & Wright (2010), I control for TMT size effect by measuring team size as the number of executive officers in the IPO firm's management team. This data was collected manually for each firm from the "Officers and Directors" section of the IPO firm prospectus. The natural log of TMT size is meant as a way to control for the skewness.

4.6.3.3 Time-to-IPO

Time-To IPO is used both as a dependent variable (in the case of hypothesis 4) as well as a control variable (for all the other hypotheses). It is measured by the firm's age at the time of IPO (Chang, 2004; Shepherd & Zacharakis, 2001), and is defined as the difference between the year of the IPO and the year of the firm's foundation (Fischer & Pollock, 2004). Time-to-IPO indicates how quickly a private firm goes public by issuing first shares in the market. There is considerable variation in the types of firms that go public. Some firms are older while others may be just one-year-old. In general, it is argued that more information is available for older firms as compared to younger firms because older firms have received greater media coverage before the IPO, compared to the new firms that may have received little or no media attention. The implication is that well-established older firms are well understood by the market compared to new firms (Lowry, Officer, & Schwert, 2010). This may lead to reduced information asymmetries for older firms (Heely, Matusik, & Jain, 2007) affecting both underpricing and returns.

For this study, I calculated firm age or Time-to-IPO as the natural log of age plus one at the time of IPO. Age is measured by subtracting a firm's year of foundation from the year of IPO. Data for the founding year was obtained from VentureXpert. This data was confirmed with the respective prospectuses.

4.6.3.4 Underwriter reputation

Research has revealed that IPO performance, including underpricing, is affected by the reputation of the IPO underwriter (Carter & Manaster, 1990; Gulati & Higgins, 2003). To control for the effects of a top-tier underwriter, I am using Loughran & Ritter's (2004) version of the underwriter reputation ranking developed by Carter & Manaster (1990). Data on underwriter ranking is obtained from Ritter's (2013b) IPO database that provides underwriter ranking from 1980 to 2011. This ranking is divided into three categories: underwriters with a rank of 8 or higher are considered top-tier underwriters; underwriters with a rank of 5.0 to 7.9 are considered quality regional underwriters; underwriters with a rank of 0 to 4.9 are considered to be associated with penny stocks (Loughran & Ritter, 2004). So two dummy variables are instituted: Dummy Top Underwriters (1 if rank is 8 or above, 0 otherwise) and Dummy Medium Underwriters (1 if rank is 5 to 7.9, 0 otherwise).

4.6.3.5. Firm size

A firm's size may affect the IPO performance (LiPuma, 2011). A larger firm size may lead to lower underpricing because of the reduced information asymmetry about the viability of the firm (Heely, Matusik, & Jain, 2007). Organizations that are larger and older may be better established and thus pose less information asymmetry in terms of their valuations. Firm size is included as a control variable and is measured as the natural log of total assets at the time IPO. A number of studies have used total assets in the year of IPO as a measure of the size of the firm (e.g., Mudambi, et al, 2012; Heeley, Matusik, & Jain, 2007; Arthurs, et al., 2009). In addition, gross proceeds included as a control measure also account for the size of the firm because larger and more established firms are more likely to raise more capital.

4.6.3.6. Year of the IPO

A control for the year in which the IPO took place is also included in the form of dummy variables. Year dummies are created for all the years from 2002 to 2011 (Reference year: 2001) in order to control for differences due to the year of the IPO. Year dummies may also account for macroeconomic factors not controlled by other variables.

4.6.3.7. Industry and year dummies

To ensure that any firm-level effects are not due to industry differences, industry dummies are included. Industry dummies are created based on the Bloomberg Industrial Classification System. Industries differ in many aspects. In some industries, internationalization is more rapid and necessary as compared to other industries. Industries may also differ in terms of performance (Walters, Kroll, & Wright, 2010). Overall, in some industries the number of IPOs is higher (such as technology, energy, financial, and health care) which may affect IPO performance (Transaction Services Practice, 2011). Investors may find some industries more attractive or less attractive and so bid for the share of the IPO firms up or down accordingly.

4.6.3.8. Country and stock exchange

The Canadian economy and political system is similar in many aspects to that of the United States because both countries are considered as having common law legal systems and are considered as market-based economies (Porta, Lopez-de Silanes, & Shleifer, 1999). However, there are some important differences between the two countries, especially related to public offerings. First, Canada does not have a national security regulator whereas the United States has a central regulator called the Securities and Exchange Commission (SEC) (Industry Canada, 2014). Second, Canadian IPOs tend to be smaller than their US counterparts (Industry Canada, 2014). According to Carpentier &

Suret (2006), 85% of the Canadian IPOs are penny stocks. Third, compared to Canada, the United States has a large domestic market. The United States being the largest trading partner of Canada may be due the close proximity of the large US market. Last, there is a relative lack of venture capital in Canada compared to the US (Kroeker, 2014). As my sample includes firms both from the US and Canada, a country dummy variable is created to control for country specific effects. Country dummy is operationalized as 1 if country is US, otherwise, 0.

Ernst & Young, (2012) has shown New York Stock Exchange (NYSE), NASDAQ, and American Stock Exchange (AMEX) as the three major stock exchanges in the US in terms of IPO activity, while a PWC survey of IPOs in Canada shows TSX and TSX Venture as the largest stock exchanges in Canada in terms of the number of IPOs (PWC, 2012). As these stock exchanges have different listing requirements, dummy variables are created to control for the stock exchange specific effects. These Stock exchange dummies are operationalized as: 1 if stock exchange is Toronto, otherwise 0; 1 if stock exchange is NASDAQ, otherwise 0; and 1 if stock exchange is AMEX, otherwise 0. As no firm listed on the TSX venture exchange is included in my sample, three dummies are created. NYSE is the reference category for the exchange dummies.

I tested both the country dummy and exchange dummies in my analysis. However, there was no significant difference using one or the other. Therefore, I included country dummy in my results because only the Toronto stock exchange dummy was statistically significant. This implies that differences between the US stock exchanges were not significant.

4.6.3.9 Gross Proceeds

The underpricing literature has identified some other factors (such as gross proceeds) that may affect the underpricing. Therefore, the natural log of gross proceeds is included as a control variable. Gross proceeds are calculated as the product of offer price and share volume.

The use of all these control variables in regression models allow for evaluating the relative effect of internationalization. A brief description of all the variables and their short forms used in the text and Appendices are presented in Table 6.

Table 6: Variables Definitions

Variable	Short Form	Definition
Compound Holding Period Return	CHPR12M	Natural log of monthly returns compounded for up to 12 months post-IPO, starting with the first month closing prices.
Relative Volatility of Returns	RelVol	Calculated as the natural log of the standard deviations of post-IPO monthly returns divided by the average industry standard deviations of returns.
Underpricing	UP	The difference between the first day closing price and offer price divided by the offer price.
Intensity of Internationalization	Intensity	The ratio of foreign sales to total sales.
Scope of Internationalization	Scope	A count of the number of regions with sales outside the home country (US or Canada).
Dummy International New Ventures	DINVs	International New Venture firms are identified as firms with international sales and age less than or equal to 10. Dummy INVs is calculated as 1 if INVs, 0 otherwise.
Dummy Top Underwriter	DUTop	Underwriter with a rank of 8 or above on Carter & Manaster ranking is considered most prestigious. Dummy Top Underwriter is calculated as 1 if underwriter rank is 8 or above, 0 otherwise.
Dummy Medium Underwriter	DUMed	Underwriter with a rank (based on Carter and Manaster ranking) between 5 and 7.9 are considered as medium underwriter with respect to prestige. Dummy Medium Underwriter is calculated as 1 if Medium, 0 otherwise.
Dummy Venture Capital Backing	DVCB	A firm is considered backed by venture capital if one or more of the principal stockholders belong to a venture capital firm. It is calculated as 1 if the firm receives venture capital, 0 otherwise.
Dummy Country	DCountry	Country dummy is calculated as 1 for US firms, 0 otherwise.
Log of Gross Proceeds	LnGross Proceeds	It is the natural log of gross proceeds. Gross proceeds are calculated as the product of offer price and share volume.
Log of TMT Size	LnTMT Size	It is the natural log of the number of top management team members taken from "Officers and Directors" section of the respective prospectus.
Log of Total Assets	LnTotal Assets	It is the natural log of total assets for the year of IPO.
Log of Time-to-IPO	LnTime-to-IPO	Age is calculated as the natural log of the difference between the year of IPO and founding year.
Industry Dummies	IDIndustry	As the sample represents a total of 16 industries, 15 industry dummies are created with Technology-Software as the reference category.
Year Dummies	YDYear	Dummies for year 2002 to 2011 are created with 2001 as the reference category
Dummy Domestic	Domestic	1 if Intensity/Scope = 0, otherwise 0
Dummy Low Intensity	Low Intensity	1 if Intensity is greater than 0 and less than 50%, otherwise 0.
Dummy High Intensity	High Intensity	1 if Intensity is greater than or equal to 50%, otherwise 0.
Dummy Low Scope	Low Scope	1 if Scope is 1 to 3, otherwise 0.
Dummy High Scope	High Scope	1 if Scope is 4 to 6, otherwise 0.

The next section outlines some important descriptive statistics of the variables discussed above.

4.7 Descriptive Statistics

Table 7 provides correlations among all the variables of interest. Correlations among the predictors provide a first check on multicollinearity. The correlations among the predictors (with the exception of correlations between intensity/scope and their quadratic terms) are sufficiently low to preclude the generation of unstable beta coefficients in the regression analysis. In order to check for multicollinearity among these variables, colinearity diagnostics (Variance Inflation Factors (VIFs) and Tolerance) are included in the regression analysis for all the models (see Appendix A and B for VIFs and tolerance values). The results show that VIFs between intensity and intensity squared is approximately 13, while that between scope and scope squared is 9. The correlations between intensity and intensity squared, as well as that between scope and scope squared are intuitive. However, the standardized versions of these four variables (e.g., standardized intensity, scope, intensity squared, and scope squared) produced VIFs of less than 5, well below the threshold of 10 identified by Netter et al. (1996). In addition, Hitt, Hoskisson, & Kim (1997) also obtained a VIF value of 12.182 between international diversification and international diversification squared, is consistent to my results. Low levels of correlation between the predictors is a minor nuisance, but will still reduce the statistical power, resulting in detecting the effect less likely and the effect will be measured less accurately. However, a higher correlation is a more serious issue (Baguley, 2013).

Table 8 summarizes differences in variable means between international and domestic firms. These statistics are reported separately for all IPO firms, international firms and domestic firms. International firms are those that report foreign sales whereas domestic firms raise their revenue wholly from domestic operations. International firms are only slightly different from domestic firms in terms of compound holding period

Table 7: Correlations Among Variables

NO	Variable	1	2	3	4	5	6	7	8	9	10
1	Gross Proceeds										
2	TMT Size	0.217**									
3	Time-to-IPO	0.102*	0.076								
4	Total Assets	0.620**	0.280**	0.221**							
5	Intensity	0.037	-0.001	0.016	0.052						
6	Intensity ²	-0.016	-0.029	-0.011	0.007	0.951**					
7	Scope	0.087	0.061	0.081	0.152**	0.634**	0.466**				
8	Scope ²	0.089	0.056	0.088	0.198**	0.470**	0.346**	0.924**			
9	Underpricing	0.071	0.042	-0.100*	-0.101*	-0.059	-0.078	-0.052	-0.082		
10	Rel Volatility	-0.093*	-0.143**	-0.170**	-0.144**	0.017	-0.001	-0.046	-0.093*	-0.039	
11	CHPR12M	0.017	-0.047	0.103*	0.007	0.072	-0.106*	0.055	0.091	-0.048	-0.198**

*. Correlation is significant at the 0.05 level (2-tailed); **. Correlation is significant at the 0.01 level (2-tailed).

returns but on all other aspects, both international and domestic firms, are quite similar. Therefore, the effect of internationalization in this study may not be attributed to other factors such as size, age, TMT, and gross proceeds.

The mean TMT size for my sample is 7.16, not very different from the mean TMT size (5.80) obtained by Walters, Kroll, & Wright, (2010). Similarly, the mean age (Time-to-IPO) is 12.90 years where Tallman & Li, (1996) obtained a value of 10.43. The average intensity for this study is 23 percent whereas that obtained by Tallman & Li, (1996) is 28 percent and Al-Shammari, O'Brien & AlBusaidi, (2013) got a value of 13 percent. The average value for international scope is 1.27 regions with a range of 1 to 6 regions, is quite similar to the values obtained (e.g., Mean=1.887; Range: 1–6) by Mudambi et al. (2012).

Table 8: Differences in Variable Means Between International and Domestic Firms

Variables	All firms (N= 459)		International firms (N= 252)		Domestic firms (N= 207)	
	Mean	SD	Mean	SD	Mean	SD
LN Gross Proceeds	7.969	0.3741	8.009	0.3866	7.921	0.3531
LN TMT Size	1.905	0.3585	1.923	0.3528	1.882	0.3649
LN Time-to-IPO	2.317	0.7788	2.394	0.7206	2.224	0.8346
LN Total Assets	4.407	1.5113	4.526	1.5632	4.261	1.4359
Intensity	0.230	0.3045	0.420	0.2987	-----	-----
Intensity Squared	0.145	0.2636	0.265	0.3079	-----	-----
Scope	1.27	1.466	2.31	1.224	-----	-----
Scope Squared	3.76	6.385	6.84	7.294	-----	-----
Underpricing	0.137	0.1960	0.137	0.1953	0.137	0.1973
LN Relative Volatility	0.998	0.4749	1.013	0.4530	0.980	0.5007
LN CHPR12M	-0.144	0.6076	-0.160	0.6317	-0.124	0.5778

The mean underpricing for my sample is 13.7 percent. Jay Ritter has documented underpricing over the years. According to Professor Ritter, the average underpricing for IPOs in the United States was 13.3 percent from 2001 to 2013 (Ritter, 2014). The average value of compound holding period returns (log of CHPR12M) of -0.144 for my sample is not very different from the average return value of -0.183 obtained by Mudambi et al., (2012). The distribution of firms by international and domestic is similar to that used by LiPuma (2011). The percentage of international firms in my sample is 54.9 percent whereas the percentage of international firm in the sample of LiPuma (2011) is 52 percent.

4.8 Statistical Models

Following the work of Heely, Matusik, & Jain (2007); Walters, Kroll, & Wright (2010); Jayaraman et al. (2000); LiPuma (2011), and Mudambi et al. (2012) multiple regression is used to test the hypotheses developed in Chapter 3.

The first two hypotheses H1a and H1b, proposing a positive relationship between internationalization and post-IPO compound holding period returns (CHPR12M) are tested using equation 1a.

$$CHPR12M_i = \beta_0 + \beta_1 Intensity_i + \beta_2 Scope_i + \beta_3 - \beta_n Control\ Variables\ (DTopU, DMedU, DVCB, DCountry, lnGross\ Proceeds, LnTMT\ Size, LnTime-to-IPO, LnTotal\ Assets, Industry\ \&\ Year\ dummies) + Error_i \text{-----}(1a)$$

Where CHPR12M is one year compounded holding period returns for firm i ; Intensity and Scope are the measures of internationalization of firm i at the time of IPO. Following the work of Tallman & Li (1996), both the intensity (measured by foreign sales over total sales) and scope (measured by the number of geographic regions with sale) of internationalization are tested; Time-to-IPO is the time (in years) that firm i has taken to offer initial public offerings since foundation; DTopU represents Dummy for Top tier underwriters; DMedU, represents dummy variable for underwriter with a medium prestige; DVCB means dummy variable for venture capital backing; DCountry, represents the dummy variable for country where the firm has its headquarter; LnGross Proceeds is the natural log of the gross proceeds; LnTotal Assets is used to represents the size of the firm; TMT size $_i$ shows the size of the Top Management Team ; Industry $_i$, represents industry dummies included; Year $_i$ represents year dummies for IPO years from 2002 to 2011; Error $_i$ is the random error assumed to be normally distributed with a mean of zero and variance σ^2 ; β_i are the respective beta coefficients of the variables.

Walter, Kroll, & Wright (2010) argued that the exploration of only linear and curvilinear relationship between board composition and performance might not reveal the complexity of the relationship. They suggested that an appropriate approach would be to

create three distinct ranges of the TMT board membership percentage: 0 to 49 percent, 50 to 75 percent, and greater than 75 percent. Analogous to this argument, internationalization is a more complex phenomenon than TMT board composition. This is particularly true for a sample where half of the firms are domestic with a value of 0 for internationalization. Therefore, in order to analyze the complexity of the relationship between internationalization and firm performance, and to separate the effects of solely domestic firms, this study uses dummy categories for domestic, intensity, and scope of internationalization: low intensity, high intensity, low scope, high scope. In addition to separating the effects of domestic firms, using these categories allowed me to estimate separate slopes for each category.

Research on using dummy categories of internationalization is limited. Riahi-Belkaoui (1996) used two categories of the intensity of internationalization: high and low. The inflection point between the high and low categories was 0.44 percent of intensity of internationalization. However, the study did not provide any explanations on how the point of inflection was chosen. More recently, LiPuma (2011) examined the relationship between internationalization and post-IPO performance using four categories of the intensity of internationalization (intensity-low, intensity-moderate, intensity-significant, and intensity-high) along with a domestic category. However, LiPuma (2011) also did not provide any explanations as how these four categories are created. Rather, his CorpTech data was already categorical. In addition, his highest category of internationalization had an intensity of 25 percent or higher. This percentage (25 percent) is well below the inflection point that I am using. Further, researchers have yet to evaluate the categories of the scope of internationalization.

As the literature does not provide any guidance, part of this study is exploratory as the dummy categories created are based on the quadratic fitted line graphs using the continuous variable--internationalization. These dummy categories include domestic, low intensity, high intensity, low scope, and high scope. A more detailed description is provided in Table 6.

Hypotheses H1a and H1b are re-tested replacing the continuous variable internationalization with dummy categories in equation 1b.

$$\begin{aligned}
CHPR12M_i = & \beta_0 + \beta_1 \text{ Dummy Domestic} + \beta_2 \text{ Low Intensity}_i + \beta_3 \text{ High Intensity}_i \\
& + \beta_4 \text{ Low Scope}_i + \beta_5 \text{ High Scope}_i + \beta_6\text{-}\beta_n \text{ Control Variables (DTopU, DMedU,} \\
& \text{DVCB, DCountry, LnGross Proceeds, LnTMT Size, LnTime-to-IPO, lnTotal Assets,} \\
& \text{Industry \& Year dummies)} + \text{Error}_i\text{-----}(1b)
\end{aligned}$$

Studies on internationalization-performance relationship have found both linear (Kotabe, Srinivasan, & Aulakh, 2002; Ramirez-Aleson & Espitia-Escuer, 2001; Qian & Li, 2003; Qian, Yang, & Wang, 2003) and non-linear (Capar & Kotabe, 2003; Gomes & Ramaswamy, 1999; Lu & Beamish, 2001; Garinger, Beamish, & DaCosta, 1989; Chiang & Yu, 2005; Contractor, Kundu, & Hsu, 2003) relationships. Therefore, it is important to test for this non-linearity especially in cases where a linear relationship is not found. In order to test for the non-linear relationship between internationalization and stock return performance, following the work of Contractor, Kundu, & Hsu (2003) and Hitt, Hoskisson, & Kim (1997), a quadratic term of the intensity and scope of internationalization is included in model 1a.

To understand the relationship between volatility of returns (risk) and internationalization, hypotheses 2a and 2b, proposing a negative relationship between internationalization and relative volatility of post-IPO returns are tested using equation 2a. Similar to CHPR12M, the non-linearity between internationalization and relative volatility is evaluated by adding quadratic terms of intensity and scope of internationalization in equation 2a.

$$\begin{aligned}
\text{Relative Volatility}_i = & \beta_0 + \beta_1 \text{ Intensity}_i + \beta_2 \text{ Scope}_i + \beta_3\text{-}\beta_n \text{ Control Variables} \\
& \text{(DTopU, DMedU, DVCB, DCountry, lnGross Proceeds, LnTMT Size, LnTime-to-} \\
& \text{IPO, lnTotal Assets, Industry \& Year dummies)} + \text{Error}_i \text{-----}(2a)
\end{aligned}$$

Where Relative Volatility_i is the relative volatility for firm_i. The rest of the variables included in model 2 are the exactly the same that are described above with respect to equation 1a.

Similar to CHPR12M, the relationship between relative volatility and internationalization is also tested using dummies of domestic and internationalization.

Hypotheses H2a and H2b are re-tested replacing the continuous measure of internationalization with dummy categories in equation 2b.

$$\begin{aligned} \text{Relative Volatility}_i = & \beta_0 + \beta_1 \text{ Dummy Domestic} + \beta_2 \text{ Low Intensity}_i + \beta_3 \text{ High} \\ & \text{Intensity}_i + \beta_4 \text{ Low Scope}_i + \beta_5 \text{ High Scope}_i + \beta_6\text{-}\beta_n \text{ Control Variables (DTopU,} \\ & \text{DMedU, DVCB, DCountry, LnGross Proceeds, LnTMT Size, LnTime-to-IPO,} \\ & \text{LnTotal Assets, Industry \& Year dummies)} + \text{Error}_i \text{-----}(2b) \end{aligned}$$

Likewise, with respect to underpricing, hypotheses H3a and H3b are evaluated using equation 3a and adding the quadratic terms of intensity and scope in equation 3a tests hypotheses H3c and H3d.

$$\begin{aligned} \text{Underpricing}_i = & \beta_0 + \beta_1 \text{ Intensity}_i + \beta_2 \text{ Scope}_i + \beta_3\text{-}\beta_n \text{ Control Variables (DTopU,} \\ & \text{DMedU, DVCB, DCountry, LnGross Proceeds, LnTMT Size, LnTime-to-IPO,} \\ & \text{LnTotal Assets, Industry \& Year dummies)} + \text{Error}_i \text{-----}(3a) \end{aligned}$$

Where underpricing_i represents the underpricing of firm i, measured by the difference between the closing price on the first trading day and the offer price, as a percentage of the offer price.

Just like the above two dependent variables (CHPR12M and relative volatility) the continuous variable internationalization is replaced with the dummy categories of intensity and scope of internationalization (equation 3b) to test the linear hypotheses H3a and H3b.

$$\begin{aligned} \text{Underpricing}_i = & \beta_0 + \beta_1 \text{ Dummy Domestic} + \beta_2 \text{ Low Intensity}_i + \beta_3 \text{ High Intensity}_i \\ & + \beta_4 \text{ Low Scope}_i + \beta_5 \text{ High Scope}_i + \beta_6\text{-}\beta_n \text{ Control Variables (DTopU, DMedU,} \\ & \text{DVCB, DCountry, LnGross Proceeds, LnTMT Size, LnTime-to-IPO, LnTotal Assets,} \\ & \text{Industry \& Year dummies)} + \text{Error}_i \text{-----}(3b) \end{aligned}$$

The next hypothesis proposes that international new venture firms go public earlier than other internationalizing firms. This hypothesis is investigated using equation 4. In this model, the log of Time-to-IPO is used as a dependent variable, whereas DINV_i is used as an independent dummy variable. Control variables are the same as used in equation 1a to equation 3b with the exception of log of Time-to-IPO which is used as a dependent variable.

$$\text{Log of Time-to-IPO}_i = \beta_0 + \beta_1 \text{DINV}_i + \beta_2 - \beta_n \text{ Control Variables (DTopU, DMedU, DVCB, DCountry, LnGross Proceeds, LnTMT Size, LnTotal Assets, Industry \& Year dummies)} + \text{Error}_i \text{-----}(4)$$

Where DINV_i represents a dummy variable for international new venture firms (1 if firm is classified as INV, 0 otherwise).

4.9 Issues of Endogeneity

Empirical research in international business is difficult because of the unaffordability of ideal settings allowing for conducting a randomized controlled experiment. Therefore, in the absence of randomized trials, researchers focus on observational data and cross-sectional regressions (Angrist & Krueger, 2001). One of the major issues in this type of approach is endogeneity, which may result in inconsistent ordinary least square estimates (Reeb, Sakakibara, & Mahmood, 2012). With respect to endogeneity, there are at least three main sources of problems, including omitted variable bias, reverse causality, and measurement error (Robert & Whited, 2012). Reverse causality is not an issue for this study due to the event study methodology where the independent variables are recorded before any stock activity happened and stock returns are calculated for a short period (12 months) after the IPO.

To mitigate the effects of endogeneity, this study uses the control variable approach. Theoretical predictions in international business are often direct and straightforward, suggesting that internationalization lead to some kind of performance (Reeb, Sakakibara, & Mahmood, 2012). This research, drawing support from the integration of theories of internationalization with theories of finance and past empirical studies, follows this direct and straightforward approach. However, other factors may have an effect on the performance. Control variables are included in the analysis in such situations. This approach, although not a perfect solution for endogeneity, adopted for this study, is the best that I can do given the type of data I used. Although this approach is not

immune to criticisms, one advantage of this approach is that it is simple to use and easy to interpret and verify.

However, researchers have used other approaches to deal with the issue of endogeneity. These approaches are briefly discussed below:

Fixed effects regression

Using fixed effects regression is another approach to deal with endogeneity (Wooldridge, 2001). This approach essentially includes creating a dummy variable for each firm or individual and relies on changes of the causal variable within a given firm or individual. However, fixed effects regression is suitable for panel data (Nichols, 2009) and thus is not appropriate for my analysis because my data is cross-sectional.

Simultaneous equations

In this approach, multiple equations are created containing the dependent variable of interest and separate equations estimating the potentially endogenous regressors. Estimating all of these equations simultaneously reveal the distinct relationship between the variables of interest. However, the disadvantage of this approach is that a single misspecified equation can bias all the regressions (Hayashi, 2000).

Instrumental variable approach

This approach seek to find an exogenous proxy variable for the relevant independent variable of interest (Larcker & Rusticus, 2010). The main idea here is finding a variable called instrumental variable, which is highly correlated with the independent variable of interest but does not affect the dependent variable (Wintoki, Linck, & Netter, 2012). In practice, it is very difficult to find and utilize appropriate instrumental variables (Adams, Hermalin, & Weisbach, 2008).

4.10 Summary

This chapter provided an in-depth discussion on the methodology used to test the research hypotheses of this study. In particular, a detail discussion on sample selection process, data cleaning and missing data, an argument that the sample approximates the population of IPOs, brief descriptions of the different sources from which data is obtained, some basic descriptive statistics about the sample, explanations of each variables used in this study, statistical models used for analysis, and the issue of endogeneity related to this research are covered.

The next chapter presents the findings of this research.

Chapter 5

Findings

5.1 Introduction

The purpose of this chapter is to presents the results of the regression models used to test the hypotheses developed in Chapter 3. In this Chapter, I describe only the technical results of the models. An in-depth discussion of the implications of these results, how these results are related to the theoretical model used for development of the hypotheses and how these findings are related to the previous work is reserved for the Discussion Chapter of this dissertation.

Internationalization is examined both linearly and non-linearly with three measures of post-IPO performance: compound holding period returns, relative volatility of returns, and underpricing. In addition, two specifications of the regression model are used to test the hypotheses developed in this research. In the first model, the relationship between internationalization and post-IPO performance is evaluated using internationalization as a continuous variable that includes domestic firms. Each of the three dependent variables of performance is evaluated both linearly and non-linearly with the intensity and scope of internationalization. In the second specification, the variable internationalization is converted into three dummy categories: domestic, low internationalization, and high internationalization. Greater details about the use of these two specifications are provided below and in Chapter 3.

5.2 Hypothesis Testing

In this research, I examined the impact of internationalization at the time of IPO on post-IPO performance of firms. Firm performance was measured using three variables: compound holding period returns, relative volatility of returns, and underpricing. In addition, I also tested the proposition that international new venture firms go public earlier than other traditionally internationalizing firms. Therefore, thirteen hypotheses are tested:

Table 9: Support (S) / No Support (NS) for Hypothesis

Hypothesis	Model	S	NS
<i>H1a: Intensity is positively associated with Comound Holding Period Returns.</i>	Model 2 (Table 10, 11)		NS
<i>H1b: Scope is positively associated with Comound Holding Period Returns..</i>	Model 3 (Table 10, 11)	S ¹	
<i>H1c: The relationship between Intensity and Comound Holding Period Returns is non-linear, with the slope initially negative up to a certain percentage of Intensity but positive thereafter.</i>	Model 4 (Table 10,)	N	S
<i>H1d: The relationship between Scope and Comound Holding Period Returns is non-linear, with the slope initially negative up to a certain level of Scope but positive thereafter.</i>	Model 5 (Table 10)	S	
<i>H2a: Intensity is negatively associated with Relative Volatility..</i>	Model 2 (Table 12, 13)		NS
<i>H2b: Scope is negatively associated with Relative Volatility.</i>	Model 3 (Table 12, 13)		NS
<i>H2c: The relationship between Intensity and relative volatility is non-linear, with the slope initially positive up to a certain percentage of Intensity but negative thereafter.</i>	Model 4 (Table 12)		NS
<i>H2d: The relationship between Scope and relative volatility is non-linear, with the slope initially positive up to a certain level of Scope but negative thereafter.</i>	Model 5 (Table 12)	S	
<i>H3a: Intensity is negatively associated with Underpricing.</i>	Model 2 (Table 14, 15)	S ²	
<i>H3b: Scope is negatively associated with Underpricing.</i>	Model 3 (Table 14, 15)	S ¹	
<i>H3c: The relationship between Intensity and underpricing is non-linear, with the slope initially positive up to a certain percentage of Intensity but negative thereafter.</i>	Model 4 (Table 14)		NS
<i>H3d: The relationship between Scope and underpricing is non-linear, with the slope initially positive up to a certain level of Scope but negative thereafter.</i>	Model 5 (Table 14)		NS
<i>H4: INVs go public earlier than traditional Internationalizing firms.</i>	Model 2 (Table 16)	S	

S: Supported; NS: Not Supported; S¹: supported at High Scope ; S²: Supported at High Intensity.

four hypotheses with respect to each of the three dependent variables (CHRP12M, relative volatility and underpricing) and one with respect to the dependent variable Time-to-IPO. Table 9 provides a summary of the results of these hypotheses.

5.2.1 Internationalization and comound holding period returns

The first two hypotheses focus on the linear relationship between internationalization and stock return performance while the next two hypotheses argue for a non-linear relationship between internationalization and CHPR12M. Accordingly, the first hypothesis (H1a) formally states: *Post-IPO stock return performance varies positively with the Intensity of Internationalization*. Model 2 of Table 10 presents results for this hypothesis. Results did not support H1a because intensity (Intensity: -0.110; $P > .10$) is not statistically significant. The second hypothesis (H1b) in the first set formally states: *Post-IPO stock return performance varies positively with the Scope of Internationalization (number of geographic regions)*. The results for this hypothesis are provided in Table 10 model 3. This hypothesis also did not get support.

As the linear relationship between internationalization and compound holding period return is not statistically significant, it seems that this relationship is more complex than a simple linear one. This argument is supported by the previous studies that found significant quadratic (Capar & Kotabe (2003); Gomes & Ramaswamy (1999); Garinger, Beamish & DaCosta (1989) and cubic (Chiang & Yu, 2005; Contractor, Kundu & Hsu, 2003) models relating internationalization to firm performance. However, all of these studies have used accounting measures of performance. None of the previous studies have tested this non-linearity in the context of IPO that includes the assessments of external investors. Addressing this gap in the literature, my second set of hypotheses tests this non-linearity between internationalization and compound holding period returns. The first hypothesis in this second set (H1c) states: *The relationship between Intensity and Post-IPO CHPR12M is non-linear, with the slope initially negative up to a certain percentage of Intensity but positive thereafter*. Model 4 in Table 10 presents results for this hypothesis. This hypothesis is not supported although the quadratic term (Intensity square:

-0.739, $P < .05$) is statistically significant because the direction of the relationship is opposite to that proposed in the hypothesis. In addition, the fit of the quadratic model (Adjusted R Square=18.5%) is slightly better than the fit of the linear model (Adjusted R Square=17.9%). In order to better depict this non-linearity, a fitted line graph (Figure 8) between intensity and CHPR12M using quadratic model in SPSS is constructed. This graph shows that the relationship is initially positive up to around 50 percent of the intensity, but beyond that it declines. In addition, the graph also displays that the initial increase is lower compared to the decrease after around the middle.

Table 10: Regression Results for Dependent Variable CHPR12M

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Constant	-0.134	-0.100	-0.169	-0.022	-0.141
Dummy Top Underwriter	0.568***	0.563***	0.557***	0.556***	0.568***
Dummy Med Underwriter	0.151*	0.145*	0.152*	0.147*	0.153*
Dummy Venture Capital Backing	-0.067	-0.066	-0.069	-0.066	-0.065
Dummy Country	0.073	0.013	0.097	-0.061	0.071
Log of Gross Proceeds	-0.113	-0.107	-0.113	-0.111	-0.109
Log of TMT Size	0.007	0.008	0.005	0.009	0.004
Log of Time-to-IPO	0.062*	0.067*	0.058	0.063*	0.065*
Log of Total Assets	-0.007	-0.007	-0.011	-0.012	-0.013
Intensity		-0.110		0.480	
Intensity Squared				-0.739** (-.522)	
Scope			0.026		-0.055
Scope Squared					0.019* (0.019)
R ²	23.8%	24.0%	24.1%	24.8%	24.6%
R ² Adjusted	17.9%	17.9%	18.1%	18.5%	18.4%
F	4.018***	3.933***	3.956***	3.975***	3.942***

* $P < .10$, ** $P < .05$, *** $P < .01$

Industry and Year dummies are included in all the models but regression coefficients are not shown. For all the models, $N=459$. Parentheses include values back-transformed.

Hitt, Hoskisson, & Kim (1997) also argued for the initial positive slope at low to moderate level of international diversification after which the cost of managing further internationalization outweighs the benefits. Garinger, Beamish, & DaCosta (1989) also suggested a critical threshold for international diversification after which the cost of internationalization exceeds the benefits of further internationalization.

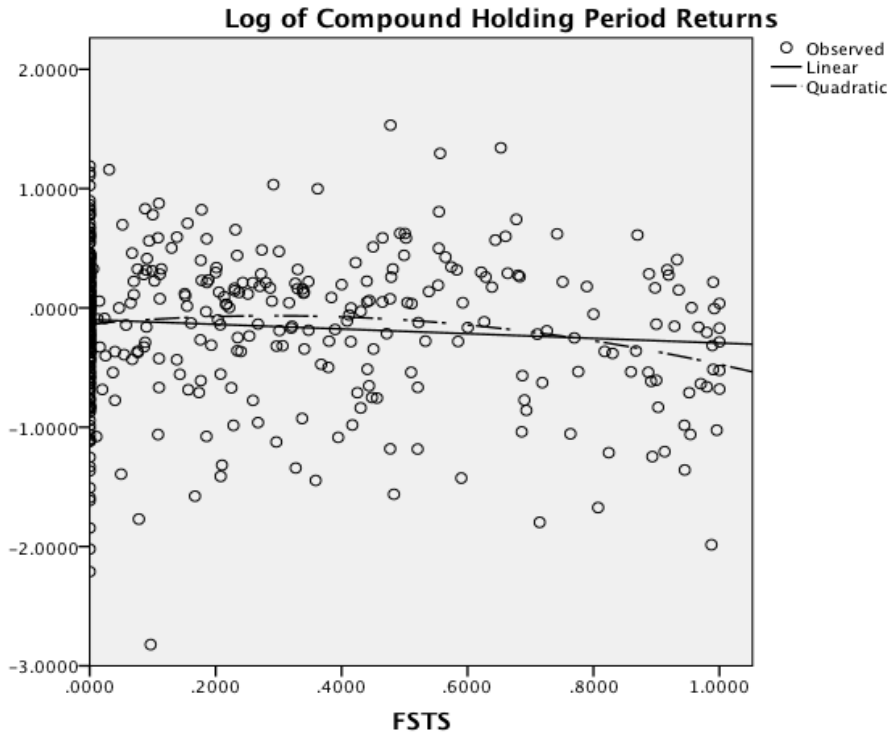


Figure 8: Quadratic Fitted Line Graph between Intensity and CHPR12M

The second hypothesis (H1d) within the second set of hypotheses relating scope with CHPR12M using quadratic model states: *The relationship between Scope and Post-IPO CHPR12M is non-linear, with the slope initially negative up to a certain level of Scope but positive thereafter.* This hypothesis is supported (Scope squared: 0.019; $P < .10$). In addition to a significant quadratic term, the overall fit of the quadratic model (Adjusted R square: 18.4%) is better compared to the linear model (Adjusted R square: 18.1%). In order to better portray this relationship, a quadratic fitted line plot between scope and CHPR12M (Figure 9) is created. The graph shows that initially CHPR12M decreases up to three regions of scope, after which the relationship is positive. In addition, the initial decrease is not very pronounced compared to the increase after three regions of scope. This result is consistent with the U-shaped relationship between internationalization and performance identified by previous studies (Capar & Kotabe, 2003; Gomes & Ramaswamy, 1999; Lu & Beamish, 2001). Contractor et al. (2003) have attributed this initial drop in performance to the liability of foreignness, initial learning costs, and insufficient economies of scale. This initial drop in the performance at low level

of scope is also implicit in the Uppsala School of internationalization theory (Johanson & Vahlne, 1977). This theory describes that firms initially seek only familiar and similar markets with close proximity. However, in the context of IPO, this initial drop in stock performance can be attributed to the fact that low level of international scope, especially into similar markets may not allow firms to fully appropriate the benefits of international expansion. Therefore, this low level of international scope might provide a different signal (negative) to the external investors compared to higher level (positive signal).

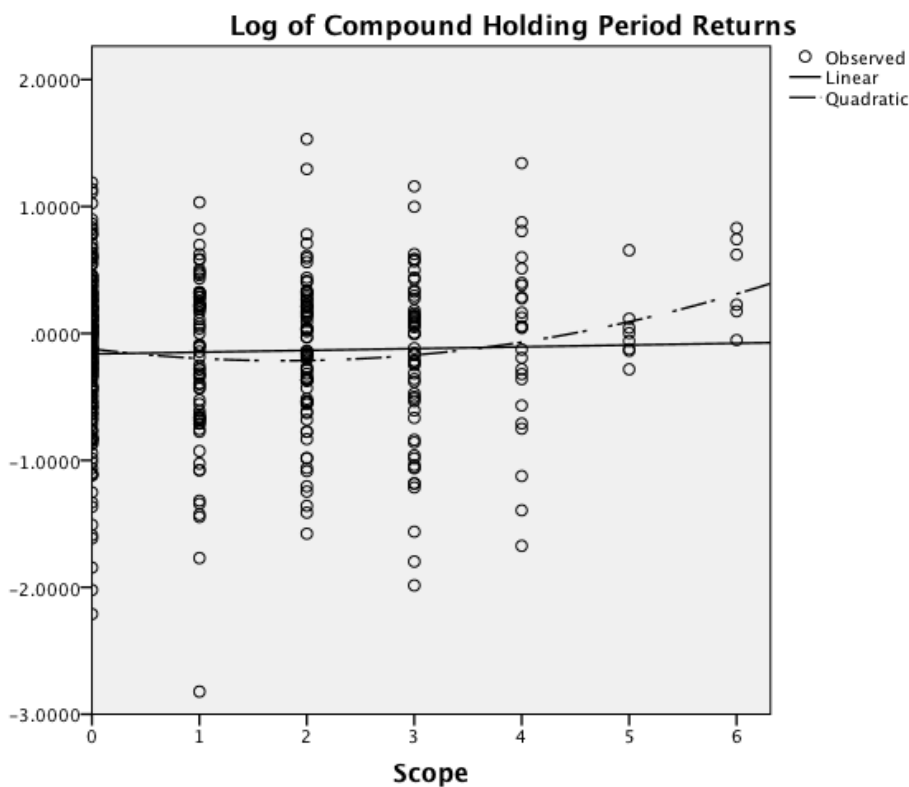


Figure 9: Quadratic Fitted Line Graph between Scope and CHPR12M

In the above regression formulations, internationalization is measured as a continuous variable. This formulation is consistent with studies of Morck & Yeung (1991), Mudambi et al. (2012) and Fernhaber (2013). However, LiPuma (2011) used a formulation in which he created dummy categories: Domestic, Intensity-low, Intensity-moderate, Intensity-significant and Intensity-high. This formulation evaluates the effects of the domestic firms separately. As nearly half of the firms in my sample are domestic, in

order to separate the effects of these domestic firms, I created three dummy categories: Domestic, Low & High Intensity, and Low and High Scope.

Equation 1b is re-estimated substituting the continuous measure of internationalization with dummies of both the intensity and scope of internationalization. The results are displayed in Table 11. The variable domestic is not statistically significant showing that domestic firms do not influence CHPR12M. Similarly, both the categories of intensity are statistically insignificant. The negative relationship between High Intensity and Comound Holding Period Returns is consistent with the results obtained by LiPuma (2011) for high-Intensity. He found significant and negative relationship between high-Intensity (of Intensity) with IPO valuations. The most interesting result is the significant and positive relationship between high scope and compound holding period returns, confirming hypothesis H1b. This result is consistent with Mudambi et al. (2012) but is opposite to that of LiPuma (2011). The reason may be that Mudambi et al. measured internationalization using geographic scope whereas LiPuma used the intensity of internationalization. In addition, the different signs of high and low scope also confirm the significant non-linear relationship between Scope and Comound Holding Period Returns obtained in the previous model.

Overall, two important conclusions can be inferred from the above results. First, higher scope of internationalization is positively associated with compound holding period returns. Second, the relationship between internationalization and compound holding period returns is non-linear.

Table 11: Regression Results for CHPRI2M with Dummy Categories

Variables	Model 1	Model 2	Model 3	Model 4
Constant	-0.134	-0.140	-0.111	-0.167
Dummy Top Underwriter	0.568***	0.569***	0.567***	0.561***
Dummy Med Underwriter	0.151*	0.151*	0.149*	0.149*
Dummy Venture Capital Backing	-0.067	-0.066	-0.068	-0.060
Dummy Country	0.073	0.071	0.042	0.062
Log of Gross Proceeds	-0.113	-0.112	-0.111	-0.107
Log of TMT Size	0.007	0.007	0.007	0.011
Log of Time-to-IPO	0.062*	0.062*	0.063*	0.069*
Log of Total Assets	-0.007	-0.007	-0.007	-0.012
Domestic		0.007		
Low Intensity			0.007	
High Intensity			-0.043	
Low Scope				-0.041
High Scope				0.182* (0.199)
R ²	23.8%	23.8%	23.8%	24.7%
R ² Adjusted	17.9%	17.7%	17.5%	18.4%
F	4.018***	3.891***	3.784***	3.956***

* P < .10, ** P < .05, *** P < .01

Industry and Year dummies are included in all the models but regression coefficients are not shown. For all the models, n=459. Parenthesis includes values back-transformed. Domestic is the reference category for both low and high intensity and scope dummies.

5.2.2 Internationalization and relative volatility of stock returns

Volatility is the most basic statistical measure of risk indicating the variability in returns (Kaur 2004). Measuring volatility (risk) by the standard deviation of the returns is an accepted practice in diversification research (Kim et al., 1993). Following the work of Mazzucato & Tancioni, (2012) volatility is measured relative to the industry average because firms compete with other firms in their own industry and thus their growth potential shall be valued in comparison to their immediate competitors. Therefore, volatility (relative volatility) is calculated as the natural log ratio between the standard deviations of a firm's returns and standard deviations of average industry returns.

The first two hypotheses (H2a and H2b) propose a linear relationship between internationalization (measured by intensity and scope) and relative volatility of returns. Hypothesis H2a states: *Post-IPO stock return volatility varies negatively with Intensity.*

Model 2 of Table 12 presents results for this hypothesis. Intensity (Intensity: 0.176; $P < 0.05$) is positively and significantly related to relative volatility. Hypothesis H2a is not supported because the direction of the relationship is opposite to that proposed in the hypothesis. The second hypothesis (H2b) relates relative volatility to the scope of internationalization. This hypothesis (H2b) formally states: *Post-IPO stock return volatility varies negatively with Scope*. This hypothesis is also not supported because the scope of internationalization (Scope: 0.011; $P > .10$) is not statistically significant (Table 12: Model 3).

Finding no support for the above two hypotheses may signal to a more complex relationship between internationalization and relative volatility. This conclusion is also supported by the previous studies identifying a non-linear relationship between internationalization and performance, although none of the previous studies have tested the relationship between internationalization and volatility of stock returns in the context of IPO.

In order to examine this non-linearity between internationalization and relative volatility of returns, two hypotheses are tested. The addition of a quadratic term of intensity to model 3 tests the first hypothesis (H2c). This hypothesis formally states: *The relationship between Intensity and relative volatility is non-linear, with the slope initially positive up to a certain percentage of Intensity but negative thereafter*.

Results for hypothesis H2c are provided in Table 12, Model 4. Linear term is statistically significant (Intensity: 0.449; $P < 0.10$) but positive while Intensity squared is insignificant. Therefore, Hypothesis H2c is not supported.

Adding a quadratic term of scope to model 2 tests the second hypothesis (H2d). This hypothesis states: *The relationship between Scope and Relative Volatility is non-linear, with the slope initially positive up to a certain level of Scope but negative thereafter*. The results for this hypothesis are presented in Table 12 under model 5. Hypothesis H2d is supported as both the linear (Scope: 0.100; $P < 0.05$) and quadratic (Scope squared: -0.021; $P < 0.05$) terms are statistically significant. To depict the shape of this relationship, a linear and quadratic fitted line graph between scope and relative

volatility is created in the form of Figure 10. It is clear from Figure 10 that relative volatility initially increases up to three regions of scope but declines thereafter with

Table 12: Regression Results for Relative Volatility

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Constant	2.824***	2.77***	2.81***	2.81***	2.78***
Dummy Top Underwriter	-0.086	-0.078	-0.090	-0.082	-0.102
Dummy Med Underwriter	-0.059	-0.050	-0.059	-0.049	-0.060
Dummy VCB	-0.034	-0.036	-0.035	-0.036	-0.040
Dummy Country	0.281***	0.377***	0.291***	0.343***	0.319***
Log of Gross Proceeds	-0.112	-0.121	-0.112	-0.123	-0.115
Log of TMT Size	-0.152**	-0.153**	-0.153**	-0.152**	-0.152**
Log of Time-to-IPO	-0.046	-0.054*	-0.048*	-0.055*	-0.055*
Log of Total Assets	-0.044*	-0.044*	-0.045*	-0.046*	-0.042*
Intensity		0.176** (0.192)		0.449*	
Intensity Squared				-0.342	
Scope			0.011		0.100** (0.105)
Scope Squared					-0.021** (-0.020)
R ²	23.9%	24.7%	24.0%	25.0%	25.0%
R ² Adjusted	18%	18.7%	17.9%	18.8%	18.8%
F	4.047***	4.099***	3.93***	4.031***	4.028***

* P < .10, ** P < .05, *** P < .01

Industry and Year dummies are included in all the models but regression coefficients are not shown. For all the models, n=459. Parenthesis includes values back-transformed.

increasing scope. This result can be explained by saying that it is the higher level of geographic scope that may help a firm realize the benefits of diversification, whereas a low level may not provide these benefits. In the context of IPO, external investors may not see the low level of internationalization as sufficient for reaping the full benefits of international expansion. In other words, a low level of internationalization may not provide a positive signal to investors, leading to a small increase in volatility of returns. It is the higher level of diversification, particularly geographic scope beyond three regions that signals positive returns to external investors.

Similar to CHPR12M, relative volatility was regressed with domestic, intensity (Low Intensity; High Intensity) and scope (Low Scope; High Scope) dummies using equation 2b. The results of these new formulations are presented in Table 13. The domestic dummy is statistically significant and negatively related to relative volatility (-

0.097). This implies that, on average, domestic firms have lower relative volatility than internationalized firms. This result is opposite to what I proposed in my hypotheses.

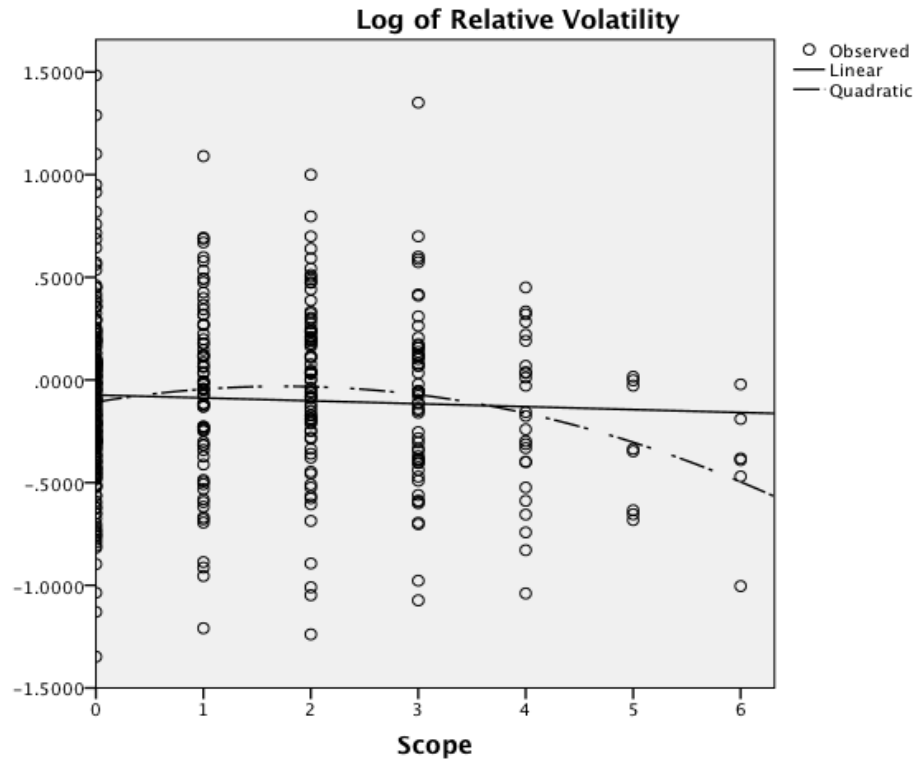


Figure 10: Quadratic Fitted Line Graph between Scope and Relative Volatility

In addition, low intensity and low scope are statistically significant, but positively related to relative volatility. Although high scope is not statistically significant, the negative sign provide support to the direction I proposed in my hypothesis H2b.

The overall conclusion from evaluating internationalization with respect to relative volatility is that domestic firms have lower relative volatility compared to internationalized firms. This is particularly true in the case of intensity of internationalization. However, the relationship between scope of internationalization and relative volatility turns negative at a higher scope. The statistically significant, but positive, relationship between relative volatility for both intensity and low scope also

provide support to the conclusion that internationalized firms have a higher relative volatility compared to domestic firms. Therefore, both the linear hypotheses H2a and H2b are not supported. The quadratic model for scope is statistically significant and negative, confirms hypothesis H2d. However, hypothesis H2c is not supported as quadratic term of intensity is not significant.

Table 13: Regression Results for Relative Volatility with Dummy Categories

Variables	Model 1	Model 2	Model 3	Model 4
Constant	2.824	2.910***	2.806***	2.834***
Dummy Top Underwriter	-0.086	-0.097	-0.097	-0.092
Dummy Med Underwriter	-0.059	-0.059	-0.058	-0.058
Dummy Venture Capital Backing	-0.034	-0.037	-0.037	-0.041
Dummy Country	0.281***	0.313***	0.322***	0.319***
Log of Gross Proceeds	-0.112	-0.119	-0.119	-0.123
Log of TMT Size	-0.152**	0.152**	0-.152**	-0.155**
Log of Time-to-IPO	-0.046	-0.053*	-0.054*	-0.057**
Log of Total Assets	-0.044*	-0.045*	-0.045*	-0.042*
Domestic		-0.097** (-0.092)		
Low Intensity			0.093* (0.097)	
High Intensity			0.108	
Low Scope				0.119** (0.126)
High Scope				-0.025
R ²	23.9%	24.7%	24.7%	25.3%
R ² Adjusted	18%	18.7%	18.5%	19.1%
F	4.047***	4.089***	3.965***	4.092***

* P< .10, ** P< .05, *** P< .01

Industry and Year dummies are included in all the models but regression coefficients are not shown. For all the models, n=459. Parenthesis includes values back-transformed. Domestic is the reference category for both low and high intensity and scope dummies.

5.2.3 Internationalization and underpricing

The first hypothesis (H3a) states: *underpricing varies negatively with Intensity*. Results for this hypothesis are provided under Model 2 of Table 14. This hypothesis is not supported because intensity (Intensity: -0.052; P >.10) is not statistically significant.

The second hypothesis (H3b) that relates the scope of internationalization (scope) with underpricing can be formally stated as *underpricing varies negatively with scope*. Results for this hypothesis, presented under model 3 of Table 14, show that scope is negative and statistically significant (Scope: -0.014; P <0.05). Therefore, hypothesis H3b is supported and it is concluded that higher scope will lead to lower underpricing. It can be concluded from the results of the above two hypotheses, that it is the scope of internationalization (not the intensity of internationalization) that provide a positive signal to investors and thus reduces the information disparity with respect to the offerings.

Table 14: Regression Results for Underpricing

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Constant	-1.424***	-1.408***	-1.406***	-1.410***	-1.407***
Dummy Top Underwriter	0.057	0.055	0.063	0.055	0.063
Dummy Med Underwriter	0.019	0.016	0.019	0.016	0.019
Dummy VCB	0.075***	0.076***	0.076***	0.076***	0.076***
Dummy Country	0.089**	0.061	0.076*	0.063	0.077*
Log of Gross Proceeds	0.198***	0.201***	0.198***	0.201***	0.198***
Log of TMT Size	0.008	0.008	0.009	0.008	0.009
Log of Time-to-IPO	0.005	0.007	0.007	0.008	0.007
Log of Total Assets	-0.045***	-0.045***	-0.043***	-0.045***	-0.043***
Intensity		-0.052		-0.069	
Intensity Squared				0.021	
Scope			-0.014**		-0.015
Scope Squared					-0.0007
R ²	26.4%	26.9%	27.3%	26.9%	27.3%
R ² Adjusted	20.7%	21.0%	21.5%	20.8%	21.3%
F	4.631***	4.584***	4.691***	4.444***	4.546***

* P < .10, ** P < .05, *** P < .01

Industry and Year dummies are included in all the models but regression coefficients are not shown. For all the models, n=459.

However, just like the previous two dependent variables (CHPR12M and relative volatility), the relationship between underpricing and internationalization may also be more complex than simply linear. Therefore, hypotheses H3c and H3d evaluate the internationalization-underpricing relationship using a quadratic model.

Hypothesis H3c relating underpricing with the square of intensity states: *The relationship between Intensity and underpricing is non-linear, with the slope initially positive up to a certain percentage of Intensity but negative thereafter*. Results under Model 4 of Table 14 show that this hypothesis is not supported, as both intensity and

intensity squared are not statistically significant. To better depict the shape of this relationship, a quadratic fitted line graph between intensity and underpricing is created (Figure 11). Figure 11 demonstrates that underpricing initial increases up to 50 percent of intensity and then decreases with further increase in intensity. However, both the increase and decrease are not very prominent, which may have resulted in the insignificant relationship between intensity and underpricing.

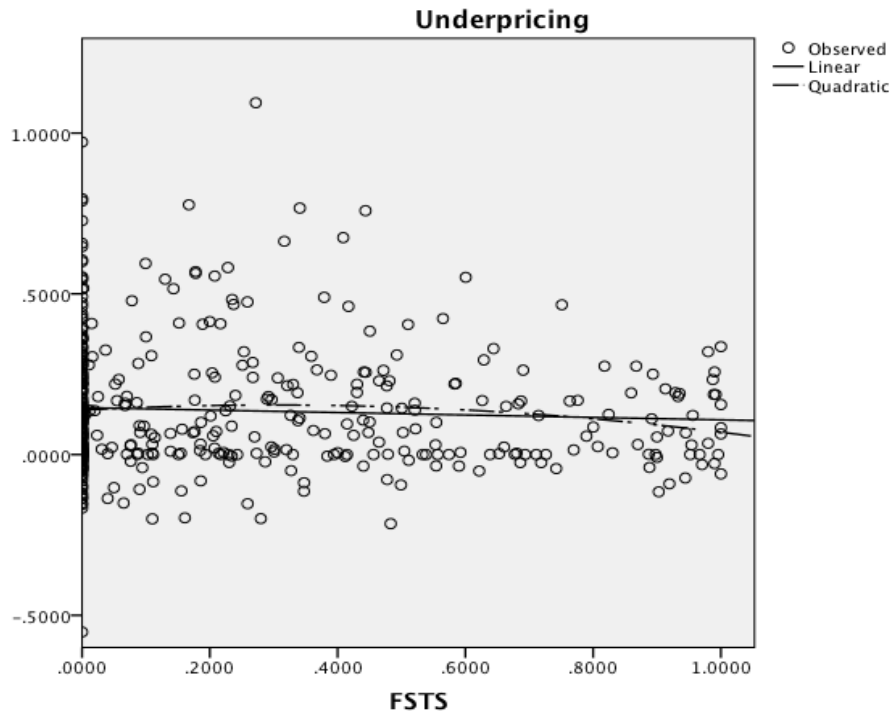


Figure 11: Quadratic Fitted Line Graph between Intensity and Underpricing

The next hypothesis (H3d) relating the square of scope with underpricing formally states: *The relationship between Scope and underpricing is non-linear, with the slope initially positive up to a certain level of Scope but negative thereafter.* Results for this hypothesis are presented under model 5 of Table 14. This hypothesis is also not supported because scope squared (Scope squared: -0.0007; $P > .10$) is statistically insignificant. The fit of the quadratic model (R Square: 21.3%) is also not better than the fit of the linear model (R Square: 21.5%). To portray this relationship, a quadratic fitted line graph between scope and underpricing (Figure 12) is created. It can be concluded from Figure 12 that this relationship is also not uni-directional, but underpricing increases up to three

regions of scope and then decreases as the level of scope increases. However, the initial increase is not as prominent as the later decrease.

Similar to the two other dependent variables (CHPR12M and relative volatility), underpricing is estimated with dummy categories of domestic, Low Intensity, High Intensity, Low Scope and High Scope using equation 3b. The results are presented in Table 15. Domestic dummy being positive and statistically significant shows that domestic firms compared to internationalized firms have a higher underpricing. The negative signs of all the four internationalization dummies suggest that internationalization leads to lower underpricing. An interesting result of this new formulation is that both intensity and scope at higher level have statistically significant and negative relationship with underpricing, thereby supporting both the linear hypotheses H3a and H3b.

Table 15: Regression Results for Underpricing with Dummy Categories

Variables	Model 1	Model 2	Model 3	Model 4
Constant	-1.424***	-1.453***	-1.407***	-1.413***
Dummy Top Underwriter	0.057	0.061	0.060	0.063
Dummy Med Underwriter	0.019	0.019	0.018	0.019
Dummy Venture Capital Backing	0.075***	0.076***	0.075***	0.075***
Dummy Country	0.089**	0.078*	0.060	0.080*
Log of Gross Proceeds	0.198***	0.201***	0.201***	0.199***
Log of TMT Size	0.008	0.008	0.008	0.007
Log of Time-to-IPO	0.005	0.008	0.008	0.006
Log of Total Assets	-0.045***	-0.044***	-0.045***	-0.043***
Domestic		0.033*		
Low Intensity			-0.024	
High Intensity			-0.055**	
Low Scope				-0.026
High Scope				-0.075**
R ²	26.4%	27.0%	27.2%	27.4%
R ² Adjusted	20.7%	21.1%	21.2%	21.4%
F	4.631***	4.608***	4.518***	4.560***

P < .10, ** P < .05, *** P < .01

Industry and Year dummies are included in all the models but regression coefficients are not shown.

For all the models, n=459. Domestic is the reference category for both low and high intensity and scope dummies.

The overall conclusion from the above results is that internationalization (both intensity and scope) at higher levels is statistically significant and negatively related to

underpricing. This implies that internationalization at higher levels provides a positive signal and thereby reduces the underpricing. However, at lower levels, the relationship is not statistically significant. Although the fitted line graphs (10 and 11) show some non-linearity between internationalization and underpricing, this non-linearity seems to be due to the presence of domestic firms. After using dummy categories to separate the effects of domestic firms, both low and high internationalization are negatively related to underpricing whereas the domestic dummy is positive and statistically significant.

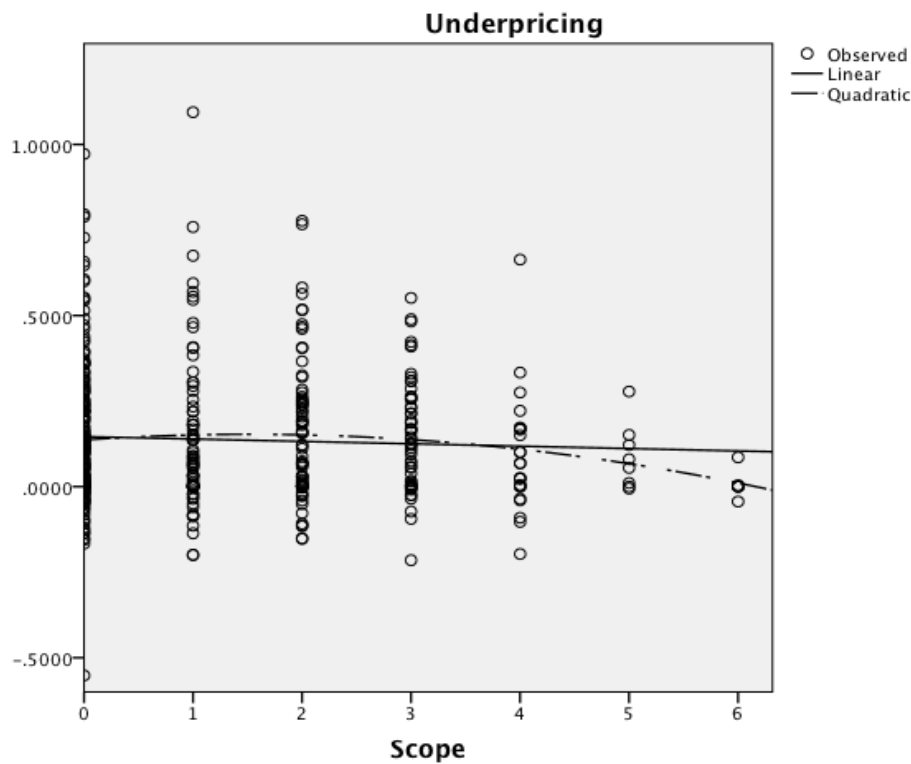


Figure 12: Quadratic Fitted Line Graph between Scope and Underpricing

5.2.4 Time-to-IPO and international new ventures

International new venture firms are characterized by high growth because these firms internationalize at a very early stage after foundation. One explanation for their

accelerated internationalization right from inception is that these firms possess unique intangible assets. According to RBV these firms internationalize early in order to deploy and exploit these unique resources more effectively. However, these firms, being new, do not have the financial resources to fund this accelerated growth. Going public earlier is one way to finance their growth. In addition to the lack of financial resources needed for growth, these firms need branding and legitimacy. IPO would not only provide funds for their growth but may also enhance its image and legitimacy. Therefore, I argue that international new venture firms go public earlier in order to finance their rapid growth, enhance branding and attain legitimacy. Hypothesis H4 states: *INVs go public earlier than traditional internationalizing firms*. The results for this hypothesis are presented in Table 16. International new venture is a dummy variable (Dummy INVs) where 1 means INVs and 0 otherwise. The variable Dummy INVs is highly significantly (Dummy INVs: -1.044: P < 0.01) and negatively related to Time-to-IPO, provides support to hypothesis H4 (Table 16).

Table 16: Time-to-IPO and International New Ventures

Variables	Model 1	Model 2
Constant	5.119***	4.474***
Dummy Top Underwriter	0.572	0.246
Dummy Med Underwriter	0.184	0.043
Dummy Venture Capital Backing	-0.224*	-0.102
Dummy Country	-0.157	-0.010
Log of Gross Proceeds	-0.432**	-0.201
Log of TMT Size	-0.139	-0.078
Log of Total Assets	0.120**	-0.002
Dummy INVs		-1.044***
		(-.647)
R ²	25.1%	63.2%
R ² Adjusted	14.1%	57.69%
F	2.289***	11.340***

P < .10, ** P < .05, *** P < .01

Industry and Year dummies are included in all the models but regression coefficients are not shown. For all the models, n=252. Parenthesis includes values after back-transformation.

This implies that INVs go public earlier than other traditionally internationalizing firms. The average age of INVs is 64.7% lower than compared to other internationalizing firms. The fitted line graph between the independent variable dummy INVs and dependent variable log of Time-to-IPO (Figure 13) better display this difference.

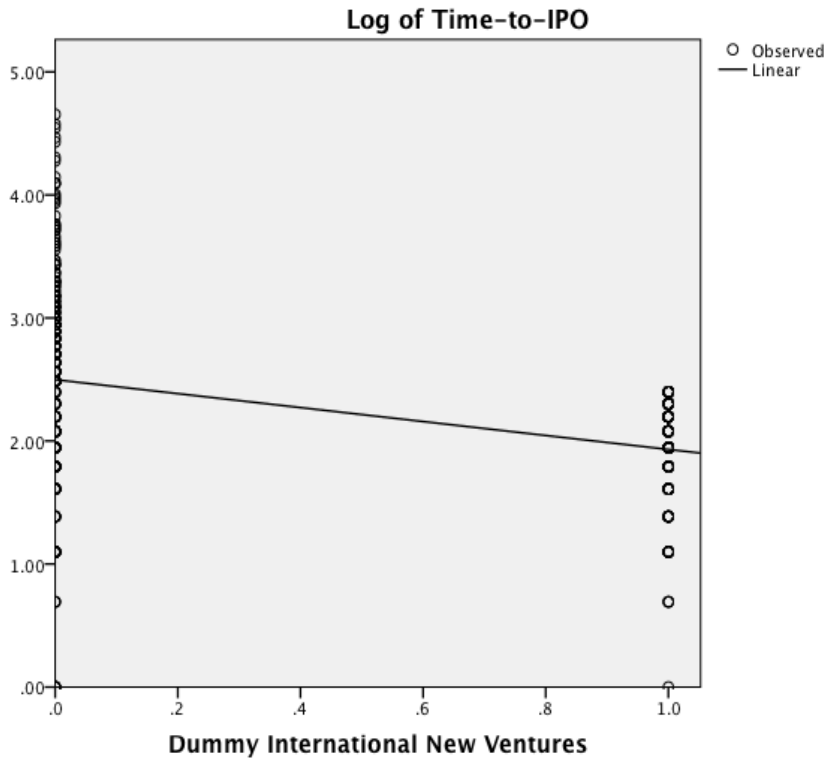


Figure 13: Linear Fitted Line Graph between Dummy INVs and Time-to-IPO

This analysis used ordinary least square regression measuring performance on log-transformed dependent variables (except underpricing). Details of the specific equations used are presented in Chapter 4. The analysis includes domestic ventures in the dataset, often excluded in internationalization-performance studies, to increase the analytical rigor and generalizability of the findings (LiPuma, 2011). Regression estimates provide a powerful and elegant summary of relationships in the data if assumptions of regressions are met. The following section discusses these assumptions and some other diagnostics essential for unbiased results.

5.3 Regression Diagnostics

Three important assumptions with respect to the error term in regression analysis were checked for each model used to test my hypotheses:

1. Residuals are normally distributed (normality assumption).
2. Residuals have equal variance (homoscedasticity assumption).
3. Residuals are independent (autocorrelation assumption).

1. Assumption of Normality of Residuals

A simple and effective way to confirm the assumption of normality of the residuals is producing histograms of the residuals. Histograms of standardized residuals for all the models used in the analysis (Appendix C) show that residuals are approximately normally distributed. In addition to the histograms, plots of standardized residuals versus fitted values and Q-Q plots of normality also confirm the above conclusion.

2. Homoscedasticity Assumption

The assumption of equal variance of the residuals for scope is confirmed by conducting Levene's test of equal variance. Appendix D presents results of Levene's test of equal variance for all the models tested in this study. Levene's test of equal variance tests the null hypothesis that the variances in different groups are equal. If this test is significant at $P < 0.05$, we can conclude that the null is incorrect and that the variances are significantly different at different levels of the variable (in this case scope). However, if the test is not significant (i.e., $P > 0.05$), then the variances are roughly equal and the assumption is tenable (Field, Miles, & Field, 2012). The P-values from Levene's test for all the models (Appendix D) are greater than 0.05, thereby confirming that the assumption of equal variance is met. In addition to Levene's test, plots of standardized residuals versus scope also confirmed the assumption of equal variance. However, the assumption of equal variance cannot be confirmed for intensity because Levene's test could not be

conducted for intensity due to the large number of groups (more than 50 identified while conducting Levene's test). Therefore, plots of standardized residuals versus intensity for all the models are created (Appendix D). These plots do not show any heteroscedasticity.

3. Independence of error term (Autocorrelation)

The third standard assumption of regression models is that the i^{th} and j^{th} error terms, associated with the i^{th} and j^{th} observations are uncorrelated. A popular test for autocorrelation is calculating Durbin-Watson statistics. However, autocorrelation not relevant in cross-sectional data (Chatterjee, Hadi, & Price, (2000), is not an issue here because my data is cross-sectional. The concerns of autocorrelation do not arise within the event study methodology (Mudambi et al. (2012).

Outlier Influence

Outlier is a case that differs substantially from the main trend of the data. Outliers can cause the model to be biased because they affect the values of the estimated regression coefficients (Field, Miles, & Field, 2012). There are several residual statistics that can be used to assess the influence of a particular case. One such statistic is called Cook's Distance. It measures the overall influence of a case on the whole model. Field, Miles, & Field, suggests that values greater than one may be a cause of concern. Therefore, Cook's distance for all the models is calculated (Appendix E). As clear from Appendix E, none of the values are greater than one, rather most of the values are very close to zero. This confirms that outliers do not have any influence on my results.

Multicollinearity

Multicollinearity exists when there is a strong correlation between two or more predictors in the regression model. This collinearity may results in unstable and unreliable estimates of the regression coefficients. Multicollinearity increases the standard errors of

the coefficients. This increase in the standard error of the coefficients may make some variables statistically insignificant when they should be significant (Minitab, 2014).

The most widely used diagnostic statistics for multicollinearity is variance inflation factors (VIFs). Although there is no hard and fast rule about the values of VIFs that can be a cause of concern, Netter et al. (1996) suggested a cut-off point of ten beyond which it may cause a concern. However, Allison (2012) argued that there are at least three situations (given below) where a high VIF is not an issue and can be safely ignored.

1. The variables with high VIFs are control variables and the variables of interest do not have high VIFs.
2. The inclusion of powers or products of other variables cause the high VIFs. This is particularly relevant to my case.
3. The variables with high VIFs are indicator (dummy) variables that represent a categorical variable with three or more categories.

VIFs calculated for all the models (Appendix A and B) and all the predictor variables show values of less than 5 except when power terms (in quadratic models) of intensity and scope are included. In addition, all the models tested with the standardized versions of intensity, scope and their squared terms, resulted in VIFs values of less than 5. Therefore, multicollinearity does not affect my results.

5.4 Summary

This chapter presented the results of the regression models used to evaluate both the linear and non-linear relationships between internationalization and post-IPO firm performance. In addition, the last model examined the relationship between INVs and Time-to-IPO. In this research, internationalization is measured using both intensity and scope variables. Post-IPO performance was measured using three variables: compound holding period returns, relative volatility of returns, and underpricing. Two formulations of the regression model are used to examine the relationship between internationalization and post-IPO performance. In the first formulation, internationalization was used as a

continuous measure that included domestic firms. In the second formulation, the continuous variable of internationalization was replaced with dummy categories including domestic, high, and low internationalization.

The next chapter first discusses these results in more detail. After the discussion section, conclusions, contributions, and limitations of the proposed research are described and the chapter concludes with some recommendations for future research.

Chapter 6

Discussions, Conclusions, and Implications

6.1 Introduction

The internationalization-performance relationship has been studied extensively with respect to accounting and organizational measures of performance. However, these measures provide an assessment of the organizational performance of the firm. Post-IPO stock price performance used in this study measures the assessment of that performance by external investors. Past research in strategy and international business provide strong theoretical reasons for a positive relationship between multinationality and firm performance (Mudambi, et al., 2012); but the empirical findings are inconclusive. However, little is known about how the post-IPO performance is related to the level of internationalization at the time of IPO (LiPuma, 2011). Certo et al. (2009) identified this gap in a comprehensive literature review of studies conducted in the IPO context. The current study addresses this gap by examining the relationship between internationalization and post-IPO performance using three different performance measures: CHPR12M, relative volatility, and underpricing. Internationalization is measured using both the intensity and scope of international activities of firms because each captures different facets of internationalization (Gomes, and Ramaswamy, 1999).

Examining internationalization in the post-IPO context allows for three things. First, measures of financial performance are available to both internal and external investors (for publicly listed companies). Financial data is relatively objective and measures historical performance. Share price reflects the interpretation of the financial position by shareholders. In addition, share performance reflects the assessment of other firm specific factors including internationalization by external investors. The IPO context of this study allows for assessing how external investors value the degree of

internationalization of a firm at the time of IPO. Second, examining internationalization in the IPO context allows for the synthesis of theories of international business with theories of finance. This integration allows us to understand the type of signals that internationalization emits to potential investors and how it affects the share price. Integration also allows for an understanding of how internationalization at the time of IPO is related to information asymmetry. This is different from the benefits/costs of internationalization rationale used by the extant literature. Internationalization at the time of IPO, perceived as a quality of the firm, reduces the information asymmetry of investors with respect to the future performance of the firm. Third, examining the relationship between the degree of internationalization at the time of IPO and relative volatility of returns allows for understanding of how international diversification may reduce risk.

6.2 Hypotheses

The following section provides a discussion on the findings of each hypothesis presented in Chapter 5.

6.2.1 Internationalization and Compound Holding Period Returns

An essential proposition of this study is that higher internationalization at the time of IPO directly influences post-IPO firm performance. This proposition is based on strong theoretical and empirical work conducted in the internationalization-performance relationship. Specifically, hypotheses H1a and H1b, developed in Chapter 3 posited a positive relationship between internationalization (measured using intensity and scope) and post-IPO compound holding period returns.

Regression results presented in Table 10 show that the relationship between internationalization and CHPR12M is statistically insignificant for both the linear hypotheses (H1a and H1b). This can be interpreted that internationalization at the time of

IPO does not have any influence on CHPR12M. In other words, the “null” is true in this case. Researchers generally discuss only statistically significant results and do not give any importance to null hypotheses. However, a truly null finding may also be important. Rather, Loannidis (2006) in an editorial suggested for all journals to publish every study with a “null” result provided these studies acknowledge their limitations. Gliner, Leech, & Morgan (2002) also recommend reporting effect size for non-significant outcomes.

However, hypothesis H1b is supported when the second formulation of the regression model (equation 1b) is used for testing hypotheses but H1a is still insignificant. The positive and statistically significant association between the scope of internationalization and CHPR12M is consistent with the results obtained by Mudambi et al. (2012). This finding support the argument that the benefits identified by the theories of IB send positive signals to external investors and thereby reduces the information asymmetry of investors with respect to the future performance of the firm. However, this conclusion is only true at a higher level of the geographic scope of internationalization. The implication is that, unlike Mudambi et al., this study gives more concrete values of the degree of internationalization and thus identifies an optimal point beyond which the signal turns strong and positive.

Both high and low intensity of internationalization is statistically insignificant. This finding is not consistent with the results of LiPuma (2011) even though he also used dummy categories of the intensity of internationalization. This may be due to the categories of internationalization that LiPuma (2011) used in his study. His highest category of intensity is 25 percent. This 25 percent intensity even misses the midpoint of intensity in my results. LiPuma (2011) described that the statistically significant relationship between the high intensity (25 percent) and valuation may be due the sample representation.

Some important changes in the results are identified when the second formulation of the regression model is used where the continuous measure of internationalization is replaced with the dummy categories. First, with the second formulation of the regression model, the intensity of internationalization not only becomes insignificant but also the value of effect size decreases considerably. However, in case of the scope of

internationalization, high scope not only becomes statistically significant but the effect size changes from very low to a considerably high value. This positive high percentage has significant economic importance for both the management and the investors. The change in the significance and coefficient values between the two formulations implies the conflicting findings of the previous studies. The findings of a statistically significant and stronger relationship between high scope and compound holding period returns may be due to separating the effects of both domestic and low scope. This result also implies that the relationship between internationalization and performance is more complex and thus may not be adequately understood using simple linear or non-linear models as discussed above. Secondly, the formulation with dummy categories resulted in identifying differences with respect to the direction of the relationship, both at domestic and different levels of the internationalization. The results from Table 11 show that the direction of the relationship is different at different levels of both intensity and scope. One implication of identifying differences in the direction at different levels is that performance changes as the degree of internationalization increases.

Although, the majority of studies report only statistically significant results but the recent work in international business research asks for evaluating substantive significance along with statistical significance. Statistical significance reflects the improbability of findings drawn from samples, given certain assumptions about the null hypothesis. Substantive significance is the meaning of that finding with respect to the population (Ellis, 2010a). In this study, in addition to reporting statistical significance, I have analyzed statistical power based on the anticipated effect size and interpreted effect sizes of the results.

Statistical power is the likelihood that a study will detect an effect when there is an effect (Ellis, 2010b). Brock (2003) provided the first assessment of statistical power in the domain of international business studies published from 1990 to 1999. He concluded that the majority of these studies lacked statistical power. Similarly, in a meta-analysis, Ellis (2010b) found that the majority of studies published in the *Journal of International Business Studies* (85%) lacked the power needed to detect small effects. This is important because the weighted mean effect size he obtained from his meta-analysis is very small ($r = 0.06$). In a discipline where average effect sizes are small, lack of attention to matters of

statistical power can lead to both Type I and Type II errors (Ellis, 2010a). Therefore, researchers need to ensure that their studies have sufficient power to detect small effects. Following this recommendation, I conducted power analysis for this study. Using the “Sample Size Calculator for Multiple Regression” (Soper, 2014a), the minimum sample size needed for a statistical power of 0.95, using the anticipated small effect size (0.06) and an alpha level of 0.05, is 292. The power for this study is high as the sample size is much higher than required for the power level mentioned above. Using another power calculator “Statistical Power Calculator for Hierarchical Multiple regression” (Soper, 2014b) resulted in power of 1.0. The power of 1.0 means that this study has a 100 percent probability of detecting any effect that exists.

The effect size measures the strength of the relationship between two variables in a statistical population (Cohen, 1988). Wilkinson & TFSI (1999) recommend presenting effect sizes for primary outcomes using unstandardized measures (regression coefficients or mean differences) compared to standardized measures (Cohen’s r or d) when the units of measurement are meaningful on a practical basis. The effect size for the positive and statistically significant relationship between High Scope and CHPR12M is large (Beta= 0.199) compared to the weighted mean effect size of 0.06 that Ellis (2010a) reported from the meta-analysis of 204 studies published in the Journal of International Business Studies. The effect sizes with respect to insignificant results are small (Domestic= 0.007; Low Intensity= 0.007; High Intensity= -0.043 and Low Scope= -0.041). The practical significance of the above results for High Scope can be interpreted that the addition of one more region to the high geographic spread of the firm would result in 19.9 percent increase in the CHPR12M. An almost twenty percent increase in returns has considerable economic value for investors as well as the management.

It is possible that the relationship between internationalization and stock performance be driven by currency devaluation of the US dollar. In the case of devaluation of the US dollar during the period of 2001 to 2011, exporting firms may be performing better than their domestic counterparts and thus the stock prices of exporting firms may exhibit higher growth. The devaluation of currency makes exports more competitive and cheaper to foreigners, thereby increasing demand for exports. However, Laffer (2015) found that the real exchange rate between the US dollar and the basket of

currencies of its seven major trading partners has been stable for the period of 2003 to 2015. In fact this exchange rate has appreciated by 3.3 percent since December 2008. Therefore, it can be said that the relationship between internationalization and stock return performance is not driven by currency fluctuations.

According to the efficient market hypothesis, information is instantly incorporated into the stock price. As both the theoretical and empirical literature suggest that internationalization is positively associated with performance, according to the efficient market hypothesis, the value of internationalization would already be incorporated into the stock price on the first day of trading. This incorporation would drive the price higher at the end of the first trading day. Therefore, after the first trading day, as the expected higher future performance of internationalization is already reflected in the higher stock price, the expected returns from that day forward should not be different for domestic firms. The efficient market hypothesis implies that internationalization should not be positively associated with stock return performance as proposed in this study. If this is true then the results of this study and other previous studies should not find a statistically significant relationship between internationalization and stock return performance. However, this study and a number of other studies (e.g., Mudambi et al., 2012) have found statistically significant relationships between internationalization and stock return performance. In addition, researchers have evaluated the impact of other firm specific factors on both initial returns (underpricing) and long-term returns. For example, Carter, Dark, & Singh (1998) found a negative and statistically significant relationship between underwriter's reputation and underpricing and a positive and statistically significant relationship between underwriter's reputation and long-term returns (three years post IPO). Therefore, my findings and the results of these other studies support the theoretical rationale used to develop hypotheses for this study.

As theoretical arguments for both linear and non-linear relationship can be made, this study tests both forms of the relationship to find which one fits the best. Therefore, in addition to testing the linear relationship between internationalization and post-IPO performance, this study tests the non-linearity between internationalization and all the dependent variables of post-IPO performance. The following reasons support the non-linearity between internationalization and post-IPO firm performance:

1. Previous Studies have identified non-linear relationship between internationalization and firm performance.
2. In spite of strong theoretical and empirical research suggesting a positive and linear effect of internationalization on firm performance, the statistically insignificant results from the first formulations for linear relationship from this study points to a more complex, potentially non-linear relationship.
3. The statistically significant results for High Scope and CHPR12M and insignificant results for all other dummies using equation 1b and the differences between the direction of the relationship for domestic, low and high also points to a more complex form of the relationship.
4. In addition to the empirical support for a non-linear relationship between internationalization and CHPR12M, this study makes theoretical arguments in support of a non-linear relationship.

Therefore, the next two hypotheses (H1c and H1d) relating internationalization to CHPR12M argue that CHPR12M initially decreases but after certain optimal point starts increasing. Specifically, H1c states that intensity initially decreases but starts increasing after a certain optimal point.

Contractor et al., (2003) have also attributed the initial decrease in the performance for early internationalization to insufficient economies of scale, liability of foreignness and initial learning costs. Operating in relatively few geographic regions may not be enough to recoup the up-front costs of creating an international operation (Hitt, et al., 1997). These theoretical arguments mentioned above, suggesting a non-linear relationship, provide support to my argument that an optimal level of internationalization is needed for full utilization of the benefits of international expansion. Chen & Hsu (2009) also suggested an optimal level of internationalization and investment in advertisement as necessary for positive impact on firm performance.

Statistically significant results for quadratic terms of intensity (Table 10, model 4) and scope (Table 10, model 5) confirm the proposed non-linear relationship between internationalization and CHPR12M. Hypothesis H1d, suggesting a positive relationship between scope and CHPR12M beyond three regions of scope (See Figure 9) implies that

only at higher level of scope, there appears to be a positive relationship between geographic scope and CHPR12M. Hypothesis H1c is partially supported. The non-linearity part of the hypothesis is supported by the statistically significant result but the direction of the relationship is opposite to that proposed in the hypothesis. The large effect size of intensity squared (-0.522), consistent with the negative effect size of 41 percent obtained by LiPuma (2011), implies that a further one percent increase in the intensity would result in 52% decrease in the CHPR12M. The small and positive effect size of the Scope Squared (0.019) is consistent with average effect sizes found in international business research (Ellis, 2010a). This small effect size implies that a one-unit increase in High Scope increases the CHPR12M by 1.9%. Although the effect size seems very small, large sums of money are involved, so the economic significance is large. For instance, for Google (one of the firm in my sample), the total number of outstanding shares by the end of fourth quarter is 304 million (investor.google.com). An increase of 1.9% would mean an increase of \$577 million in the valuation of the equity.

The quadratic fitted line graphs of intensity (Figure 8) and scope (Figure 9) better describe the shape of the relationship. These graphs not only confirm the non-linearity, they identify the point of inflection for both the scope and intensity. The inflection point in the case of scope means that CHPR12M up to three regions is negative but turns positive after this level. In other words, Figure 9 supports the theoretical argument that geographic scope up to three regions is not sufficient for appropriating the full benefits from internationalization. Therefore, scope up to three regions, at the time of IPO, may not provide a positive signal to potential investors. However, beyond three regions scope provides a positive signal to potential investors, leading to higher CHPR12M. An important finding of this study is the identification of an optimal point especially with respect to the scope of internationalization. Beyond this optimal point, the geographic scope of internationalization emits positive signal to potential investors.

However, with respect to intensity, the opposite is true. CHPR12M initially increases up to 50% of intensity but then drops down after that level. A possible explanation for this contradictory result is that intensity and scope capture different facets of internationalization. Intensity can be viewed as a proxy for a firm's dependence on its overseas markets for sale revenue, while the geographic scope capture the dispersion

element encompassing locational costs and benefits (Gomes & Ramaswamy, 1999). Intensity does not capture the geographic spread that is important for risk diversification and other benefits through higher internationalization. In addition, a firm generating higher revenue from a single country may be considered more risky than a comparable firm generating the same amount of revenue from many different regions.

The overall conclusions from the above discussions are that the relationship between internationalization and compound holding period returns is non-linear and that only high scope of internationalization leads to higher returns.

6.2.2 Internationalization and Relative Volatility

In order to understand whether investors see internationalization at the time of IPO as a risk or a value in terms of future performance, this study examines the effects of internationalization on the relative volatility of returns—a measure of risk. The first two hypotheses (H2a and H2b) test the linear and negative relationship between internationalization (intensity and scope) and relative volatility. Results from regression analysis using equation 2a, provided in Table 12, show that intensity is statistically significant but positive whereas scope does not have any influence on relative volatility. In the case of intensity, the result is opposite to what I have proposed in my hypothesis (H2a). The result implies that relative volatility actually increases with increase in intensity.

Assessing these two hypotheses (H2a and H2b) using equation 2b that uses internationalization as dummies also confirms the above finding. The statistically significant and negative result for domestic dummy (Table 13) implies that on average domestic firms have lower relative volatility than international firms. The positive and large effect size (0.192) of intensity implies that a one percent increase in the intensity increases the relative volatility or risk of returns by 19.2 percent. The effect size with respect to the scope (0.011) is very small.

The next two hypotheses (H2c and H2d) test the non-linearity between internationalization and relative volatility of returns. Hypothesis H2c specifically argues that relative volatility increases with increase in intensity up to a certain optimal point. But beyond that point, increase in intensity actually decreases the relative volatility. Similar argument is also presented in H2d. The logic behind these hypotheses (H2c and H2d) is similar to the one described for the non-linearity between internationalization and CHPR12M. The argument for non-linearity between internationalization and relative volatility specifically states that lower level of internationalization may not be sufficient for firms to reap the full benefits from their international expansion. The statistically significant and negative result for the quadratic term of Scope provides support to hypothesis H2d. In addition, a quadratic fitted line graph of scope and relative volatility also support the argument proposed in the hypothesis H2d. The effect size of Low Scope is larger (0.119) than that of High Scope (-0.025). This implies that positive relationship at Low Scope is stronger than the negative relationship at High Scope. Although the effect size is small, High Scope at the time of IPO provides positive signals to potential investors and thereby reduces the information asymmetry between investors and the firm. The implication is that the relationship between internationalization and relative volatility is more complex than simply linear and negative (or positive) and that low scope is insufficient to appropriate the full benefits of internationalization.

Overall, the statistically significant and negative quadratic term of Scope (Table 13) give support to the previous findings that international diversification reduces the risk. However, this is not true for the intensity of internationalization. The positive and statistically significant relationship between intensity (both low and high) and relative volatility implies that intensity sends a negative signal to potential investors. As discussed above, a high intensity in a single country may be more risky than spreading that intensity on many diverse markets. This finding is not consistent with the results of studies including Mathur & Hanagan, (1983), Rugman (1979), Heston & Rouwenhorst (1994), Huges, Logues, & Sweeney (1975), Agmon & Lessard (1977), and Shaked (1986). In terms of the strategy of the firm, Low Scope in this case actually sends a negative signal to investors. Investors may perceive High Intensity in a large domestic market (e.g., US) that the firm has actually overlooked their domestic market.

6.2.3 Internationalization and Underpricing

Underpricing is a well-known phenomenon in the IPO literature. As underpricing is calculated using both the offer price and the first day closing price, it allows for including the assessment of management, institutional investors, and external investors. The first two hypotheses (H3a and H3b) argue for a negative relationship between internationalization (Intensity and Scope) and underpricing. Results from testing these hypotheses using equation 3a are presented in Table 15.

The first hypothesis (H3a) that relates intensity to underpricing is not supported. This null result shows that intensity does not affect underpricing. However, intensity becomes statistically significant when Canadian firms are removed from the sample. This implies that H3a is supported for the US IPO firms. Hypothesis (H3b) that relates Scope with Underpricing is supported. This result adds to the inconclusive findings of the internationalization-performance relationship and confirms that the conflicting results may be due to the use of different measures of internationalization. In addition, this finding is also consistent with Gomes & Ramaswamy (1999) argument that geographic spread and intensity capture different facets of internationalization.

The results from regression with dummies using equation 3b (Table 15) show that both these hypotheses (H3a and H3b) are supported at higher levels of internationalization, but not at lower levels. These results are not consistent with the findings of Mudambi et al. (2012) and Al-Shammari, O'Brien, & AlBusaidi (2013). The first study found a statistically insignificant relationship between the geographic scope and underpricing whereas the second study found a statistically significant but positive relationship between the intensity of internationalization and underpricing.

The statistically significant and negative relationship between internationalization and underpricing at higher level provide support to the synthesis argument put forward in support of a non-linear relationship between internationalization and underpricing. This argument implies that only higher internationalization at the time of IPO provides a positive signal to potential investors, thereby reducing the information asymmetry of investors. However, lower levels of both the intensity and scope may not provide a

positive signal to investors. Rather the signal in the case of low level is negative or weak. A weak signal may not reduce the information asymmetry of investors. However, a negative signal, reducing the information asymmetry, signals lower value and performance of the firm. Therefore, it can be argued that firms with higher internationalization at the time of IPO will have lower underpricing compared to those with low levels of internationalization. The previous explanations of insufficient economies of scale at low levels of internationalization may also explain the insignificant findings with low internationalization. Similar to the findings with compound holding period returns, another possible explanation for the above result is that investors might consider higher internationalization as a significant component of the strategy of the firm, resulting in a positive signal for such firms. The positive and statistically significant Domestic Term and negative and statistically significant terms of High Intensity and High Scope, show that underwriters have set a higher offer price for firms with high intensity and scope compared to domestic firms. This finding implies that the gap between the offer price and closing price for high intensity and high scope is lower than that for domestic firms.

Considering the effect sizes of -0.055 for the high intensity and -0.075 for the high scope of internationalization, the economic significance is substantial. The average underpricing for the US IPOs after the bubble period is 12 percent (Loughran & Ritter, 2004). This means that underpricing for firms with high intensity will be 45 percent lower than other IPO firms. In the case of scope, this reduction is even higher, 60 percent.

Theoretical arguments similar to that presented in support of a non-linear relationship between compound holding period returns/relative volatility and internationalization can also be made with respect to underpricing. In addition, this non-linearity between underpricing and internationalization is also evident from the above results of finding statistically significant results only at higher level of internationalization. Therefore, the next two hypotheses (H3c) and H3d) test for the non-linearity between underpricing and internationalization (Intensity and Scope). Results for the non-linear hypotheses, presented in Table 14 show that internationalization is not related to underpricing.

The implication of the above results is that although the quadratic model for both intensity and scope are statistically insignificant, the differences in the signs of the linear and quadratic term and the fitted line graphs (Figure 11 and Figure 12) provides some support for the contention that this relationship may be more complex than simply linear. This non-linearity is also apparent from the results with categorical dummies of internationalization.

As previous studies have also identified an S-curve relationship between internationalization and firm performance, for the sake of exploration, I used higher order polynomials (cubic) for internationalization with respect to all the three measures of post-IPO firm performance. Consistent with Fernhaber (2013), results from this exploration are not included because none of these were statistically significant. In addition, theoretical support especially in the context of IPO is lacking.

As the numbers of Canadian firms were too low compared to the US firms, results may be more representative of the US IPO firms. Due to the low number of Canadian firms, a meaningful comparison could not be made. However, all the models were recalibrated after removing the Canadian firms from the sample. There were no significant changes in the results except that intensity turned from being insignificant to significant with respect to the dependent variable underpricing.

6.2.4 International New Ventures and Time-to-IPO

Besides providing firms with raising capital to finance their activities, an IPO enhances a firm's image and legitimacy. All these three aspects are particularly important for international new ventures (INVs). Implicit in the International New Venture Theory (Oviatt & McDougal, 1994), INVs are new firms that seek significant international expansion from inception. Being new, these firms do not have the financial resources needed for rapid international expansion. In addition, being new and not well established, these firms lack legitimacy and branding in the market. An IPO could address all these three aspects of INVs. In addition, using signaling theory, the speed of internationalization

and early IPO may send strong signals of growth and future performance to external investors. Therefore, in order to raise capital to finance rapid international expansion, enhance its image/legitimacy in the market, and emit a positive signal to investors, I argue that INVs go public earlier than other internationalizing firms.

Results from regression presented in Table 16 support the hypothesis H4. Statistically significant and negative result for dummy INVs show that INVs go public earlier than other internationalizing firms. This result is consistent with LiPuma (2011) who found statistically significant and positive relationship between domestic dummy and Time-to-IPO. The large and negative effect size for INVs (-0.647) show that on average INVs that go public are 64.7 percent younger than other internationalizing firms.

The implications from this result are that INVs raise their capital in the public markets in order to finance their international expansion. In addition, an early IPO may also send positive signals of growth and future performance to investors, resulting in higher valuations.

6.3 Conclusions

This study examined the relationship between internationalization and post-IPO firm performance. Post-IPO firm performance is measured using three variables: compound holding period returns, relative volatility of returns and underpricing. The reason for using three variables of firm performance is to include the assessment of all the stakeholders including management, internal, and external investors. In addition, this study also examined the question that international new ventures go public earlier than other traditionally internationalizing firms.

The sample included US and Canadian firms that issued their initial public offerings from 2001 to 2011. The sample was further restricted to manufacturing and service sectors. The standard criteria used in the IPO research further restricted the sample to 459. A large number of data sources including databases and company prospectuses were used to obtain data for the variables.

Both linear and non-linear regression models were used to test the hypotheses of this study. In addition, two different formulations of the regression model were used. In the first formulation, a continuous measure of the internationalization variable is used. Considering the complexity of this relationship, a second formulation of the regression model replacing the continuous variable of internationalization with the dummy categories is used.

The synthesis of theories of international business and portfolio theory with signaling and information asymmetry theory is used as a framework for the development of the hypotheses. This synthesis is based on the premise that the benefits identified by international business theories and portfolio theory send positive signals to potential investors. These positive signals reduce the information asymmetry of investors with respect to the future performance of the firm. Therefore, internationalization at the time of IPO is considered to lead to higher returns and lower volatility of returns and underpricing. Resource-based view and international new venture theory and their integration with signaling theory provide support for the hypothesis that INVs go public earlier than other traditionally internationalizing firms. In this synthesis, I argue that INVs internationalize rapidly to exploit the full benefits of their intangible assets. These firms go public earlier to finance this rapid growth. Therefore, going public earlier might send signals of growth and future performance to external investors.

The research approach and the findings of this study make significant contributions to the literature of international business, international entrepreneurship, strategic management, management of technology, and finance. In terms of theory, the major contribution of this study is the introduction of the synthesis of theories concept to understand internationalization-performance relationship. In addition, this research also integrates portfolio theory with signaling and information asymmetry theory to understand the diversification aspect of international expansion. Even, the synthesis framework can be used to understand the early timing of IPO of the international new venture firms.

This study extends both the linearity and non-linearity of internationalization-performance relationship into the context of IPO. Researchers have generally examined internationalization-performance relationship using linear and non-linear models.

Replacing the continuous measure of internationalization with the dummy categories, this study allows for evaluating the complexity of this relationship from a different aspect.

In terms of empirical contributions, this study not only confirms the non-linearity of the internationalization-performance relationship in the IPO context but has also identified an optimal point beyond which the scope of internationalization provides a positive signal to investors. The study refutes the claim that international diversification reduces the risk of returns. This reduction may only be supported at higher geographic scope of internationalization. But both the intensity and low scope of internationalization actually increases the risk of returns.

The findings that international new venture firms go public earlier than other traditional firms suggest that entrepreneurs seeking to raise funds to finance the rapid growth and expansion should go public. Going public earlier also sends a positive signal of growth and performance to external investors. The positive signal may result in higher valuations for the firm. The findings of this study give investors more information in the form of an optimal point. They can now differentiate firms on the basis of the degree of internationalization at the time of IPO.

6.4 Implications

6.4.1 Theoretical Contributions

A major contribution of this study is the introduction of the synthesis of theories of international business and portfolio theory with signaling and information asymmetry theories to understand the relationship between internationalization and post-IPO firm performance. Researchers have used portfolio theory to justify the diversification aspect of international expansion (Rugman, 1979) as a standalone theory. Similarly, the few studies that have evaluated internationalization in the context of IPO have used signaling and information asymmetry theory but did not integrate these theories with theories of international business.

Contemporary studies have increasingly evaluated the non-linearity between internationalization and firm performance, but none have so far examined this relationship in the context of IPO. The context of IPO is important in order to include the assessment of external investors. Confirming the non-linearity between internationalization and post-IPO performance, this study contributes to the literature on non-linearity by extending its application into the post-IPO context. Moreover, the identification of a non-linear relationship between internationalization and post-IPO performance helps in explaining the conflicting findings of the past empirical research.

It has been demonstrated theoretically and empirically that foreign operations reduce the risks of a firm's profits (Rugman 1979). This study extends this diversification aspect into the IPO context for the first time. At the time of IPO, uncertainty is high because firms have limited histories of operations and public access to the performance information of firms is limited. Therefore, managing and understanding risk becomes more important around the time of IPO. The findings of this study refutes the general conclusion of the previous research that international expansion reduces the risk of investments and provides more concrete and specific information about the optimal level of internationalization needed for obtaining the diversification benefit.

Studies that have evaluated the diversification aspect of international expansion were conducted in the 1970's or before. Since that time, there have been a number of changes related to global trade and international business. The world is becoming more integrated with the passage of time due to increase in free-trade agreements between nations, advances in transportation and communication technologies and more. Therefore, this study provides a fresh perspective of the diversification aspect of international expansion by using the most recent data. Refuting that popular claim may be due to the changes in the global business since the 1970's.

Studies have generally considered linear or non-linear relationship between internationalization and firm performance. Simple linear and non-linear models may not be enough to evaluate such complex relationships. Therefore, this study introduces a new approach of categorizing the internationalization variable into two ranges. This categorization not only separates the effects of domestic firms but also differentiates

between the two categories of internationalization. This approach allowed me to find an optimal point of the scope of internationalization beyond which international expansion leads to higher performance. In case of underpricing, intensity beyond a certain optimal point might also send a positive signal of performance to investors.

Although a few recent studies have evaluated internationalization in the IPO context, all of these studies relied on data before the Internet bubble period (1999-2000). LiPuma (2011) specifically mentioned this in the limitation section of his study. Since the bubble period, there have been significant changes with respect to the disclosure of information. Sarbanes-Oxley Act of 2002 was introduced in the wake of financial scandals such as Enron and WorldCom. This act, requiring firms more stringent and accurate disclosure of financial information, may help in investors' confidence by preventing opportunities for fraud. Having easy access to more accurate and consistent disclosure of information may also reduce the information asymmetry of investors. Therefore, to say that the market is operating in a somewhat new environment would not be wrong. This study, using the most recent data, evaluates this relationship in the new environment.

One conclusion from the results between internationalization and CHPR12M is that not only investors see them differently; investors differentiate between high and low levels of internationalization. This conclusion is consistent with the argument that intensity and scope capture different facets of internationalization (Gomes, and Ramaswamy, 1999).

6.4.2 Practical Contributions

Deciding to go international before going public is a major strategic decision for the management. The finding that higher geographic scope of internationalization at the time of IPO is associated with higher returns, lower risks, and lower underpricing, would help management in making this important decision. For example, managers interested in higher valuations at the time of IPO may delay their IPO decision until achieving sufficient scope of internationalization.

Managers of firms that have already achieved the optimal level of geographic scope may utilize this information when promoting their offerings. Utilizing the conclusions from this study, management can easily find the optimal point for their firm by counting the number of regions outside the domestic market. The findings of this study suggest that on average, external investors value higher geographic scope at time of IPO. Management can use this information to promote their offerings in order to get higher valuations. Management can position information about higher geographic scope more strategically in the IPO prospectus to signal higher returns to external investors.

With respect to underpricing, knowing that investors differentiate between higher scope and lower scope of internationalization would help management to price their offerings more appropriately. The negative and statistically significant results for underpricing with respect to both the high intensity and scope of internationalization have important managerial implications to have an appropriate level of internationalization at the time of IPO. Higher levels of international diversification at the time of IPO may help firms reduce the cost of issuing equity.

Investors are generally interested in higher returns with lower risks. The findings that higher geographic scope of internationalization is associated with higher returns and lower risks allow investors to differentiate between firms based on the scope of international expansion.

Financing the rapid international expansion of international new venture firms is a major strategic decision to be made by the management. The finding that INVs go public earlier to raise the capital needed for the rapid growth provides confidence to the management to utilize this route. In addition, the synthesis argument may help management to signal growth and future performance through early IPO.

The findings of this study suggest that investors value the degree of internationalization of a firm, particularly the high scope. Future investors can use this information to differentiate between IPO firms for potential investments. The optimal point beyond which internationalization leads to higher returns and lower risk and underpricing give more concrete information to investors to make informed decisions

about investing in an IPO. Investors can easily find information about the degree of internationalization from the IPO prospectus of the firm.

The study also suggests investors to give attention to early IPO of international new ventures. Investors can use the synthesis framework of this study to understand how early IPO of these firms may lead to growth and future performance.

6.5 Limitations

The findings of this study may not be generalizable beyond manufacturing and service sectors as the sample is restricted to these two industry sectors. In addition, restricting the sample to the US and Canadian firms confines its generalizability beyond these countries. Although every effort was made to include all IPO firms in my sample, the number of Canadian firms is very low and thus generalizability is even limited to the Canadian IPO firm performance domain.

The relatively small number of firms with very high scope may have influenced the results. This may be particularly true in the case where results are statistically significant for higher level of scope.

The fit of my models is comparable to other studies that evaluated internationalization in the context of IPO. However, an R-Square range of 24–27 percent may indicate that there may be other important explanatory variables not included in my models.

The operationalization of the first category of geographic scope may not be appropriate considering the North American Free Trade Agreement (NAFTA). According to this category (e.g., Scope 1) a firm sells to only one international market (region). This international market could be US/Canada or any other country of the world such as Afghanistan. Market attractiveness, cultural, political, and other risks may impact investors' perceptions. Therefore, US/Canada may provide a more favourable market for a positive performance compared to Afghanistan. An ideal way to address this issue would

be to include a set of control measures that reflect market attractiveness, political, cultural, and other risks.

6.6 Future Research

The synthesis of two streams of theories used in this study provides a starting point for researchers to utilize this approach when analyzing other firm specific factors related to corporate governance, upper echelons, social influence, and innovation. My research provides a foundation for examining how other factors may be valued at the time of IPO. These factors may also include industry and environmental effects, mergers and acquisition, competitive rivalry, etc.

The extant empirical research has evaluated internationalization-performance relationship using linear and non-linear models. Considering internationalization as a complex phenomenon, this study went a step further by categorizing the internationalization variable. This approach may be used by future researchers to better understand the influences of other complex constructs such as innovation, upper echelons, corporate governance, and more on firm performance.

The findings that higher internationalization is associated with higher returns and lower risk and underpricing implies that information asymmetry with respect to the impact of the degree of internationalization on post-IPO firm performance still exists. This is contradictory to the efficient market hypothesis. According to the efficient market hypothesis if there were any gaps in the market, investors would quickly jump to fill in those gaps by factoring them into the price. A limitation of this study is using return data as an assessment of the investor's perceptions about the impact of the degree of internationalization at the time of IPO. A more direct way will be to include the assessments of investors by asking them how they see internationalization. This will help in reconciling the contradiction with the efficient market hypothesis.

Restricting the sample to the US and Canadian IPO firms, a simple replication of this study would be to use data from other countries. Future researchers could test the

robustness of the findings of this study in other contexts. Due to the uniqueness of the US market, internationalization might affect market assessment differently in other regions such as Europe. The US has a large domestic market whereas the European Union (EU) is composed of many countries with relatively small domestic markets.

This study examined the relationship between the extent of internationalization and post-IPO firm performance, the nature of multinationality would be an interesting area for future research. So future researchers may examine the differences in performance between different geographic regions. Measuring performance with respect to different geographic regions may be particularly important in the case of volatility of returns as volatility may be related more to where the venture is doing business and how stable that region is. Therefore, a more appropriate measure would be based on the specific regions and not simply the number of regions. This measurement may also help in mitigating the issue of coding Scope 1 as discussed in the limitations section of this study.

As the IB literature did not provide any guidance for creating the dummy categories of internationalization, this study is partly exploratory in creating these categories. Particularly concerning is the values near the point of inflection. For instance, 49 percent intensity is considered low degree of internationalization while 50 percent as a higher degree of internationalization. More studies are needed to confirm these categories.

The main objective of this study was to evaluate the influences of the degree of internationalization at the time of IPO on post-IPO firm performance. The study also examined the question of whether international new venture firms go public earlier than other traditionally internationalizing firms. This is just a partial next step to explore more nuanced aspects of the internationalization strategy of INVs such as the speed and timing of internationalization with other measures of firm performance. Therefore, future researchers may explore more nuanced aspects of the relationship.

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Appendices

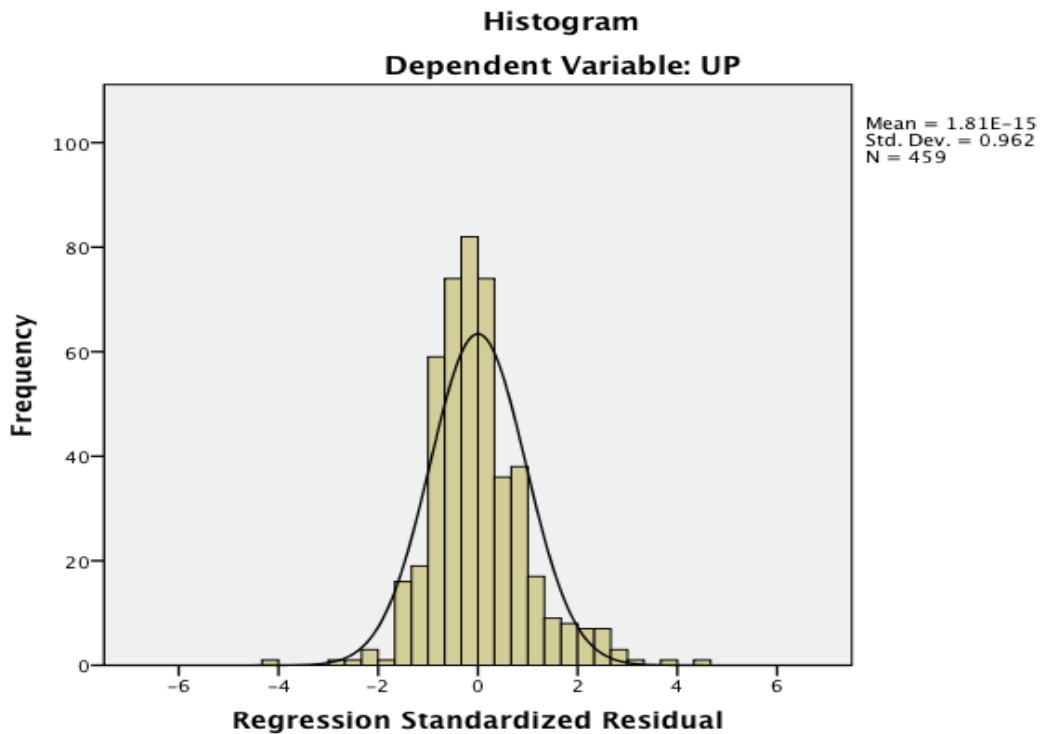
Appendix A: SPSS regression Results for Industry and Year Dummies

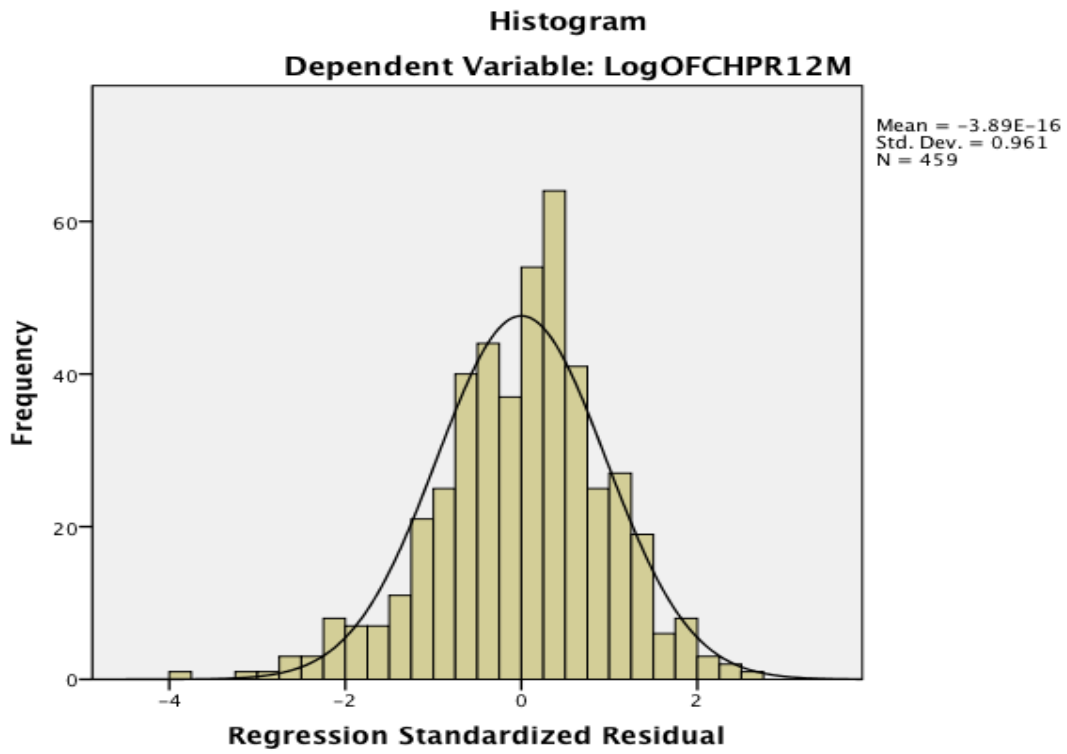
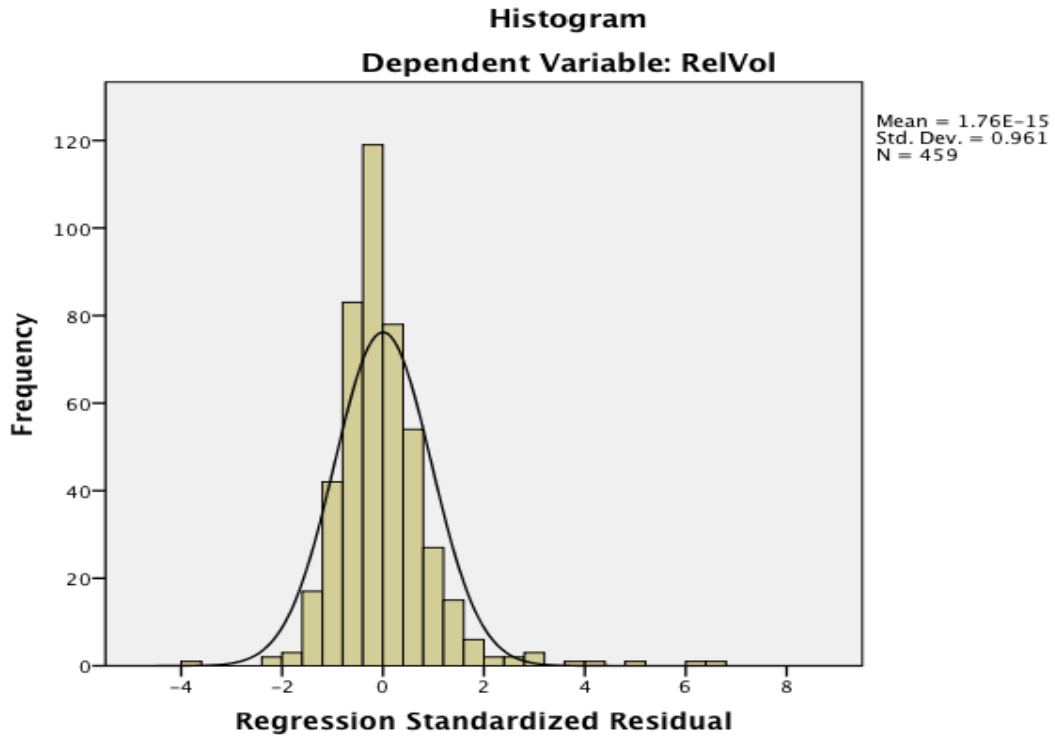
Variables	Beta	T-test	Significance	Tolerance	VIF
Dummy Communication	.010	.051	.960	.847	1.181
Dummy Communication Internet	.075	.674	.501	.626	1.597
Dummy Communication Telecommunication	-.345	-2.591	.010	.753	1.329
Dummy Consumer Cyclical	.066	.495	.621	.628	1.591
Dummy Consumer Non Cyclical	-.079	-.373	.709	.865	1.157
Dummy Consumer Non Cyclical Biotechnology	-.095	-.690	.490	.762	1.312
Dummy Consumer Non Cyclical Commercial Services	.047	-.399	.690	.637	1.570
Dummy Consumer Non Cyclical Healthcare Products	-.202	-1.925	.055	.599	1.669
Dummy Consumer Non Cyclical Healthcare Services	.214	1.372	.171	.765	1.308
Dummy Consumer Non Cyclical Pharmaceuticals	.073	-.573	.567	.690	1.448
Dummy Industrial	-.004	-.036	.971	.578	1.731
Dummy Technology Computers	-.073	-.549	.584	.748	1.338
Dummy Technology Semi Conductor	-.177	-1.362	.174	.685	1.461
Dummy Others	-.151	-.804	.422	.806	1.241
Dummy Basic Materials	-.108	-.582	.561	.749	1.335
Dummy 2002	.387	2.411	.016	.561	1.783
Dummy 2003	.394	2.408	.016	.567	1.765
Dummy 2004	.420	3.369	.001	.302	3.310
Dummy 2005	.517	3.920	.000	.344	2.911
Dummy 2006	.417	3.272	.001	.327	3.060
Dummy 2007	-.091	-.731	.465	.310	3.222
Dummy 2008	-.250	-1.244	.214	.698	1.433
Dummy 2009	.435	2.674	.008	.524	1.909
Dummy 2010	.515	3.541	.000	.421	2.372
Dummy 2011	.125	.853	.394	.416	2.401

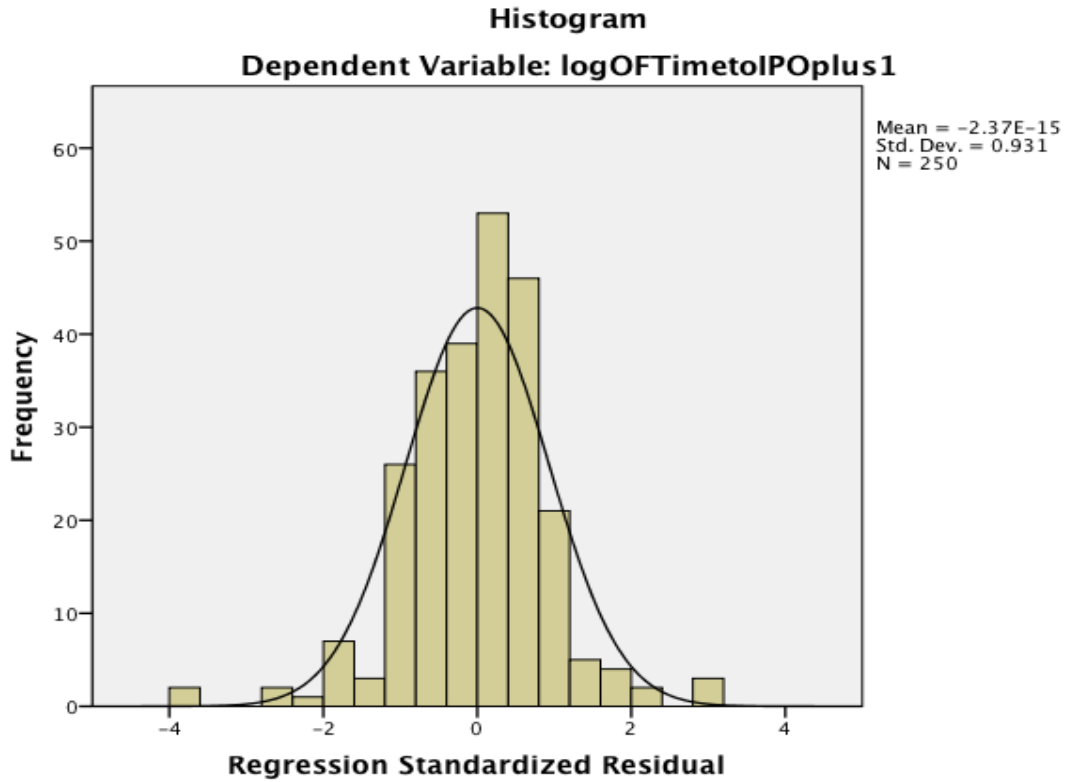
Appendix B: Variance and Tolerance for the Independent Variables

Variables	Tolerance	VIF
Intensity	0.078	12.846
Intensity Squared	0.075	13.282
Scope	0.114	8.775
Scope Squared	0.122	8.166
Domestic Dummy	0.757	1.322
Low Intensity Dummy	0.701	1.426
High Intensity Dummy	0.596	1.677
Low Scope Dummy	0.707	1.414
High Scope Dummy	0.782	1.279

Appendix C: SPSS Diagnostic graphs from Residual Normality







Appendix D: Diagnostics for Equal Variance (Homoscedasticity)

Levene's test of Equal Varance for Standardized Residuals for all models BY Scope.

Test of Homogeneity of Variances (UP)

	Levene Statistic	df1	df2	Sig.
Standardized Residual	1.164	6	452	.324
Standardized Residual	1.333	6	452	.241
Standardized Residual	1.182	6	452	.315
Standardized Residual	1.333	6	452	.241

Test of Homogeneity of Variances(Rel Vol)

	Levene Statistic	df1	df2	Sig.
Standardized Residual	.563	6	452	.760
Standardized Residual	.637	6	452	.700
Standardized Residual	.585	6	452	.743
Standardized Residual	.477	6	452	.825

Test of Homogeneity of Variances(CHPR12M)

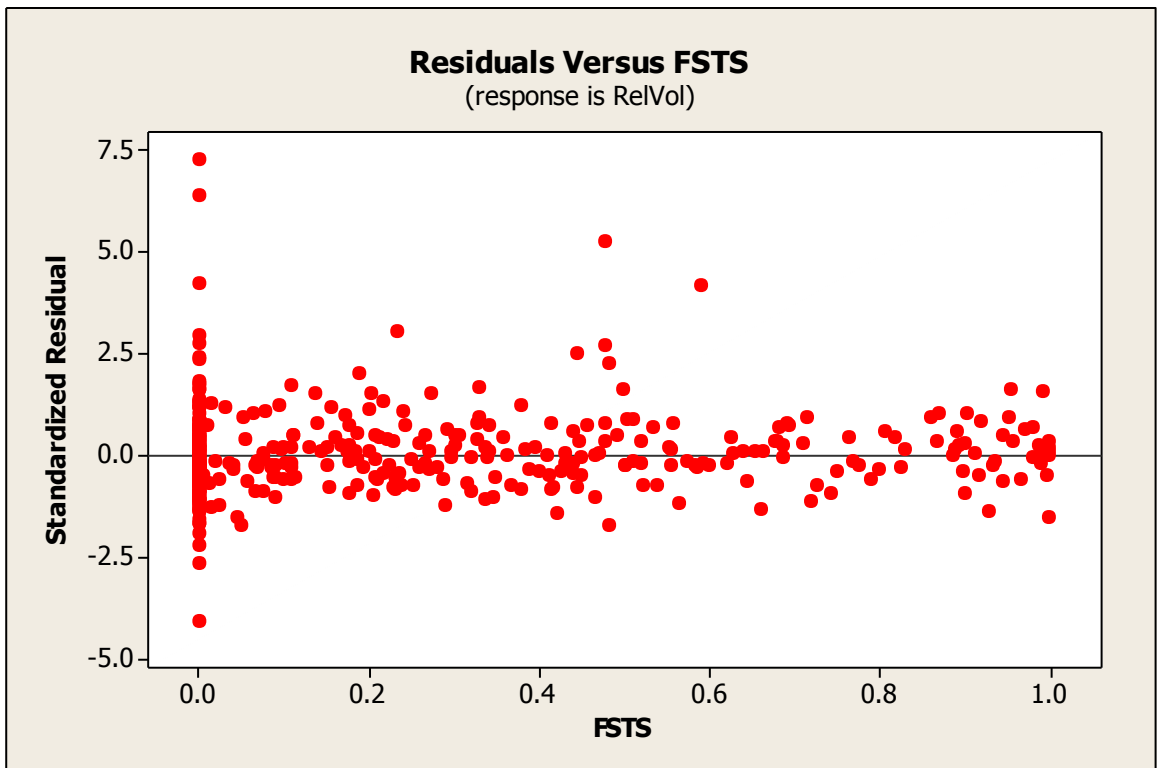
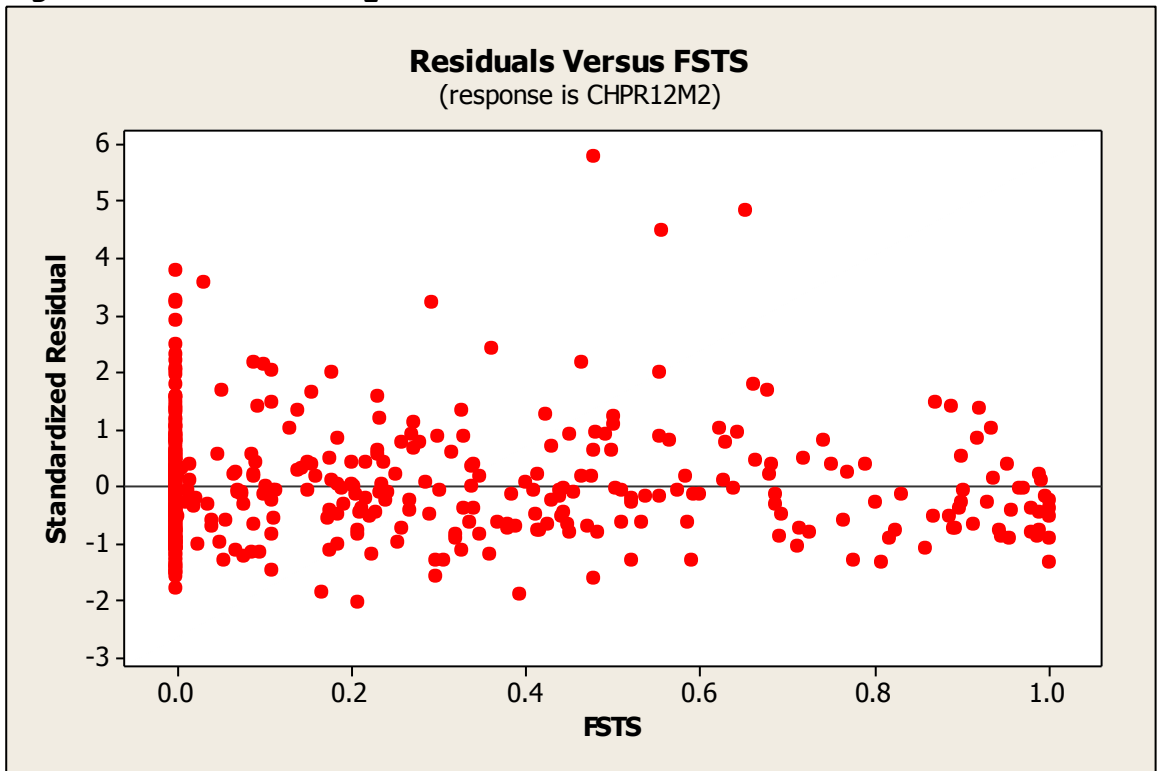
	Levene Statistic	df1	df2	Sig.
Standardized Residual	1.225	6	452	.292
Standardized Residual	1.273	6	452	.268
Standardized Residual	1.234	6	452	.287
Standardized Residual	1.269	6	452	.270

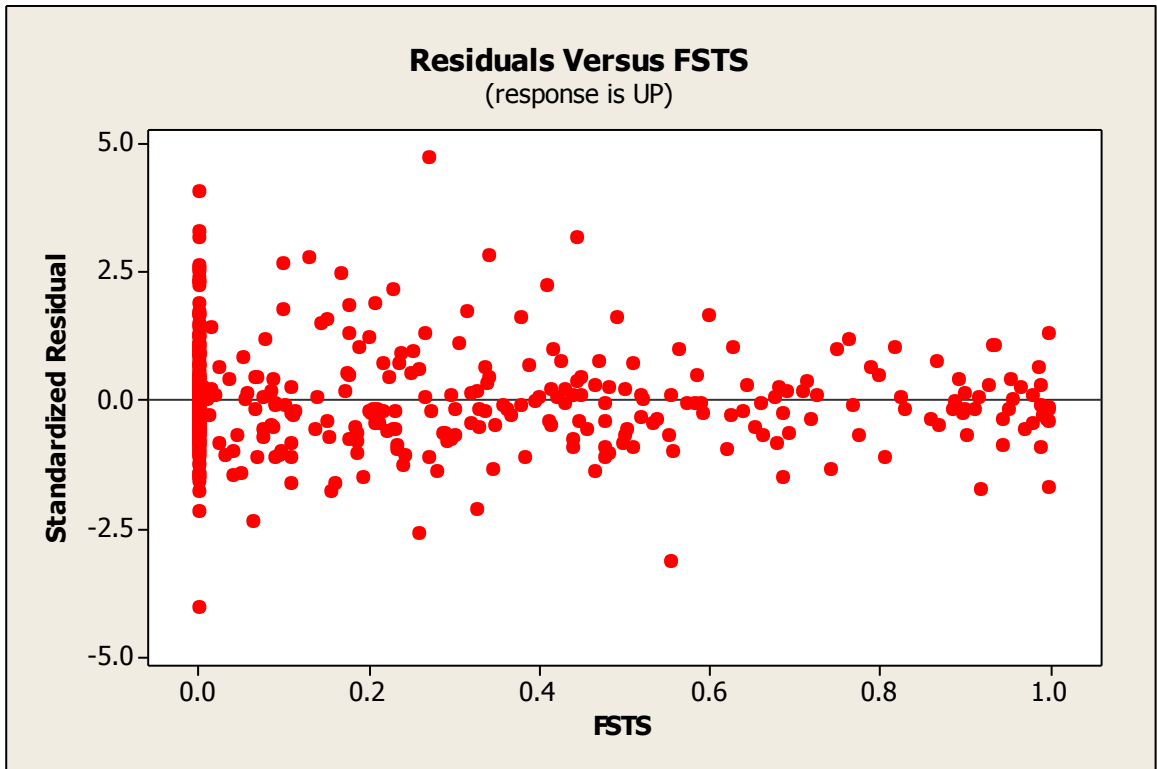
Test of Homogeneity of Variances (Time-to-IPO)

Standardized Residual.

Levene Statistic	df1	df2	Sig.
1.593	1	250	.208

Equal Variance by Plotting Standardized Residuals against Intensity.





Appendix E: Cook's Distance for all the models

Descriptive Statistics (Underpricing)

	N	Minimum	Maximum	Mean	Std. Deviation
Cook's Distance	459	.00000	.05312	.0021439	.00465508
Cook's Distance	459	.00000	.05647	.0021528	.00469888
Cook's Distance	459	.00000	.05325	.0021381	.00464497
Cook's Distance	459	.00000	.05639	.0021469	.00466797
Valid N (listwise)	459				

Descriptive Statistics (CHPR12M)

	N	Minimum	Maximum	Mean	Std. Deviation
Cook's Distance	459	.00000	.05786	.0024373	.00474916
Cook's Distance	459	.00000	.05325	.0024394	.00463703
Cook's Distance	459	.00000	.05377	.0024383	.00468402
Cook's Distance	459	.00000	.05267	.0024075	.00455078
Valid N (listwise)	459				

Descriptive Statistics (Relative Volatility)

	N	Minimum	Maximum	Mean	Std. Deviation
Cook's Distance	459	.00000	.27421	.0030479	.01541494
Cook's Distance	459	.00000	.26606	.0030403	.01515469
Cook's Distance	459	.00000	.26809	.0030093	.01504170
Cook's Distance	459	.00000	.26191	.0029845	.01483143
Valid N (listwise)	459				