School of Economics and Finance

Three Essays on Corporate Finance

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Declaration

To the best of my knowledge and belief this thesis contains no material previously published by any other person except where due acknowledgment has been made.

This thesis contains no material which has been accepted for the award of any other degree or diploma in any university.

Signature: ……………………..

Date: 29th June, 2015

Dedication

To my loving mother, Jahanara Begum, my caring father, Ruhul Amin,

AND

to my helpful and patient wife, Aynun Nahar.

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Abstract

This thesis examines three distinct but interrelated topics that are centered on two important concepts in corporate finance, namely, organization capital and firm life cycle. Organization capital encompasses business practices, processes, systems, designs, and culture that affect firms' fundamental efficiency and future operating, investment, and innovation performance. On the other hand, firm life cycle theory proposes that firms pass through a series of predictable patterns of development, and that the resources, capabilities, strategies, structures, and functioning of the firm vary significantly with the corresponding stages of development. In light of recent advances in developing appropriate constructs for these two concepts at the firm-level, this thesis aims to examine the relationship between these two seemingly unrelated concepts and their effect on some firm-level variables, such as risks and cost of capital. In particular, the first topic is to explore the relationship between organization capital and firm life cycle, the second topic is to distinguish different types of organization capital and disentangle their differential impacts on idiosyncratic, systematic, and total risk, and the third topic is to examine the relationship between firm life cycle and cost of capital. These three new topics are largely unexplored in the literature. The thesis contributes to extending the frontier of corporate finance literature on these topics.

The first chapter in this thesis presents the introduction of the thesis. This chapter discusses the motivation for and structure of the thesis, presents a summary of the main findings, and outlines the contribution of the thesis.

The second chapter, entitled, "Organization Capital and Firm Life Cycle," focuses on the association between organization capital and firm life cycle stages. The results of the paper suggest that firms with higher organization capital are more likely to be in the introduction or decline stage, whereas firms with a lower level of organization capital are more likely to be in the growth or mature stage. The findings of this chapter also show that firms with a higher organization capital in the introduction and decline stages are more likely to progress to the growth and mature stages in the subsequent five years.

The third chapter of the thesis entitled, “Management-Specific Organization Capital vs. Firm-Specific Organization Capital – Are They the Same? Evidence from an Analysis on Firm Risks,” examines the role of management-specific and firm-specific organization capital on firm risks. This also investigates the relative role of management-specific and firm-specific organization capital in influencing risks. The results of this chapter suggest that the impact of management-specific and firm-specific organization capital on risks differs quite remarkably. In particular, management-specific organization capital increases (decreases) systematic (idiosyncratic and total) risk, while firm-specific organization capital increases (decreases) idiosyncratic and total (systematic) risk. This paper also shows that management-specific organization capital plays a dominant role in affecting firm risks.

The fourth chapter, “Firm Life Cycle and Cost of Equity Capital,” investigates the association between firm life cycle and cost of equity capital. The findings of this chapter show that cost of equity is higher in the introduction and decline stages but lower in the growth and mature stages, resembling a U-shaped pattern.

Finally, chapter five concludes the thesis and presents directions for future research.

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List of Abbreviations

AFAANZ	Accounting and Finance Association in Australia and New Zealand
AMEX	American Stock Exchange
ASX	Australian Securities Exchange
CRSP	Centre for Research in Security Prices
FLC	Firm Life Cycle
FM	Fama and MacBeth
I/B/E/S	Institutional Brokers' Estimate System
IV	Instrument Variables
LEV	Leverage Ratio
MTB	Market-to-Book Ratio
OC	Organization Capital
OC_MS	Management-Specific Organization Capital
OC_FS	Firm-Specific Organization Capital
OLS	Ordinary Least Square
NASDAQ	National Association of Securities Dealers Automated Quotations
NYSE	The New York Stock Exchange
SIC	Standard Industrial Classification
U.S.	United States of America
2SLS	Two-Stage Least Square

CHAPTER 1

INTRODUCTION

1.1 Background and Motivation

Organization capital and the firm life cycle have received considerable research interest in the contemporary finance, accounting, and economics literature. Extant studies suggest that organization capital plays a crucial role in improving firm (and national) innovation, growth, and competitiveness (Brynjolfsson, Hitt, & Shinkyu, 2002; Lev & Radhakrishnan, 2005). Studies on firm life cycle show that firm life cycle has an immense impact on operating performance (Warusawitharana, 2014), financing (Bender & Ward, 1993; Berger & Udell, 1998), investment (Richardson, 2006), and dividend decisions (DeAngelo, DeAngelo, & Stulz, 2006; Fama & French, 2001; Grullon, Michaely, & Swaminathan, 2002). The predominant role of organization capital and firm life cycle in influencing the productivity, efficiency, and performance of the firm, and recent advances in developing appropriate constructs for these two concepts at the firm level have motivated me to investigate three distinct but interrelated aspects of corporate finance that are centered around organization capital and the firm life cycle.

Organization capital, as defined by Lev and Radhakrishnan (2005, p. 75), is "an agglomeration of technologies—business practices, processes and designs, and incentive and compensation systems—that together enable some firms to consistently and efficiently extract from a given level of physical and human resources a higher value of product than other firms find possible to attain." Eisfeldt and Papanikolaou (2014) argue that organization capital is an increasingly important part of United States (U.S.) and global capital stock. Corrado, Hulten, and Sichel (2009) show that organization capital, the single largest category of intangible business capital, accounts for about 30% of all intangible assets in the U.S. Atkeson and Kehoe (2005) document that the payments that owners receive from organization capital are more than one-third of the payments they receive from physical capital. Furthermore, they show that organization capital represents more than 40% of the cash flows generated by all intangible assets in the U.S. National Income and Product Accounts. Likewise, Black and Lynch (2005) notes that changes in organizational capital account for approximately 30% of output growth in manufacturing over the period 1993–1996.

Adopting a firm-level analysis, Lev, Radhakrishnan, and Zhang (2009) show that organization capital is associated with future operating and stock return performance, and it captures firms' fundamental ability to generate abnormal performance. According to Eisfeldt and Papanikolaou (2013), firms with more organization capital are associated with 4.6% higher average returns. They also provide evidence that firms with more organization capital are more productive, have higher Tobin's Q, and exhibit higher executive compensation. Attig and Cleary (2014a) demonstrate that organization capital decreases investment sensitivity to internal cash flows, implying that superior management practices reduce the firm's financing frictions. Carlin, Chowdhry, and Garmaise (2012) find that firms with more organization capital have lower employee turnover and higher diversity in skills.

Corporate life cycle theory proposes that firms pass through a series of predictable patterns of development, and that the resources, capabilities, strategies, structures, and functioning of the firm vary significantly with the corresponding stage of development (Miller & Friesen, 1980, 1984; Quinn & Cameron, 1983). Recent research in finance and accounting also confirms the unique role of the firm life cycle stages. DeAngelo, DeAngelo, and Stulz (2010) demonstrate that the corporate life cycle has a significant influence on the probability that a firm will engage in secondary equity offerings. Other studies (e.g., Bulan, Subramanian, & Tanlu, 2007; DeAngelo et al., 2006; Fama & French, 2001) acknowledge the role of the firm life cycle in determining dividend payout policy. Evidence in the accounting literature also suggests that investors' valuation of firms and pricing of accruals and cash flows are a function of the life cycle stage of the firm (Anthony & Ramesh, 1992).

The resource-based theory of Wernerfelt (1984) suggests that resources are the ultimate source for establishing and maintaining competitive advantage. The dynamic resource-based view articulates the notion that general patterns and paths in the evolution of organizational capabilities change over time (Penrose, 1959; Rumelt, 1984; Wernerfelt, 1984). This theory proposes that the growth of a firm depends on the efficient and effective interaction between its resources and its management. Thus, the evolution of a firm's competitiveness, in terms of its resource base and capabilities, is the foundation of the firm's life cycle.

Numerous studies provide evidence that organization capital is a valuable resource base and source of competitive advantage. Lev and Radhakrishnan (2005) show that organization capital is a persistent creator of value and growth for business enterprises. They also suggest that the contribution made by organization capital is generally manifested in sustained growth in sales, earnings, and market value. Eisfeldt and Papanikolaou (2013) show that firms with more organization capital are more productive, and have higher Tobin's Q. Carlin et al. (2012) also view organization capital as a significant source of firm value. The strategic management literature, on the other hand, suggests that the resource base and competitive advantage are the foundations of the growth, development and success of a firm (Penrose, 1959; Wernerfelt, 1984). Thus, given that organization capital is a valuable resource base and source of sustainable competitive advantage, and that the firm life cycle is driven by production efficiency, performance, and firm-specific resources, I posit that the accumulation of firm-specific knowledge, business practices, processes, and overall systems is an important driving force that can explain firm progression across life cycle stages. Surprisingly, no study to date has empirically investigated the association between organization capital and firm life cycle. The **first paper** in this thesis addresses this gap in the literature and provides some intriguing findings on the association between organization capital and firm life cycle.

Despite the outstanding role played by organization capital in improving the productivity and efficiency of the firm, there remains debate in the academic literature concerning the adhesiveness of such organization capital. Some studies view organization capital as rooted in the business practices, processes and culture of the firm, and hence as firm specific (Lev et al., 2009; Atkeson & Kehoe, 2005; Tomer, 1987). Some studies, however, posit that organization capital is embodied in the efficiency and network of the employees of the firm, and, therefore executive specific (Jovanovic, 1979; Prescott & Visscher, 1980; Becker, 1993). Adding another context to this debate, some studies view the efficiency of organization capital as partly firm specific and embodied in the key talents of the firm, implying that it is a combination of both firm-specific and executive-specific organization capital (Eisfeldt & Papanikolaou, 2013). These divergences of opinion show that extant studies cannot clearly differentiate or precisely estimate management-specific and firm-specific organization capital, and therefore use these terms interchangeably, implicitly assuming that they have identical implications for firm outcome. The **second paper** in this thesis attempts to fill this void in the literature, disentangling firm-specific organization capital from management-specific organization capital and examining their (differential) impact on a wide range of firm risks.

Firms in different life cycle stages differ in their ability to raise funds from the market (Berger & Udell, 1998). Firms in the earlier stages of the life cycle are relatively small, unknown, and are less closely followed by analysts and investors. Hence, these firms suffer from substantial information asymmetry. On the other hand, mature firms have a longer existence in the market and they are more closely followed by analysts and investors. Hence, these firms suffer from less information asymmetry and are less risky. Easley and O'Hara (2004) note that firms with a long operating history are better known by investors, improving the precision of information about the firm and lowering the cost of capital. Resource-based theory also suggests that the resource base and capabilities of mature firms are large, diverse, and rich, whereas those of young and declining firms are small, concentrated, and limited. The resource base, together with its accompanying superior competitive advantage and capacities, may help mature firms to benefit from cheaper and easier sources of finance. However, research efforts examining the association between firm life cycle and cost of equity are scant. The **third paper** in this thesis investigates the association between firm life cycle and cost of equity capital.

1.2 Structure of Thesis and Summary of Findings

The thesis is structured around a three-paper format. These papers examine three distinct but interrelated aspects of corporate finance related to organization capital and firm life cycle. As a whole, the thesis consists of five chapters including this chapter. The rest of the thesis is structured as follows:

Chapter 2 presents the first paper of this thesis, which investigates the association between organization capital and firm life cycle. Extant studies show that organization capital is the source of productivity, performance, efficiency, competitiveness, and a valuable resource base for the firm. The strategic management literature suggests that a firm's movement through the life cycle depends on its valuable resource base and competitive advantage. Therefore, this paper argues that idiosyncratic and intangible organization capital may have valuable implications for firm life cycle progression.

The empirical evidence in this paper suggests that firms with more organization capital are likely to be in the introduction, shake-out, or decline stage, whereas firms with less organization capital are likely to be in growth or mature stage. The results also show that firms with higher organization capital in the introduction or decline stages are more likely to progress to the growth and mature stages in the subsequent five years. Taken together, this paper documents a significant impact of organization capital in influencing firm life cycle stages.

Chapter 3 presents the second paper of the thesis, which distinguishes different types of organization capital and disentangles their differential impacts on idiosyncratic, systematic, and total risk. Despite the considerable evidence that organization capital affects firm productivity, efficiency and performance, there remains a clear divergence of opinion regarding the adhesiveness of such organization capital. Some research argues that organization capital is firm-specific as it is rooted in the business practices, processes, and culture of the firm, whereas another line of research argues that organization capital is embodied in an organization's employees and their social networks, and yet other studies view the efficiency of organization capital as partly firm-specific and partly embodied in the key talents of the firm. These studies, however, do not *empirically* differentiate between management-specific and firm-specific organization capital, implicitly assuming that they have identical implications for firm-level outcomes and thus using both forms of organizational capital interchangeably. However, I argue that this assumption is questionable. Therefore, in this chapter, I first disentangle firm-specific organization capital from management-specific organization capital and then investigate whether both forms of organization capital affect firm risks identically. I argue that firm-specific organization capital and management-specific organization capital, owing to their idiosyncratic nature, should affect idiosyncratic, systematic, and total risk distinctively.

Using data from U.S. publicly listed firms from 1980 to 2012, this paper shows that the impact of organization capital on idiosyncratic, systematic, and total risk depends on whether organization capital is firm-specific or management-specific. The empirical evidence in this paper shows that management-specific organization capital reduces (increases) idiosyncratic and total (systematic) risk, whereas firm-specific organization capital reduces (increases) systematic (idiosyncratic and total) risk. Furthermore, management-specific organization capital, when interacting with firm-specific organization capital, negatively affects idiosyncratic, systematic and total risk, suggesting the dominant role of management-specific organization capital in reducing a wide range of firm risks.

Chapter 4 presents the third paper in this thesis, investigating the association between firm life cycle and cost of equity capital. An extensive body of literature suggests that investors' valuation of a firm is a function of the life cycle stage of the firm. I argue that as the life cycle has a significant influence on the firm's ability to attract investors, this should have implications for the cost of equity capital of the firm.

Using a sample of Australian firms between 1990 and 2012, I find that the cost of equity capital varies over the life cycle of the firm. In particular, this paper shows that the cost of equity is higher in the introduction and decline stages, and lower in the growth and mature stages, resembling a U-shaped pattern.

Chapter 5 provides a summary of major findings from the empirical analysis in this thesis. The chapter also presents overall conclusions and policy implications. In addition, it discusses directions for future research.

Table 1.1: Summary of the Findings

Chapter	**Hypothesis**	**Findings**
Two	Organization capital is associated with firms' progression through the life cycle stages.	Strong support
Three	**i.** Management-specific and firm-specific organization capital do not affect firm risk identically. **ii.** Management-specific organization capital, when interacting with firm-specific organization capital, plays a more dominant role in affecting firm risks.	Strong support
Four	Cost of equity varies with the firm's stage in the life cycle.	Strong support

1.3 Contribution to the Literature

The thesis investigates three aspects of organization capital and corporate life cycle that have largely been unexplored in the corporate finance literature. The findings of the thesis contribute to the literature in the following ways:

Chapter 2 of the thesis contributes to the corporate finance literature by examining the association of organization capital with the corporate life cycle stages. This chapter contributes to the area of research that stresses the importance of organization capital as a major driver of firms' (and national) growth and competitiveness (e.g., Eisfeldt & Papanikolaou, 2014; Lev & Radhakrishnan, 2005;

Youndt, Subramaniam, & Snell, 2004). While prior research shows that organization capital has a valuable impact on the growth, productivity, and competitiveness of the firm, little has hitherto been known about the role of organization capital in driving the corporate life cycle. This paper fills this gap in the literature. The findings in this chapter suggest that organization capital can greatly benefit the firm in remaining competitive in successive stages (i.e., the growth and mature stages). In particular, this study indicates that organization capital could be a channel through which managers can lead the firm to attain and maintain growth and mature, the prime stages, in their life cycle.

Chapter 3 of this thesis extends the corporate finance literature by directly examining the role of management-specific and firm-specific organization capital in influencing idiosyncratic, systematic and total risk. While prior research has investigated the association between organization capital and cross-sectional stock returns (Eisfeldt & Papanikolaou, 2013), future operating and stock return performance (Lev et al., 2009), investment cash flow sensitivity (Attig & Cleary, 2014a), and production possibility (Prescott & Visscher, 1980), little attention has been paid to the role of organization capital in influencing a wide range of risks. This paper bridges this gap in the literature. A further contribution of this chapter is that, to the best of my knowledge, it is the first to isolate firm-specific organization capital systematically from management-specific organization capital and examine whether both forms of organization capital affect firm-level outcomes identically. This chapter empirically shows that the effects of organization capital on idiosyncratic, systematic, and total risk differ considerably based on whether organizational capital is management-specific or firm-specific. Thus, this study makes an important contribution in resolving the competing views on the embodiments and effects of different forms of organization capital.

Chapter 4 extends the corporate finance literature by providing empirical evidence that the firm life cycle has significant implications for the cost of equity of the firm. While prior research has investigated the role of the firm life cycle in decision making regarding dividends (DeAngelo et al., 2006; Fama & French, 2001) and capital structure (Berger & Udell, 1998), little attention has been paid to the role of the firm life cycle in determining the cost of equity capital. This chapter attempts to fill this gap in the literature. It thus augments our understanding of the role of the corporate life cycle in major financial policies. The findings of this chapter may help managers to understand the effect of the life cycle on the financing costs of firms and hence has important implications for strategic planning.

CHAPTER 2

ORGANIZATION CAPITAL AND FIRM LIFE CYCLE[*]

2.1 Introduction

Firm-level organization capital, which "enables superior operating, investment and innovation performance, represented by the agglomeration of technologies—business practices, processes and designs" according to Lev et al. (2009, p. 277), has received immense interest in the recent finance and accounting literature. Studies in these areas show that organization capital affects a firm's fundamental ability to generate superior performance (Lev et al., 2009). The remarkable contribution of organization capital to entrepreneurial dynamics and productive capacity, as evidenced by recent studies, motivates corporations to invest a substantial amount of their capital in developing organization capital. Corrado et al. (2009) show that organization capital (firm-specific resources) is the single largest category of intangible capital, accounting for about 30% of all intangible assets in the United States. However, the role of organization capital in influencing the progression of a firm in its life cycle stages remains unclear and deserves more detailed study. This paper concentrates on how firm-specific organization capital, evidenced by business practices, processes, systems, designs and the unique corporate culture, contributes to the life cycle transition.

A growing body of literature suggests that organization capital affects firms' fundamental efficiency and future operating performance (Lev et al., 2009). Attig and Cleary (2014a) document that organization capital reduces the firm's financing frictions and contributes to value-maximizing behavior. Eisfeldt and Papanikolaou (2013) show that firms with more organization capital are more productive, have higher Tobin's Q and higher risk-adjusted returns, and display higher levels of

[*] This chapter of the thesis was presented at the Financial Markets and Corporate Governance Conference 2015, CRAE annual research forum, Curtin University, 2015, and the Finance and Financial Planning Seminar at Griffith University, 2014.

executive compensation. Other studies (e.g., Lev & Radhakrishnan, 2005) suggest that organization capital is a valuable resource base that provides firms with sustainable competitive advantage and drives firm growth and outcomes. The strategic management literature, on the other hand, suggests that the ability of a firm to capitalize the benefits from scarce and non-imitable firm-specific resources underpins its growth and development. Dickinson (2011) also suggests that firm life cycle (FLC) stages are distinct and identifiable phases that are determined by the key internal resources and/or external factors. Since organization capital is an important firm-specific resource base and source of sustainable competitive advantage, I argue that organization capital serves as one of the precursors that allow firms to progressively move from one stage to another.

The organization science literature suggests that firms in early stages of the life cycle should maximize growth opportunities to create permanent advantage over competitors and to make the product market unattractive to potential entrants (Porter, 1980; Spence, 1979). Therefore, firms are likely to have more organization capital in the introduction stage of the life cycle because they are willing to invest a substantial amount of resources in developing organization processes, practices, culture, language, know-how, etc. – commonly known as organization capital. firms in the growth and mature stages are more concerned with maximizing the benefits from the stock of organization capital (Atkeson & Kehoe, 2005). Since the cost incurred in developing organization capital in the introduction stage is not expected to increase significantly in the growth and mature stages during which firms also have incentives to acquire tangible assets,[1] I expect that firms in these stages are likely to be associated with less organization capital. In sum, I posit that organization capital is a determinant of the firm life cycle.

This study is motivated by some recent findings in the finance, accounting and economics literature that organization capital plays an important role in improving the efficiency and productivity of the firm. Eisfeldt and Papanikolaou (2014) note that organization capital is an increasingly important part of the US and global capital stock. Atkeson and Kehoe (2005) show that payments from

[1] See Section II for a discussion of these incentives.

organization capital are more than one-third of payments from physical capital, net of new investment. Prior studies (Lev & Radhakrishnan, 2005; Lev et al., 2009) also show that investment in organization capital form the basis of sustainable competitive advantage. This study is also inspired by the dynamic resource-based view (RBV) of the firm, which articulates that the general patterns and paths in the evolution of organization capabilities depend on the existence and application of the bundle of valuable, interchangeable, immobile and imitable resources[2] that generate the basis of the competitive advantage of a firm. Prior studies suggest that competitive advantage and capabilities influence transition of firms stages across the life cycle, which has profound effect on investment (Richardson, 2006), financing (Bender and Ward, 1993), dividend (Fama and French, 2001; DeAngelo et al., 2006), risk taking decision (Habib and Hasan, 2015) and choices of distress restructuring strategies (Koh et al, 2015). Therefore, it is important to assess real managerial decisions in the context of life cycle dynamism. Thus, by taking both the role of organization capital in forming the resource base and the role of the resource base in influencing the life cycle stages, I posit that organization capital can drive transition in a firm's life cycle stages.

To test the association between organization capital and firm life cycle (hereafter FLC), I examine how firms' organization capital is associated with the progression of the life cycle. I follow Eisfeldt and Papanikolaou (2013) to measure firm-specific organization capital based on selling, general and administrative (SG&A) expenses. The life cycle proxy is based on the methodology of Dickinson (2011). By using a large sample of U.S. public firms from 1987 to 2013, I find firms with a higher organization capital are more likely to be in the introduction or decline stages compared with their possibility of being in the shake-out stage. However, firms in the growth and mature stages are more likely to have a lower organization capital, as these firms concentrate more on exploiting benefits from the existing stock of organization capital and have incentives to acquire tangible assets. These results are robust after controlling for other predictors of FLC as well as alternative

[2] 'Resource' refers to any assets or input (tangible and intangible) to production that help the firm implement strategies to improve efficiency and effectiveness. Examples of resources include brand names, in-house knowledge of technology, employment of skilled personnel, trade contacts, machinery, efficient procedures and capital (Wernerfelt, 1984).

specifications of organization capital and life cycle proxies. To mitigate the endogeneity concern, I use a two-stage instrumental variable approach, and the results suggest that endogeneity cannot explain the relationship between organization capital and FLC.

In addition, I track the subsequent transition of introduction- and decline-stage firms based on their organization capital. My results reveal that introduction (decline) firms with high organization capital move to (move back to) the growth and mature stages at a higher rate than do firms with less organization capital. This result is consistent with the view that firms' investment in organization capital in the early stages of the life cycle enables them to develop the resource base and thus progress to the growth and mature stages. Moreover, firms' organization capital in the decline stage helps them revive and come back to favorable life cycle stages in subsequent years. My results are consistent with the findings of Lev et al. (2009) that upfront investment in organization capital serves as a subsequent source of competitive advantage, as evidenced by higher future firm performance in their study. Overall, the evidence in my study supports the notion that organization capital (i.e., business practices, processes, systems, designs and unique corporate culture) is a decisive resource that influences the effectiveness of the firm and progression of a firm's stage in the life cycle.

This study contributes to the literature in several ways. *First*, this paper extends the organization capital literature by directly examining the role of organization capital in influencing FLC stages. While prior research investigates the association of organization capital with cross sectional stock return (Eisfeldt & Papanikolaou, 2013) and future operating and stock return performance (Lev et al., 2009), little attention has been paid to the role of organization capital in driving FLC stages. Even though using a quantitative growth model of the life cycle of plants, Atkeson and Kehoe (2005, p. 1027) redefine the concept of "life cycle" in terms of *organization rent* which in turn hinges upon *organization capital*: "young plants tend to have low organization rents and older plants higher ones… an older plant has built up a type of intangible capital—organization capital—that entitles the owner to high organization rents", but they do not examine the role of organization capital in propelling FLC stages. This paper attempts to bridge that gap in the literature.

Second, this study contributes to the area of research that stresses the importance of organization capital as a major driver of firms' (and national) growth and competitiveness (e.g., Eisfeldt & Papanikolaou, 2014; Lev & Radhakrishnan 2005; Youndt et al., 2004). Prior theoretical (e.g., Carlin et al., 2012) and empirical studies (e.g., Lev & Radhakrishnan, 2005; Lev et al., 2009) provide evidence that organization capital improves the productivity and efficiency of the firm and thus can be an alternative source of value creation. This study extends these prior studies by empirically establishing a link between organization capital and transition of the FLC stages. I show that organization capital is a source of sustainable competitive advantage, which can progressively drive FLC stages in an important way. I specifically document that firms' shifting from the introduction to the growth and mature stages and moving back from the decline stage to the growth and mature stages depends largely on their organization capital. Thus, organization capital can greatly benefit the firm to remain competitive in the success stages (i.e., the growth and mature stages).

Third, given that organization capital represents a source of productivity and efficiency (Atkeson & Kehoe, 2005; Lev & Radhakrishnan, 2005), it is a key factor affecting firms' long-term success and competitiveness. Examining the link between organization capital and FLC, therefore, should help managers understand the effect of organization capital on firms' future growth and potential. Hence, this study has an important implication for managerial strategic planning: organization capital could be a channel through which managers can lead the firm to reach and maintain growth and mature, the prime stages, in their life cycle. Therefore, findings of the study make an important contribution to the understanding of the determinants of firms' survival and competitiveness.

Finally, this study also contributes to the life cycle literature that focuses on the determinants of firms' position in the life cycle stages. Although research efforts to understand the effect of FLC on financial performance and outcome are numerous, little is known as to whether organization capital is a new determinant of FLC stages.

The remainder of the paper is organized as follows: Section two reviews studies of organization capital and life cycle theory and develops testable hypotheses. Section three focuses on research design, data collection and sample selection. Section four documents the results of the study, while Section five concludes the paper.

2.2 Literature Review and Hypothesis Development

2.2.1 Organization Capital

The economics and management literature has long recognized the importance of organization capital in improving firm-level (and national-level) efficiency and productivity. The early management literature defines organization capital in terms of firm-specific management practice such as decentralization (Caroli & Reenen, 2001), high performance work systems (Bailey, Berg, & Sandy, 2000) and the opportunity to communicate with employees outside the work group, while the economics literature defines organization capital in terms of information assets (Prescott & Visscher, 1980; Squicciarini & Mouel, 2012) and estimates its effect on firm performance (e.g., Lev et al., 2009; Miyagawa & Kim, 2008). Furthermore, there are two views regarding the existence of organization capital in the firm. One school of thought views it as something embodied in an organization's employees and their social networks (Eisfeldt & Papanikolaou, 2013; Prescott & Visscher, 1980). On the contrary, another school of thought considers organization capital embodied in the organization itself, since this is rooted in organization practices, processes and systems, which do not change even if the employees of the organization are replaced (Atkeson & Kehoe, 2005; Lev & Radhakrishnan, 2005; Lev et al., 2009; Ludewig & Sadowski, 2009; Tomer, 1987).[3] In this regard, I take the second view and define it as sets of standardized practices, processes, designs,

[3] See Lev et al. (2009) and Ludewig and Sadowski (2009) for a detailed explanation of how organization capital is embodied in the organizational process.

culture and know-how that develop systems of production and effectively and efficiently integrate human skills and physical capital to consistently and efficiently generate a higher level of returns from a given resource endowment. The models developed by Rosen (1972) and Ericson and Pakes (1995) show that organization capital is acquired by endogenous learning by doing. Atkeson and Kehoe (2005) also follow this theme and consider organization capital to be embodied in the plant. Evenson and Westphal (1995, p. 2213) emphasize that "much of the knowledge about how to perform elementary processes and about how to combine them in efficient systems is tacit … neither codified nor readily transferable". Moreover, motivated by prior studies (e.g., Autor, Kerr, & Kugler, 2007; Bozkaya & Kerr, 2009) that suggest that employment protection regulations make it expensive to fire incumbents and hire new employees, I posit that organization capital is embodied in the firm. The study of Carlin et al. (2012) also suggests that firms with more organization capital are associated with higher employee retention and more frequent insider CEO succession. Prior studies show that investment in organization capital enables the firm to achieve higher productivity (Black & Lynch, 2005) and thus generate super-normal performance (Evenson & Westphal, 1995; Lev et al., 2009). Recent studies in finance and accounting also acknowledge the implication of organization capital in the cost of capital (Eisfeldt & Papanikolaou, 2013), investment cash flow sensitivity (Attig & Cleary, 2014a), corporate social responsibility (Attig & Cleary, 2014b) and employee turnover and diversity in skill and wages (Carlin et al., 2012).

Prior studies clearly differentiate organization capital from other intangibles. Blair and Wallman (2000) suggest that intangible assets such as copyrights, brand and trade names can be owned and sold, whereas organization capital is non-tradable and idiosyncratic (Ludewig & Sadowski, 2009). In a recent study, Attig and Cleary (2014a) differentiate organization capital from human capital in that the former (e.g., management *practices*) is more stable and remains within the firm for a relatively long period even after management turnover. However, human capital (e.g., management *style*) may change significantly over a relatively short time due to management turnover. Economists also argue that organizations store and accumulate knowledge and that this accumulated knowledge (i.e., organization capital) is distinct from the concepts of physical or human capital (Atkeson & Kehoe, 2005). Black and Lynch (2005) divide organization capital into three broad components, workforce training, employee voice and work design (including production processes). These components together contribute to the overall value of organization capital within a firm.

2.2.2 Organization Capital as a Source of Resource Base

Prior studies extensively document that organization capital, in the form of superior management practice, is associated with more efficient production and stable business operation and transactions, which leads to better firm performance (Attig and Cleary, 2014a; Fredrickson, 1986; Riley & Vahter, 2013). Attig and Cleary (2014a) document that organization capital reduces firms' investment sensitivity to internal cash flow. They also find that superior management practice lead to improvement in firm performance, which also alleviates capital market imperfections and capital constraints. By using SG&A expenses as a proxy for organization capital, Eisfeldt and Papanikolaou (2013) show that firms with more organization capital are more productive, have higher Tobin's Q and higher risk-adjusted returns and display a higher level of executive compensation. Lev et al. (2009) also find that organization capital is positively associated with long-term operating and stock performance.

Prior studies also document that organization capital is a source of sustainable competitive advantage. The study of Lev et al. (2009) suggests that investment in unique structural and organization designs and business processes serves as a source of sustainable competitive advantage. Atkeson and Kehoe (2005) estimate that the payments from organization capital are more than one-third of the payments from physical capital. They also document that organization capital represents more than 40% of the cash flows generated by all intangible assets in the US National Income and Product Accounts. Lev and Radhakrishnan (2005) state that organization capital enables firms to consistently and efficiently generate a higher level of production than other firms. Carlin et al. (2012) also admit that organization capital is a significant source of firm value.

The management literature also views organization capital as a firm-specific resource and important source of competitive advantage to create and maintain a revenue stream (Ludewig & Sadowski, 2009; Squicciarini & Mouel, 2012). Teece, Pisano, and Shuen (1997) suggest that organization structure and managerial processes determine a firm's ability to react and adapt to ever-changing business environments. This RBV stipulates that the fundamental sources and drivers of firms' competitive advantage and superior performance are associated with resources that are valuable and scarce (Barney, 1991; Barney, Wright, & Ketchen, 2001). In this regard, Barney (1991) also argues that resources that are difficult to imitate and substitute provide firms with sustainable competitive advantage. Organization capital is valuable because it allows productive interaction between tangible and intangible resources for creating economic value and growth (Lev et al., 2009). Organization capital (e.g., business processes, practices etc.) is difficult to imitate by competitors because of the adjustment cost. Lev and Radhakrishnan (2005) and Lev et al. (2009) explain how Wal-Mart's vendor-managed inventory and supply chains and electronic data exchange systems help the firm achieve long-lasting competitive advantage, which major competitors (such as K-Mart) have been largely unsuccessful in replicating. Carlin et al. (2012) also suggest that organization capital is tied to the firm and hence employees departing from the firm cannot carry this. They also argue that the learning and experience necessary for generating organization capital makes the acquisition and replacement of organization capital difficult and time consuming. These features also make organization capital a rare resource.

Thus, the concepts and lessons drawn from the above economics and management literature lend support that organization capital comprises knowledge, know-how and business practices and processes that empower firms to integrate physical and human capital in the most efficient and effective way to generate production efficiency and to gain sustainable competitive advantage. Moreover, from a strategic point of view, organization capital is valuable, rare and difficult to replicate and replace. Therefore, I conclude that organization capital is a valuable resource base that allows firms to achieve sustainable competitive advantage.

2.2.3 Resource Base as the Foundation of FLC

The RBV analyzes firms from the resource side rather than from the product side and posits that the existence and application of the bundle of valuable, scarce, immobile and inimitable resources generate the basis of sustainable competitive advantage for a firm (Barney, 1991). Moreover, this resource base is the root of heterogeneity in organization capabilities (Wernerfelt, 1984; Rumelt, 1984; Penrose, 1959). Dynamic resource-based theory incorporates the founding, development and maturity of capabilities and thereby suggests that competitive advantages and disadvantages in terms of resources and capabilities evolve over time in important ways (Helfat & Peteraf, 2003). This dynamic resource-based theory is mainly based on *The Theory of the Growth of the Firm* (Penrose, 1959), which proposes that the growth of the firm depends on the efficient and effective interaction of its resources and management. Thus, the evolution of the firm's competitiveness, in terms of its resource base and capabilities, is the foundation of its life cycle.

The FLC model suggests that firms, like the organic body, tend to progress in a linear fashion through predictable stages of development sequentially from birth to decline (Gray & Ariss, 1985; Miller & Friesen, 1984, 1980; Quinn & Cameron, 1983). Strategy and management researchers have adopted the FLC model from biological sciences (Van De Ven & Poole, 1995) and have incorporated it into business research since the 1960s. Penrose (1959) provides a general theory of firm growth, arguing that it depends on the firm's resources and productive opportunities. She identifies managerial limitations as the main constraint to a firm's growth rate. Chandler (1962), one of the pioneers of life cycle theory, argues that organization structure follows the growth strategy of the firm to avail itself of external opportunities. Subsequent studies in organization science reveal the grounds behind the existence of the FLC. For example, the resource-based theory of Wernerfelt (1984) suggests that resources are the ultimate source of establishing and maintaining competitive advantage. He argues that firms possess resources, a subset of which allows them to achieve competitive advantage over others, and a subset of those helps them attain superior long-term performance and thus earn above-average profits (Grant, 1991). In a more recent study, Helfat and Peteraf (2003) argue that the RBV must incorporate the emergence, development and progression of organization resources and capabilities over time and hence they introduce a more comprehensive and vibrant view: 'the dynamic resource-based theory'. This view suggests that the resource base that forms the foundation of competitive advantage and disadvantage comes about over a period of time and also may shift over time. They document that firms' portfolios of resources and capacities and their characteristics change over time and that this variation results in different stages in the FLC.

There are several multi-stage life cycle models, which differ in terms of the number of stages involved and features that correspond to each stage. For example, Greiner (1972) proposes that firms move through five stages of the life cycle in their movement from growth through creativity: direction, delegation, coordination, monitoring and collaboration. Adizes (1979) proposes that firms evolve through 10 stages in their life cycle ranging from courtship (where the firm exists only as an idea) to death. Kazanjian and Drazin (1990) propose four stages in the FLC, which are conception and development, commercialization, growth and stability. Gort and Klepper (1982) suggest five stages in the FLC, introduction, growth, mature, shake-out and decline. Summarizing the prior literature on life cycle models, Miller and Friesen (1984) propose a similar classification that separates the FLC into five common phases: birth, growth, mature, revival and decline. Based on this, Dickinson (2011) provides an empirical methodology to classify firms into different life cycles.

Recent empirical studies in accounting and finance investigate the impact of FLC on corporate financial decisions. Bender and Ward (1993) find that the financial structure of firms changes over the firms' life cycles. Berger and Udell (1998) argue that small and young firms generally resort to private equity and debt markets, whereas larger and mature firms mainly rely on public markets. Richardson (2006) suggests that firms are more likely to undertake relatively large, growth-oriented investments in the initial stage, while mature stage investments are more likely to be geared towards the maintenance of assets in place. Fama and French (2001), Grullon et al. (2002) and DeAngelo et al. (2006) find that mature and profitable firms are more likely to pay dividends, while young firms with higher growth options are less likely to do so. Koh et al. (2015) provide evidence that lifecycle affect firms' choices of distress restructuring strategies. Although a growing number of studies in accounting and finance investigate the role of FLC in affecting investment, financing and dividend decisions, no study to date has examined how FLC is influenced by firm's organization capital, a source of a sustainable resource base.

2.2.4 Organization Capital as a Determinant of FLC

The discussion in previous sections reveals that organization capital in terms of organization structure, culture and management processes and practices harmonizes physical and human capital to improve production efficiency and enhance a firm's ability to react and adapt to ever-changing business environments. Squicciarini and Mouel (2012) suggest that superior management qualities and flexible organization structures enrich a firm's capabilities to configure its production to enter new markets and upgrade its activity in global value chains, which ensure the growth and long-term survival of the firm. Lev and Radhakrishnan (2005) in this regard also suggest that organization capital determines the value and growth of enterprises and captures a firm's ability to maintain its leadership position. Thus, given that organization capital is a valuable resource base and source of sustainable competitive advantage and that FLC is driven by the accumulation of firm-specific resources, I posit that the accumulation of firm-specific knowledge, practices, processes and overall systems is the driving force that can explain firm progression across life cycle stages.

Dickinson (2011) develops a parsimonious firm-specific life cycle measure by deploying data from the firm's cash flow statement. She argues that cash flows capture differences in a firm's profitability, growth and risk and hence one may use cash flow from operating (OANCF), investing (IVNCF) and financing (FINCF) to group firms into life cycle stages such as 'introduction', 'growth', 'mature', 'shake-out' and 'decline'.[4] The methodology is based on the following cash flow pattern classification:

(1) introduction: if OANCF < 0, IVNCF < 0 and FINCF > 0;
(2) growth: if OANCF > 0, IVNCF < 0 and FINCF > 0;

[4] For a detailed justification of classifying firms into different life cycle stages based on cash flow statement data, please refer to Dickinson (2011).

(3) mature: if OANCF > 0, IVNCF < 0 and FINCF < 0;

(4) decline: if OANCF < 0, IVNCF > 0 and FINCF ≤ or ≥ 0; and

(5) shake-out: the remaining firm years will be classified under the shake-out stage.

Firms in the introduction stage of the life cycle lack an established customer base and suffer from knowledge deficits about potential revenues, costs, and industry dynamics (Jovanovic, 1982). Managerial optimism in this stage prompts firms to invest more to develop a sustainable resource base to deter potential entrants (Spence, 1977, 1979, 1981). As a result, firms in the introduction stage incur substantial cost in developing organization processes, systems, structures, capacities and qualities and employee skills and in adapting themselves to the competitive environment (Pérez, Llopis, & Llopis, 2004; Tomer, 2012). Atkeson and Kehoe (2005) suggest that owners incur substantial expenditure in organization capital in the initial stage of a plant's life cycle to reap organization rents in the future. Thus, the lack of established customers and knowledge base and substantial cost incurred for organization capital result in negative operating cash flows (i.e., OANCF<0) for introduction-stage firms. Introduction-stage firms also need to decide on financing organization capital and the other costs of operation. Prior studies (e.g., Barclay & Smith, 2005) show that introduction firms resort to debt financing to avail tax benefit (i.e., deductibility of interest expenses), which leads cash flow from financing to be positive (i.e., FINCF>0). However, introduction firms must also decide on the allocation of resources. In this line, (Tomer, 1987, p. 24) notes that "investment in organization capital uses up resources in order to bring about long lasting improvement in productivity, worker well-being, or social performance through changes in the functioning of the organization". Owing to resource constraints, firms in this stage may need to substitute alternative forms of productive resources with organization capital (Carlin et al., 2012). Thus, I expect that firms with a higher organization capital (compared with investment in tangible assets) in the introduction stage of the life cycle are likely to gain sustainable competitive advantage, to capture larger market shares, and to generate profit in the foreseeable future. Nonetheless, the formulation of profit-oriented and sustainable direction (i.e., the optimal combination of investment in physical assets and organization capital) resulting from managerial optimism in the introduction stage causes cash flow from investment to be negative (i.e., IVNCF<0). The cash flow pattern (OANCF<0, IVNCF<0 and FINCF>0) with more organization capital makes these firms a suitable candidate to be in the introduction stage.

H1: Firms with a higher organization capital are likely to be in the introduction stage.[5]

Firms in the growth stage of the life cycle are characterized by dramatic increase in sales and in the number of products, while firms in the mature stage are characterized by sales stabilization and acute market competition. Growth (mature) firms have already overcome the 'liability of newness' and initial exit probabilities and therefore, these firms have modest (adequate) knowledge regarding the competitiveness and these firms focus more on product modification and improvement (product differentiation) (Hay & Ginter, 1979; Wind, 1981). Organizational efficiency and effectiveness, derived from the accumulated organization capital in introduction stage of life cycle, help growth and mature firms to achieve productivity, growth, and competitiveness. Since organization capital, in the course of accumulation, store, retain, integrate and institutionalize knowledge regarding business process, practice and system within databases, documents, patents and manuals (Wright, Dunford, & Snell, 2001; Youndt et al., 2004), it becomes a critical component that guide firms' *future* actions (Zahra, Ireland, & Hitt, 2000). Therefore, firm's ability to exploit advantages from the available stock of organization capital critically determines its performance, which in turn influences life cycle stage transition. Moreover, the initial cost incurred in the introduction stage of the life cycle for developing organization capital is not re-incurred in the growth and mature stages, as management processes, practices and know-how are reused in business operations (OECD, 2012). Cohen and Levinthal (1990, p. 131) note that, "the ability to assimilate information is a function of the richness of the pre-existing knowledge structure: learning is cumulative, and learning performance is greatest when the object of learning is related to what is already known". Miyagawa and Kim

[5] As Dickinson (2011) remarks, the literature clearly spells out cash flow pattern of the different stages of the life cycle except for the shake-out stage. As a result, the impact of organization capital in shaping this stage is unclear. Thus, I use the shake-out stage as a basis in developing hypotheses and in interpreting the impact of organization capital in determining the other stages of the life cycle.

(2008) document that, “the conventional total factor productivity (TFP) growth rate decreases when investment in organization capital increases rapidly. After organization capital is sufficiently accumulated, it starts to contribute to conventional TFP growth”. This implies that organization capital development entails time, commitment, and financial resources, which does not yield benefit instantly, rather require time to generate the expected pay-off. Atkeson and Kehoe (2005) suggest that firms in the growth and mature stages concentrate to reap the benefits from the existing stock of organization structure, processes, practices and corporate culture. Therefore, increased efficiency in production and sales resulting from the existing organization capital, but reduced cost incurred for organization capital, leads growth- and mature-stage firms to generate positive operating cash flow (i.e., OANCF>0).

Growth-oriented firms attempt to expand operation to capitalize on the benefits from existing resources (e.g., business practices, processes, designs, culture, know-how etc.). Wernerfelt (1985) shows that in the presence of learning curves, declining price sensitivity, and declining growth rates, growth maximization early in the life cycle can be a means of profit maximization. In achieving this objective, firms in the growth stage focus more on investment in physical assets and in the efficient use of capabilities and resources-base (Hambrick, MacMillan, & Day, 1982). In the mature stage, firms also continue to invest in physical assets as some of these assets become obsolete (Wernerfelt, 1985). Thus, for both growth- and mature-stage firms, investing cash flow is expected to be negative (i.e., IVNCF<0).

Growth firms continue to resort to debt financing for capital investment, and further growth and development, resulting in positive financing cash flow (i.e., FINCF>0). On the contrary, limited growth opportunity in mature-stage prompts firms to focus on debt servicing and distribution of excess funds among shareholders (i.e., FINCF<0). In sum, I expect that higher level of organization capital in introduction stage of life cycle prompt firms to capitalize productivity and efficiency from the available stock of organization capital and to progressively move to growth and mature stage. In pursuing this objective, firms in the growth and mature stages of the life cycle do not invest more in organization capital further; rather, they tend to invest more in tangible assets, and maximize the benefits from existing organization capital. Therefore, the resulting cash flow patterns ((OANCF>0, IVNCF<0 and FINCF>0) and (OANCF>0, IVNCF<0 and FINCF<0)) are likely to be associated with firms with less organization capital, making these firms suitable candidates to be in the growth and mature stages, respectively.

H2: Firms with less organization capital are more likely to be in the growth and mature stages.

Firms in the decline stage are characterized by very low or negative profit margins, low levels of efficiency and low capacity utilization (Dickinson, 2011). In this stage, other firms begin to adopt and improve upon the innovating entrepreneur's new idea and hence firms' competitive advantage in terms of resource base and organization capital begins to decline (Mueller, 1972). Tomer (1990), in this vein, notes that, "organization capital is subject to depreciation, obsolescence, inefficient utilization and disuse." If firms cannot match their innovation and business process, practice and culture with that of competitors, functioning of the firms become irrelevant to the innovative activities of the other firms in the market. Therefore, the '*liability of senescence'* phenomenon also suggests that decline firms face a relatively high likelihood of exiting the market due to their internal inefficiencies, erosion of technology, products, business concepts and management strategies over time. To overcome this limitation and boost their market share, firms in the decline stage are likely to concentrate in business process analysis, employee retraining and new work procedures that constitute organization capital. The study of Dickinson (2011) also depicts that decline-stage firms may increase their R&D as a turnaround attempt. Sørensen and Stuart (2000) also argue that, "older firms may innovate more frequently, and their innovations may have greater significance than those of younger enterprises." Thus, poor sales performance, together with an increase emphasis to reformulate organization capital, results in negative operating cash flow (i.e., OANCF<0). On the other hand, the liquidation of assets to serve debt and support operations results in positive cash flow from investment (i.e., IVNCF>0).[6] Moreover, decline firms may focus on debt repayment and/or the renegotiation of debt to

[6] It is worth noting that investment in organization capital, in an accounting sense, only results in an increase in expenses (especially SG&A) but not an increase in assets.

finance investment in organization capital and to meet other costs, leading cash flow from financing activities to be positive or negative (FINCF≥0 or FINCF≤0). In sum, outdated business practice, process and culture may motivate decline stage firms to reinforce the lost efficiency and productivity to get back to favorable life cycle stage, causing stock of organization capital to increase further. This leads firms with higher stock of organization capital more likely to be in decline stage.

Other studies, however, show that firms can enter the decline stage from any other stages. The *'liability of newness'* phenomenon (Amit & Schoemaker, 1993; Freeman, Carroll, & Hannan, 1983; Jovanovic, 1982; Stinchcombe, 1965) suggests that initial endowments (monetary resources, technological or managerial capability, etc.) interact with mortality rates. Thus, young and growth-stage firms that succumb to initially high mortality rates may switch from the growth stage to the decline stage. Firms in this stage prefer to distribute the earnings among investors rather than investing in future growth (DeAngelo et al., 2006). Thus, lower level of organization capital firms are likely to be in decline stage.

Thus, lacking a clear theoretical guidance on the association between organization capital and decline-stage firms, I formulate the following two competing hypotheses:

H3a: There is a positive association between organization capital and the decline stage of firm life cycle.

H3b: There is a negative association between organization capital and the decline stage of firm life cycle.

2.3 Research Design

2.3.1 Sample and Data

The sample of this study includes all non-financial (excluding SIC 6000–6799) firms traded on NYSE, AMEX, and NASDAQ (EXCHG =11, 12 and 14) that are available from the Compustat fundamentals annual file from 1987 to 2013 and that have the required financial information. The sample period begins in 1987 because prior to that year cash flow data required to estimate the life cycle are unavailable.[7] To avoid the undesirable influence of outliers, I winsorize key variables at the 1st and 99th percentiles. I also exclude observations with missing values in the measurement of key dependent variables (i.e., life cycle proxies), independent variable and control variables. Table 2.1 presents the sample selection (Panel A) and industry distribution of the sample (Panel B). Variable definitions are presented in appendix 2.1.

Table 2.1: Sample Selection and Distribution of the Sample

Panel A: Data and Sample

Description	**Total number of observations**
Data available in Compustat fundamentals annual file from 1987 to 2013	299,612
Less:	
Financial firms	(75,908)
	223,704
Firms listed outside NYSE, AMEX and NASDAQ	(105,225)
	118,479
Firms for which financial data are not available in USD	(3139)
	115,340
Firms with missing values for the variables used in the regression model	(47,292)
Final sample (firm years)	68,048

Table 2.1, Panel B reports the composition of the sample by the 12 industry groups. The sample is unevenly distributed across industries (with the largest sample being in business equipment (25.25%) and manufacturing (14.54%) industries, respectively).

[7] Since 1987, firms have been required to disclose cash flow data under the Statement of Financial Accounting Standards No. 95 (SFAS 95 (1987)).

Panel B: Industry Distribution		
Industry Name	**Total Number of Observations**	**% of Observations**
Consumer nondurables	4,740	6.79%
Consumer durables	2,019	2.97%
Manufacturing	9,896	14.54%
Oil, gas and coal extraction and products	4,257	6.26%
Chemicals and allied products	2,403	3.53%
Business equipment	17,181	25.25%
Telephone and television transmission	2,279	3.35%
Utilities	246	0.36%
Wholesale, retail and some services	8,733	12.83%
Healthcare, medical equipment and drugs	7,001	10.29%
Other	9,293	13.66%
Total	68,048	100.00%

2.3.2 Empirical Model

I test the relation between organization capital and FLC with multinomial logistic regression model. Multinomial logistic regression is suitable because the dependent variable (i.e., firm life cycle) is a categorical variable which contains a set of mutually exclusive and unordered categories. Suppose that my data comprises a set of n (i = 1,..., n) independent firms where the i^{th} firm consists of T_i observations. Let Y_{it} denote the t^{th} life cycle stage in firm i (t = 1, ..., T_i), where this life cycle stage is from one of r (r = 1, ..., R) distinct categories. Further, x_{it} denotes a column vector of p independent variables for the t^{th} observation in the i^{th} firm.

My multinomial logistic model is specified as follows:

$$\log\left(\frac{\pi_{itr}}{\pi_{it1}}\right) = \alpha_r + x_{it}^{'}\beta_r + u_{ir}, \quad r = 1 \ldots., R \qquad (2.1)$$

where $\pi_{itr} = Pr(Y_{it}= \text{r})$ are the probability of firm i in the r^th stage of firm life cycle in year t, α_r are constant terms, β_r is a p-vector of regression coefficients that capture the impact of regressors x_{ij}, and u_{ir} is the error term that follows a multivariate normal distribution with zero mean and variance-covariance matrix Σ. Two groups of regressors are included in x_{ij}; they are the main variable of interest ($OC_{i,t}$) and a set of control variables that are known to be determinants of firm life cycle. These control variables include firm size (SIZE), market to book value (MTB) ratio, capital structure (LEV), firm profitability (ROE), sales growth ($\Delta SALES_{i,t}$), capital expenditure (CAPEX), firm age (AGE), asset turnover (ATO), and investment in advertising (ADVERT) and R&D (R&D).[8] I predict the coefficient of $OC_{i,t}$ to be positive for H1 but negative for H2.

The likelihood function of firm i is,

$$l(\alpha_r, \beta_r, \Sigma) = \int_{-\infty}^{+\infty} \left\{ \prod_t^{T_i} \left[\frac{\exp(\alpha_r + x_{it}^{'} \beta_r + u_{ir})}{\sum_q^R \exp(\alpha_q + x_{it}^{'} \beta_q + u_{iq})} \right]^{I(Y_{it}=r)} \right\} f_u(u_i, \Sigma) \mathrm{du_i} \quad (2.2)$$

where $I(.)$ is an indicator function and $f_u(u_i, \Sigma)$ is the multivariate normal density. The overall likelihood function is the product of the above likelihood function from each firm and cannot be solved in closed form. As a result, maximum likelihood estimation of the parameters is done via numerical integration.

To identify the parameters (namely, α_r, β_r, and Σ), I impose a normalization by restricting α_4= 0, β_4= 0, and u_{i4} = 0, so that interpretation of parameters is with reference to the fourth category (i.e., shake-out stage). The shake-out stage is chosen because its role in the life cycle is ambiguous in theory (Dickinson, 2011). Thus, the shake-out stage is used as the base of the comparison and interpretation of results in the multinomial logistic regression model.

Note that because of the normalization, the parameters so estimated are generally not directly interpretable. For example, a negative coefficient on x_{it} does

[8] See Section 2.3.5 for a discussion of why these control variables are relevant.

not imply that a decrease in x_{it} reduces the probability that firm i is in a particular firm life cycle stage. Instead, marginal effect (ME) can be computed for firm i for the r^{th} stage of firm life cycle and regressor k and is defined as follows:

$$ME_{irk} = \frac{dPr(Y_{it}=r)}{dx_{ik}} \qquad (2.3)$$

Since there are five stages with Dickinson (2011)'s firm cycle measure, five corresponding marginal effects can be computed. These marginal effects capture, as their definition implies, the extent to which a one-unit change in regressor k increases or decreases the probability of firm i being in the r^{th} stage of firm life cycle.

2.3.3 Dependent Variables: FLC Proxies

Assessing the life cycle stage at the firm level is difficult because the individual firm is composed of many overlapping, but distinct, product life cycle stages. Moreover, firms can compete in multiple industries and their product offerings are fairly diverse (Dickinson, 2011). To overcome this estimation problem, I follow the methodology of Dickinson (2011) to develop proxies for the firms' stage in the life cycle.[9] The identification of life cycle stages based on Dickinson (2011) combines the implications from diverse research areas such as production behavior, learning/experience, investment, market share and entry/exit patterns. As a result, this process can capture the performance and allocation of the resources of the firm. I classify all sample firms into different FLCs based on the following cash flow pattern classification:

(1) introduction: if OANCF < 0, IVNCF < 0 and FINCF > 0;

(2) growth: if OANCF > 0, IVNCF < 0 and FINCF > 0;

(3) mature: if OANCF > 0, IVNCF < 0 and FINCF < 0;

[9] Anthony and Ramesh (1992) provide one of the first empirical procedures for classifying firms into different life cycle stages. However, I do not use their method for two reasons: (1) this classification procedure is 'ad hoc' and relies on portfolio sorts to classify the firm into different life cycle stages and (2) Dickinson (2011) shows that life cycle classification based on Anthony and Ramesh's (1992) procedure leads to an erroneous classification of the stage of firms in the life cycle.

(4) decline: if OANCF < 0, IVNCF > 0 and FINCF ≤ or ≥ 0; and

(5) shake-out: the remaining firm years will be classified under the shake-out stage.

I also use DeAngelo et al. (2006)'s life cycle proxies as alternative measures in the robustness section of the study.

2.3.4 Independent Variable: Estimation of Organization Capital

Organization capital is inherent in firms' underlying business practices, processes, and organization systems. Moreover, investment in organization capital is neither fully tracked nor publicly disclosed by the firm. Thus, the implicit and distinctive characteristics of organization capital make its estimation difficult at the firm level (Lev et al., 2009).

In this study, I follow the methodology of Eisfeldt and Papanikolaou (2013) to estimate firm-level organization capital based on SG&A expenses. Eisfeldt and Papanikolaou (2013, p. 1380) argue that "a large part of SG&A consists of expenses related to labor and IT (white collar wages, training, consulting, and IT expenses), consistent with the idea that any accrued value will be somewhat firm specific…" Lev et al. (2009) also argue that SG&A expenses include costs relating to developing information systems, employee training, R&D, consultant fees and brand promotion, which aid in building organization capital.

I construct organization capital based on the perpetual inventory method.[10] More specifically, I calculate the stock of organization capital (OC) each year by accumulating the deflated value of SG&A expenses based on the following equation:

$$OC_{i,t} = OC_{i,t-1}(1-\delta_0) + \frac{SGA_{i,t}}{cpi_t} \tag{2.4}$$

[10] Eisfeldt and Papanikolaou (2013) use a similar process to construct the stock of organization capital. Moreover, Zhang et al. (2012) and the Bureau of Economic Analysis use a similar methodology to construct R&D stock.

where $OC_{i,t}$ (and δ_0) denote the firm-specific stock of organization capital at time t (and depreciation rate of OC), while SGA and cpi_t are SG&A expenses and the consumer price index, respectively.

The initial stock of organization capital is estimated as

$$OC_{i,t_0} = \frac{SGA_{i,t_0}}{g+\delta_0}, \tag{2.5}$$

where $t_0 =$ initial year for the firm in the sample. Following Eisfeldt and Papanikolaou (2013), I use a depreciation rate (δ_0) of 15% in the estimation of the stock of organization capital. Hall and Mairesse (1995), Zhang et al. (2012) and the Bureau of Economic Analysis also use this rate in the estimation of R&D capital. Growth (g) in the flow of organization capital is estimated as the average real growth of firm-level SG&A expenses, which is 10.31% in my estimates. I replace any missing values of SG&A with zero.

In the sensitivity analysis, I also use Lev et al. (2009)'s approach to check the robustness of the result. For details, see Section 2.4.5.3.

2.3.5 Control Variables

Prior studies suggest that firms in any stage of the life cycle are impacted by internal factors (e.g., firms' financial resources, performance and growth) and the external environment (e.g., industry competitiveness and economic factors). Hence, the above regression model incorporates a number of control variables that are likely to affect FLC stages. Firm size is one of the important determinants of firms' life cycle stages. Prior studies (e.g., Geroski, 1995; Mata & Portugal, 1994; Pérez et al., 2004) suggest that large firms enjoy better access to capital and labor markets, which in turn improves the possibility of firms' survival and growth. On the contrary, small firms suffer from the *liability of newness* and *liability of smallness*, which increase their exit probability (Aldrich & Auster, 1986; Pérez et al., 2004). Hence, I control for firm size (SIZE) in the regression model. FLC stages depend on the growth and progress of the firm. Growth opportunities are plenteous in the introduction and growth stages, while limited in the mature and decline stages (Dickinson, 2011). I control for firm growth by using the market to book value (MTB) ratio. The availability of capital at favorable terms and rates also affects a firm's ability to grow and expand its operations. Prior studies show that the debt capacity of growth firms is higher compared with firms in other stages (Diamond & Verrecchia, 1991; Myers, 1984). Therefore, I control for a firm's capital structure (LEV). Profitability is frequently used in the business strategy and management accounting literatures in the context of life cycle analysis (Anthony & Ramesh, 1992). Profitability in the marketplace encourages new entrants in the market. When competition develops and other firms adopt and/or improve the innovating entrepreneur's new idea to gain more market control, profit opportunities begin to decline (Mueller, 1972). Since profitability conveys an important signal about a firm's position in the life cycle, I control for firm profitability (ROE). Anthony and Ramesh (1992) argue that a firm maximizes revenue growth in the early stages of its life cycle to create permanent cost or demand advantages over competitors. They also note that in the mature stage market growth slows and investments are less rewarding. By taking these views into account, I also control for a firm's sales growth ($\Delta SALES_{i,t}$).

Anthony and Ramesh (1992) also suggest that capital expenditure can signal the strategic emphasis of the firm and explain its position in the life cycle; hence, they use this as one of the components in estimating FLC stages. By taking their view into consideration, I also control for capital expenditure (CAPEX). Prior studies provide inconclusive evidence regarding a firm's age on survival possibility. Pérez et al. (2004) suggest that both younger and older firms face a higher hazard of exit. Anthony and Ramesh (1992) use age as one of the components to assess a firm's life cycle stage. Dickinson (2011) documents that a firm's age is usually at its maximum in the mature stage and at its minimum in the introduction and decline stages. Therefore, I control for firm age (AGE) in the regression model. I measure firm age as the log of the number of years since the firm's first appearance in the CRSP database. Asset turnover (ATO) reflects firms' capacity utilization, which forms a basis of competitive advantage and thus influences firms' stage in the life cycle. The study of Selling and Stickney (1989) suggests that product-differentiating firms concentrate on R&D, advertising and capacity growth, all of which are function of business strategy and competitiveness. Investment in R&D and advertising helps firms in achieving and retaining market share. Dickinson (2011) also finds that advertising intensity and R&D are higher in early-stage firms as they build their initial technology. The RBV of the firm (Barney, 1991; Wernerfelt, 1984) also posits that a firm's survival greatly depends on its ability to develop specific capabilities, which in turn may be improved by investing in R&D. Kimura and Fujii (2003) and Audretsch and Mahmood (1995) find that innovative firms and firms that invest more in R&D activities enjoy better survival prospects. To control for these determinants, I explicitly use a firm's investment in advertising (ADVERT) and R&D (R&D).[11] Firms belonging to different industries may experience different growth and development, which affect their life cycle transition processes. Hence, to take into account these industrial differences, I control for industry effect. I also control for year effect to address the concern that firms' life cycles may be adversely (favorably) affected by economic recession (expansion).

2.4. Results and Analysis

2.4.1 Descriptive Statistics

Table 2.2 presents the descriptive statistics for the variables included in the recession estimates. Panel A reports the pooled and life cycle-wise descriptive statistics for the dependent, independent and control variables, Panel B presents the Pearson correlations and Panel C shows how organization capital changes as the firm moves from one stage to another. Panel A shows that the mean (median) value of organization capital as a proportion of total assets (i.e., OC/TA) and that of organization capital as a proportion of property, plant and equipment (i.e., OC/PPE) are 1.1776 (1.299) and 19.024 (7.087), respectively. Panel A also reveals that, on average, OC/TA and OC/PPE are higher in the introduction, shake-out and decline stages compared with that in the growth and mature stages. Consistent with the data

[11] In the regression model, I do not explicitly control for intangibles as the MTB variable is highly correlated with intangibles ($\rho = 0.77$). Brynjolfsson et al. (2002) and Edmans (2011) note that the market value of a firm may differ markedly from the value of its tangible assets alone, as investors attempt to incorporate intangible assets into their valuations of firms. In other words, MTB incorporates not only anticipated growth opportunities but also intangible assets.

of Eisfeldt and Papanikolaou (2013), my statistics also reveal that high OC/TA and OC/PPE firms tend to have higher intangible capital of other forms (such as ADVERT and R&D). The mean values of MTB, AGE, ROE, SIZE, ADVERT and R&D across the life cycle stages are also largely consistent with those of Dickinson (2011). For example, similar to the findings of Dickinson (2011), Panel A shows that mean MTB (AGE) is at its highest (3.664 and 20.339, respectively) in the introduction (mature) stage, while it is at its lowest (2.408 and 10.414, respectively) in the shake-out (introduction) stage. The life cycle-wise sample distribution shows that around 75% of the firms fall into the growth and mature stages. Further analysis reveals that SIZE, ROE and AGE progressively increase as firms move from the introduction to the mature stage and that these estimates then drop as firms move from the mature to the decline stage; the opposite pattern is observed for R&D and ADVERT. The estimates in Panel A of Table 2.2 are also consistent with life cycle theory and the pattern of statistics across the life cycle is in line with Dickinson (2011), signifying the reliability of the estimates.

Table 2.2: Descriptive Statistics

Panel A: Pooled and Life Cycle-wise Descriptive Statistics

Variables	**Statistics**	**Pooled**	**Introduction**	**Growth**	**Mature**	**Shake-out**	**Decline**
OC/TA	Mean	1.776	2.409	1.492	1.696	1.984	2.607
	Median	1.299	1.682	1.094	1.306	1.381	1.826
	Std. Dev.	1.805	2.387	1.540	1.580	2.077	2.526
OC/PPE	Mean	19.024	32.532	14.840	13.896	29.061	43.633
	Median	7.087	14.234	5.466	6.126	11.108	19.026
	Std. Dev.	38.790	54.077	30.860	27.472	53.932	66.922
SIZE	Mean	5.648	4.535	5.855	6.102	5.239	4.564
	Median	5.528	4.433	5.856	6.107	5.142	4.543
	Std. Dev.	2.104	1.669	1.899	2.214	2.134	1.613
MTB	Mean	2.919	3.664	3.125	2.712	2.408	2.850
	Median	2.007	2.181	2.217	1.927	1.620	1.718
	Std. Dev.	3.943	5.576	3.730	3.577	3.615	4.512
LEV	Mean	0.246	0.306	0.317	0.208	0.164	0.153
	Median	0.188	0.227	0.265	0.174	0.078	0.045
	Std. Dev.	0.270	0.335	0.318	0.203	0.218	0.236
ROE	Mean	0.110	-0.219	0.171	0.203	0.047	-0.280
	Median	0.145	-0.098	0.174	0.188	0.068	-0.205
	Std. Dev.	0.693	1.122	0.528	0.581	0.682	0.980
ΔSALE	Mean	0.179	0.364	0.277	0.092	0.069	0.134
	Median	0.092	0.149	0.169	0.065	0.020	0.004
	Std. Dev.	0.495	0.865	0.502	0.264	0.455	0.738
CAPEX	Mean	0.074	0.077	0.113	0.059	0.036	0.033
	Median	0.046	0.041	0.070	0.044	0.024	0.021
	Std. Dev.	0.093	0.108	0.127	0.055	0.042	0.043
AGE	Mean	16.736	10.414	14.418	20.339	17.615	11.556
	Median	11.745	6.837	9.795	15.751	12.679	7.748
	Std. Dev.	15.827	10.850	14.294	17.236	16.076	11.868
ATO	Mean	1.326	1.412	1.171	1.380	1.079	0.846
	Median	1.127	1.132	1.223	1.194	0.898	0.667
	Std. Dev.	0.928	1.149	0.942	0.876	0.812	0.736
ADVERT	Mean	0.014	0.022	0.012	0.013	0.013	0.020
	Median	0.000	0.000	0.000	0.000	0.000	0.000
	Std. Dev.	0.044	0.076	0.038	0.034	0.042	0.070
R&D	Mean	0.262	0.584	0.257	0.116	0.326	0.781
	Median	0.004	0.070	0.000	0.000	0.023	0.301
	Std. Dev.	0.868	1.588	0.726	0.359	0.951	1.751
	N	68,048	7,020	21,708	29,431	6,587	3,302
	% of total N	100%	10.32%	31.90%	43.25%	9.68%	4.85%

Notes: Variable definitions are provided in appendix 2.1.

Table 2.2, Panel B reveals that organization capital and most of the control variables are highly correlated with the life cycle proxies. As expected, organization capital (OC/TA and OC/PPE) is positively correlated (at $p<0.001$) with the introduction, shake-out and decline stages, while significantly negatively correlated (at $p<0.001$) with the growth and mature stages. Moreover, SIZE and ROE are negatively (positively) correlated ($p<.001$) with the introduction, shake-out and decline (growth and mature) stages, while ΔSALE is positively (negatively) correlated ($p<.001$) with the introduction and growth (mature, shake-out and decline) stages. Overall, the correlations among organization capital (OC/TA and OC/PPE), the life cycle proxies, and the control variables are all in the expected direction and thus provide strong support for the validity of the key measures and constructs.

Panel B: Correlation Matrix

Variables	**Introduction**	**Growth**	**Mature**	**Shake-Out**	**Decline**	**RE/TA**	**RE/TE**
OC/TA	0.118	-0.108	-0.039	0.038	0.104	-0.391	-0.175
OC/PPE	0.118	-0.074	-0.116	0.085	0.143	-0.386	-0.194
SIZE	-0.188	0.049	0.166	-0.072	-0.122	0.233	0.152
MTB	0.064	0.036	-0.046	-0.042	*-0.004*	-0.084	-0.371
LEV	0.076	0.181	-0.124	-0.099	-0.078	-0.055	0.033
ROE	-0.161	0.056	0.118	-0.029	-0.127	0.221	0.399
ΔSALE	0.127	0.135	-0.153	-0.073	-0.021	-0.085	-0.042
CAPEX	*0.009*	0.282	-0.146	-0.135	-0.100	0.045	0.035
AGE	-0.140	-0.100	0.199	0.018	-0.074	0.157	0.121
ATO	0.032	0.034	0.051	-0.087	-0.117	0.078	0.063
ADVERT	0.064	-0.031	-0.021	*-0.004*	0.030	-0.039	-0.012
R&D	0.126	*-0.004*	-0.147	0.024	0.135	-0.245	-0.102

Notes: All numbers except those in *italics* are significant at $p<.001$
Variable definitions are provided in appendix 2.1.

Panel C of Table 2.2 explains how the changes in the organization capital determine the transition of FLC across different stages. The bold numbers refer to the OC/TA and OC/PPE of firms in the current stage of the life cycle. The figures in Table 2.2, Panel C depict that introduction and decline stage firms with significantly lower OC/TA and OC/PPE tend to move to growth or mature stages. On the other hand, growth or mature stage firms that move to introduction, shake-out or decline stages are associated with significantly higher ($p<.001$) OC/TA and OC/PPE. Finally, shake-out firms with significantly more (less) OC/TA and OC/PPE tend to move to introduction or decline (growth or mature) stage. Overall, these results suggest that as investment in organization capital increases (decreases), the firm move to the introduction, shake-out and decline (growth and mature) stages.

Panel C: Organization Capital and Transition in FLC					
Existing Stage	**Transition**	**OC/TA**	**t (*p* value)**	**OC/PPE**	**t (*p* value)**
Introduction	**Introduction**	**2.409**	**-**	**32.532**	**-**
	Growth	2.107	4.841 (0.000)	25.799	4.809 (0.000)
	Mature	2.117	4.693 (0.000)	22.737	7.793 (0.000)
	Shake-out	2.339	0.699 (0.484)	34.668	-0.859 (0.390)
	Decline	2.559	-1.617 (0.106)	40.217	-3.404 (0.001)
Growth	Introduction	1.999	-9.149 (0.000)	23.489	-7.334 (0.000)
	Growth	**1.492**	**-**	**14.840**	**-**
	Mature	1.493	-0.041 (0.967)	12.371	6.568 (0.000)
	Shake-out	1.637	-3.278 (0.001)	21.437	-6.660 (0.000)
	Decline	2.094	-5.539 (0.000)	31.738	-6.380 (0.000)
Mature	Introduction	2.116	-6.907 (0.000)	23.105	-7.524 (0.000)
	Growth	1.536	7.653 (0.000)	11.598	6.880 (0.000)
	Mature	**1.696**	**-**	**13.896**	**-**
	Shake-out	1.831	-3.533 (0.000)	21.410	-8.424 (0.000)
	Decline	2.186	-4.879 (0.000)	27.438	-5.898 (0.000)
Shake-out	Introduction	2.468	-4.310 (0.000)	37.894	-3.259 (0.001)
	Growth	1.747	4.259 (0.000)	24.847	2.969 (0.003)
	Mature	1.820	3.671 (0.000)	20.861	7.876 (0.000)
	Shake-out	**1.984**	**-**	**29.061**	**-**
	Decline	2.205	-1.999 (0.046)	38.448	-2.989 (0.003)
Decline	Introduction	2.763	-1.476 (0.140)	44.591	-0.345 (0.730)
	Growth	2.345	2.194 (0.028)	33.342	3.569 (0.000)
	Mature	2.333	2.187 (0.0292)	30.642	4.315 (0.000)
	Shake-out	2.550	0.442 (0.658)	40.959	0.803 (0.422)
	Decline	**2.607**	**-**	**43.633**	**-**

2.4.2 Univariate t-test

Table 2.3 reports the mean OC/TA and OC/PPE for different stages of the life cycle. This table shows that the mean OC/TA and OC/PPE for each stage significantly differs from that of the other stages based on the t-test. The average OC/TA and OC/PPE decrease significantly (at $p<0.001$) from the introduction to the growth stage, from the growth to the mature stage,[12] from the introduction to the mature stage and from the introduction to the shake-out stage of the FLC. However, the mean OC/TA and OC/PPE increase significantly (at $p<0.001$) from the mature to the

[12] However, OC/TA increases from the growth to the mature stage.

shake-out stage, from the shake-out to the decline stage, from the introduction to the decline stage, from the growth to the shake-out stage and finally from the growth to the decline stage. Overall, the fluctuations in OC/TA and OC/PPE imply that organization capital is higher in the introduction, shake-out and decline stages but lower in the growth and mature stages, resembling a 'U' shaped pattern. This supports the theoretical argument that introduction- (shake-out- and decline-) stage firms with more organization capital can generate (reinforce) the capacity to move to the growth and mature stages of the life cycle.

Table 2.3: Mean Difference Test of Organization Capital

Mean Difference Test of Organization Capital Using Dickinson (2011)'s Life Cycle Measure				
Estimates	**(Stage 1)**	**(Stage 2)**	***t* statistics for differences**	**p-values**
	Introduction	**Growth**		
OC/TA	2.409	1.492	-30.217	0.000
OC/PPE	32.532	14.840	-26.048	0.000
	Growth	**Mature**		
OC/TA	1.492	1.696	14.591	0.000
OC/PPE	14.840	13.896	-3.576	0.000
	Mature	**Shake-out**		
OC/TA	1.696	1.984	10.606	0.000
OC/PPE	13.896	29.061	22.159	0.000
	Shake-out	**Decline**		
OC/TA	1.984	2.607	12.248	0.000
OC/PPE	29.061	43.633	10.857	0.000
	Introduction	**Mature**		
OC/TA	2.409	1.696	-23.835	0.000
OC/PPE	32.532	13.896	-27.996	0.000
	Introduction	**Shake-out**		
OC/TA	2.409	1.984	-11.099	0.000
OC/PPE	32.532	29.061	-3.743	0.000
	Introduction	**Decline**		
OC/TA	2.409	2.607	3.779	0.000
OC/PPE	32.532	43.633	8.329	0.000
	Growth	**Shake-out**		
OC/TA	1.492	1.984	17.790	0.000
OC/PPE	14.840	29.061	20.388	0.000
	Growth	**Decline**		
OC/TA	1.492	2.607	24.673	0.000
OC/PPE	14.840	43.633	24.311	0.000

2.4.3 Regression Analysis

Panel A and Panel B (Panel C) of Table 2.4 show the multinomial logistic regression results (marginal effect results) for organization capital (OC/TA and OC/PPE) and Dickinson (2011)'s life cycle proxies with clustered standard errors at the firm level. As there are five life cycle stages with the dependent variable and I am interested in finding out the likelihood of observing a firm in a particular stage, multinomial logistic regression can provide me with such probabilities. Dickinson (2011) categorizes FLC into five stages: introduction, growth, mature, shake-out and decline. Five categorical variables are thus created for each (introduction = 1, growth = 2, mature = 3, shake-out = 4 and decline = 5) life cycle stage.

Panel A shows that the coefficients of all the control variables have the predicted signs and statistical significance, suggesting that the model specification is reasonable. For example, consistent with FLC theory and the empirical findings (e.g., Anthony & Ramesh, 1992; Dickinson, 2011; Mata & Portugal, 1994; Pérez et al., 2004), SIZE and ROE are positively (negatively) associated with the growth and mature (introduction and decline) stages, implying that large and profitable (small and loss-making) firms belong to the growth and mature (introduction and decline) stages. The negative associations of AGE with the introduction, growth and decline stages support the findings of Pérez et al. (2004) that young and old firms have higher exit possibilities. Moreover, the positive (negative) association of $\Delta SALE$ with the introduction and growth (mature) stages is consistent with the view of Anthony and Ramesh (1992) that firms maximize revenue growth in the early stages of their life cycles, while in the mature stage market growth slows. Furthermore, the positive (negative) coefficient of R&D with the introduction and growth (mature) stages also supports FLC in that firms invest in innovation in early stages to maximize growth opportunities and deter potential entrants (Kimura & Fujii, 2003; Spence, 1979), while investments in R&D are less rewarding in the mature stage (Anthony & Ramesh, 1992).

Table 2.4: Regression Results
Panel A: Association between OC/TA and Life Cycle Stages

Dep. Var. =	**(Model 1) Introduction**	**(Model 2) Growth**	**(Model 3) Mature**	**(Model 4) Decline**
OC/TA	**0.036****	**-0.112*****	**-0.078*****	**0.108*****
	(2.395)	**(-7.760)**	**(-5.184)**	**(7.554)**
SIZE	-0.215***	0.147***	0.195***	-0.186***
	(-14.035)	(12.065)	(16.627)	(-10.404)
MTB	0.027***	-0.004	-0.013**	0.000
	(4.056)	(-0.641)	(-1.962)	(0.032)
LEV	2.763***	2.516***	0.419***	0.783***
	(20.330)	(19.377)	(3.713)	(4.441)
ROE	-0.404***	0.081**	0.284***	-0.448***
	(-9.868)	(2.500)	(8.155)	(-9.793)
ΔSALE	0.57 8***	0.440***	-0.173**	0.354***
	(7.304)	(5.887)	(-2.304)	(4.211)
CAPEX	16.918***	18.996***	11.139***	4.459***
	(21.993)	(25.207)	(15.308)	(4.003)
AGE	-0.515***	-0.234***	-0.023	-0.338***
	(-16.247)	(-9.053)	(-0.933)	(-9.320)
ATO	0.333***	0.574***	0.512***	-0.770***
	(6.327)	(12.896)	(12.973)	(-9.928)
ADVERT	1.356***	-1.094**	-0.689	1.170**
	(2.588)	(-2.221)	(-1.469)	(2.054)
R&D	0.194***	0.116**	-0.719***	0.167***
	(3.457)	(2.210)	(-9.688)	(3.216)
Constant	0.006	-1.388***	-0.595	1.191**
	(0.014)	(-3.904)	(-1.476)	(2.385)
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Pseudo R^2				0.167
Log pseudo-likelihood				-75663.236
Observations	68,048	68,048	68,048	68,048
Number of Firms	6,872	6,872	6,872	6,872

Notes: This table estimates Equation (2.1) on the sample partitioned by life cycle stage as defined in Dickinson (2011). The indicator for the shake-out stage is omitted and thus the intercept term captures the effect of the shake-out stage. Other life cycle stage coefficients are compared with the shake-out stage.

Robust z-statistics in brackets. Standard errors are clustered by firm. *** p<0.01, ** p<0.05, * p<0.10

Variable definitions are provided in appendix 2.1.

The coefficients of organization capital as a proportion of total assets (OC/TA) are significant and positive for firms in either the introduction or decline stages (at $p<.05$ and $p<.001$, respectively), while they are significant and negative for those firms in the growth or mature stages (both at $p<.001$). These results suggest that compared with the shake-out stage, firms in the introduction and decline stages are likely to be associated with more organization capital, whereas firms in the growth and mature stages are likely to be associated with less. Thus, the regression coefficients in Model 1 to Model 3 (β_1 = 0.036, -0.112 and -0.078, respectively) do not reject H1 and H2. The regression result in Model 4 (β_1 = 0.108, $p<.001$) reveals that the decline stage is positively associated with organization capital, lending support to H3a rather than H3b.

Table 2.4, Panel B reports the multinomial logistic regression results for the alternative measure of organization capital (OC/PPE). Consistent with Eisfeldt and Papanikolaou (2013), in this measure, I scale the stock of organization capital by property, plant, and equipment (PPE) instead of book assets.[13] Overall, Table 2.4, Panel B provides results that are consistent with that in Table 2.4, Panel A. In particular, the coefficients of organization capital as a proportion of property, plant and equipment (OC/PPE) are significant and positive in the introduction and decline stages (at $p<.10$ and $p<.05$, respectively), while they are significant and negative in the growth and mature stages (both at $p<.001$).

[13] For the regression estimates, I scale stock of organization capital (OC) by net PPE (PPENT). However, the results are "qualitatively" similar if OC is scaled by gross PPE (PPEGT).

Panel B: Association between OC/PPE and Life Cycle Stages

Dep. Var. =	(Model 1) Introduction	(Model 2) Growth	(Model 3) Mature	(Model 4) Decline
OC/PPE	**0.001***	**-0.002*****	**-0.005*****	**0.001****
	(1.729)	**(-3.680)**	**(-8.100)**	**(2.435)**
SIZE	-0.223***	0.159***	0.193***	-0.215***
	(-14.792)	(13.361)	(16.803)	(-11.853)
MTB	0.029***	-0.006	-0.014**	0.005
	(4.203)	(-0.910)	(-2.066)	(0.607)
LEV	2.755***	2.534***	0.411***	0.733***
	(20.214)	(19.416)	(3.629)	(3.985)
ROE	-0.416***	0.090***	0.297***	-0.490***
	(-9.840)	(2.709)	(8.224)	(-10.209)
ΔSALE	0.569***	0.477***	-0.142*	0.316***
	(7.193)	(6.376)	(-1.901)	(3.712)
CAPEX	16.654***	18.584***	10.521***	4.477***
	(22.065)	(25.102)	(14.741)	(4.093)
AGE	-0.504***	-0.254***	-0.030	-0.317***
	(-16.121)	(-9.889)	(-1.222)	(-8.707)
ATO	0.349***	0.512***	0.500***	-0.660***
	(7.149)	(12.005)	(12.652)	(-8.976)
ADVERT	1.355***	-1.450***	-0.693	1.284**
	(2.598)	(-2.900)	(-1.486)	(2.281)
R&D	0.195***	0.134***	-0.642***	0.167***
	(3.717)	(2.735)	(-8.854)	(3.350)
Constant	0.047	-1.437***	-0.590	1.267***
	(0.107)	(-4.030)	(-1.470)	(2.498)
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Pseudo R^2				0.165
Log pseudo-likelihood				-75711.206
Observations	67,993	67,993	67,993	67,993
Number of Firms	6,868	6,868	6,868	6,868

Notes: This table estimates Equation (2.1) on the sample partitioned by life cycle stage as defined in Dickinson (2011). The indicator for the shake-out stage is omitted and thus the intercept term captures the effect of the shake-out stage. Other life cycle stage coefficients are thus compared with the shake-out stage.

Robust z-statistics in brackets. Standard errors are clustered by firm. *** p<0.01, ** p<0.05, * p<0.10
Variable definitions are provided in appendix 2.1.

Panel C shows the marginal effects of OC/TA and OC/PPE estimated from the above regression models for different stages of firm life cycle. Section I reveals that one unit increase in OC/TA may increase the probability of firms being stayed in the introduction stage (0.8%), shake-out stage (0.5%) and decline stage (0.6%) but it may reduce the probability of firms being stayed in the growth stage (-1.4%) and mature stage (-0.5%), respectively. Likewise, Section II also reports that firm with more OC/PPE is likely to be in introduction, shake-out and decline stage, while firm with less OC/PPE is likely to be in mature stage. Thus, the regression results and associated marginal effects imply that OC/TA and OC/PPE have a significant impact in shaping the FLC stages.

Panel C: Marginal Effect Results

I. Margin effect of OC/TA - Estimated from Regression Results in Panel A

Margin effect – OC/TA			Delta-method		
		dy/dx	Std. Err.	Z	P>Z
OC/TA					
	Introduction	0.008	0.000	8.82	0.000
	Growth	-0.014	0.001	-7.47	0.000
	Mature	-0.005	0.001	-2.79	0.000
	Shake-out	0.005	0.001	5.17	0.000
	Decline	0.006	0.001	12.19	0.000

Note: dy/dx = marginal effect

II. Margin effect of OC/PPE - Estimated from Regression Results in Panel B

Margin effect – OC/PPE			Delta-method		
		dy/dx	Std. Err.	Z	P>Z
OC/PPE					
	Introduction	0.0003	0.000	7.89	0.000
	Growth	0.0001	0.001	0.95	0.340
	Mature	-0.0007	0.000	-7.59	0.000
	Shake-out	0.0002	0.000	5.79	0.000
	Decline	0.0001	0.000	6.44	0.000

Note: dy/dx = marginal effect

The regression results and marginal effect results in Table 2.4 are also consistent with the theory and prior empirical findings. The positive and significant coefficient of the introduction stage with OC/TA (OC/PPE) provides support to the argument that organization capital is directly related to the *future* productivity and efficiency of firms, especially for those firms in the early stages of the life cycle. These regression results also reveal that introduction-stage firms invest more in R&D and advertising for capacity development. These results are consistent with prior studies that document that firms should invest more in the early stages of the life cycle to create sustainable competitive advantage, maximize growth opportunities and deter potential entrants (Porter, 1980; Spence, 1979). The negative and significant coefficients of the growth and mature stages with OC/TA (OC/PPE) are in line with the argument that growth- and mature-stage firms invest more in physical capital compared with organization capital, while at the same time maximize the benefit from the existing stock of organization capital. The findings of Eisfeldt and Papanikolaou (2013) that low OC/TA firms have higher investment rates in physical capital (12.6% vs. 10.1%) also lend support to my findings. The positive association between the decline stage and OC/TA (and OC/PPE) is somewhat interesting in the sense that it provides valuable insights into the contribution of OC/TA (OC/PPE) in reviving the FLC. This result lends support to the argument that firms in the decline stage of the life cycle are more likely to invest in organization capital as a means of deepening or refreshing the organization process, system and know-how. This finding is also consistent with those of prior studies (e.g., Greiner, 1972) that firms without adequate learning abilities can move from the later part of the success stage to the decline stage and that these crises can be solved by introducing new structures and programs that help employees revitalize them. Dickinson (2011) also finds that decline firms increase their investment in R&D as a turnaround attempt.

In sum, the multinomial logistic regression results reveal that high OC/TA (and OC/PPE) firms are more likely to be in the introduction or decline stage, while low OC/TA (and OC/PPE) firms are likely to be in the growth or decline stage. This regression result is consistent with the view that a firm's investment in organization capital in the early stages (decline stage) provides it with a sustainable resource base (restoration of organization practices, processes and systems), which enables firms to take advantage in the subsequent years and thereby move to the growth and mature stages. These results largely concur with the findings of Adizes (1979) who argues that management practice, style and process influence the life and effectiveness of an enterprise (see Masurel & Montfort, 2006). Further, the recent findings of Lev et al. (2009) that organization capital captures fundamental efficiency attributes affecting long-term performance also support the findings.

2.4.4 Additional Analysis

2.4.4.1 Contribution of Organization Capital to Moving Introduction and Decline Firms to the Growth and Mature Stages

The results in the previous section show that firms with more organization capital are likely to be in the introduction and decline stages (compared with the likelihood of being in the shake-out stage). However, Dickinson (2011) observes that around 57% of introduction firms are likely to move to the growth or mature stages at the end of five years. Moreover, she notes that only a small proportion of decline firms (18%) remain in the decline stage after five years. I attribute this movement in life cycle stages to organization capital. It is my view that firms with a higher organization capital in these two stages tend to move to the growth and mature stages (desired stages in the life cycle) in subsequent years. Table 2.5 reports results that support my view.

Table 2.5, Panel A reports an overall (unrestricted) transitional probabilities matrix of introduction-stage firms (Part I), a transitional probabilities matrix of introduction-stage firms with high OC/TA (OC/TA ≥ mean OC/TA) (Part II), that with low OC/TA (OC/TA< mean OC/TA) (Part III) in the next five-year period and a comparison of transitional probabilities between firms with high OC/TA and low OC/TA (Part IV). For comparison purposes, I estimate mean OC/TA for each industry[14] (based on the Fama–French 48-industry classification) and year, and group

[14] Carlin et al. (2012) argue that firms in rapidly changing industries are less likely to invest in organization capital because such industries have a greater technology obsolescence risk, which reduces the usefulness of a firm's organization capital in the future. Hence, I estimate mean OC/TA

introduction-stage firms based on their OC/TA into the respective years. To ensure the availability of five years of data subsequent to the initial introduction stage classification, I need to collapse the sample into an overlapping five-year window over the sample period; as a result, the sample size is further reduced to n = 5999. The overall (i.e., unrestricted) transition shows that on average 54.7% (i.e., 28.0% + 26.7%) of introduction firms shift to the growth and mature stages in the next five years. On the other hand, as expected, on average 71.6% (69.7%) of high (low) OC/TA introduction-stage firms move to the growth and mature stages in the next five years. The comparison of the transitional probabilities between firms with high and low OC/TA shows that introduction-stage firms with more OC/TA stay in (move to) the introduction (decline) stage at a lower rate ($p<.05$ and $p<0.10$, respectively) than that of firms with low OC/TA. Moreover, compared with low OC/TA, high OC/TA firms move to the mature stage more frequently ($p<0.10$). Thus, organization capital helps firms progress in the transition of life cycle stages.

As in Panel A, Panel B of Table 2.5 presents a similar set of tables but for decline-stage firms only. Consistent with the findings for the introduction stage in Panel A, 70.7% (66.4%) of high (low) OC/TA decline-stage firms move back to the growth and mature stages. The table shows that decline-stage firms with high OC/TA stay in (move to) the decline (introduction) stage at a significantly lower rate (both at $p<.01$), while these firms move to the growth and mature stage at a significantly higher rate (at $p<.001$ and $p<0.05$, respectively).[15] Several observations are worth noting from this analysis. In general, 19.2% of introduction firms are likely to stay in the introduction stage at the end of five years. However, for high OC/TA introduction firms, only 12.5% of introduction-stage firms remain in the same stage. By the same token, 11.90% of decline-stage firms normally stay in the same stage at the end of five years. Nonetheless, only 6.0% of decline-stage firms with high OC/TA remain in the same stage at the end of five years. High OC/TA firms in the introduction stage are less likely to move to the decline stage in the subsequent five years because the mean percentage is just 6.1.

for each industry and year, and use this mean to classify firms into two groups: high OC/TA (if $OC/TA_{i,t} \geq$ mean $OC/TA_{j,t}$) and low OC/TA (if $OC/TA_{i,t} <$ mean $OC/TA_{j,t}$).

[15] Untabulated results also show that growth and shake-out firms with more OC/TA are more likely ($p<0.10$) to move to the mature stage in the subsequent years, while mature-stage firms with more OC/TA are less likely to move to the decline stage.

Table 2.5: Transition of Introduction- and Decline-Stage Firms in the Next Five Years

Panel A: Transition of Introduction-Stage Firms in the Next Five Years

I. Overall Transition of Introduction-Stage Firms in the Next Five Years

Existing Stage	Transition in Future Period	t+1	t+2	t+3	t+4	t+5	Mean
	Introduction	0.336	0.262	0.236	0.212	0.192	0.247
	Growth	0.240	0.271	0.290	0.294	0.305	0.280
Introduction	Mature	0.208	0.247	0.269	0.299	0.315	0.267
(n = 5,999)	Shake-out	0.096	0.107	0.105	0.105	0.102	0.103
	Decline	0.120	0.113	0.101	0.092	0.086	0.103

II. Transition of Introduction-Stage Firms with *OC/TA*>= Mean *OC/TA*

Existing Stage	Transition in Future Period	t+1	t+2	t+3	t+4	t+5	Mean
	Introduction	0.123	0.131	0.141	0.128	0.125	0.130
	Growth	0.330	0.345	0.315	0.328	0.340	0.332
Introduction	Mature	0.398	0.371	0.391	0.393	0.368	0.384
(n = 2,298)	Shake-out	0.089	0.092	0.092	0.094	0.104	0.094
	Decline	0.060	0.061	0.061	0.057	0.064	0.061

III. Transition of Introduction-Stage Firms with *OC/TA*< Mean *OC/TA*

Existing Stage	Transition in Future Period	t+1	t+2	t+3	t+4	t+5	Mean
	Introduction	0.153	0.151	0.133	0.143	0.136	0.143
	Growth	0.315	0.325	0.336	0.332	0.341	0.330
Introduction	Mature	0.370	0.363	0.369	0.370	0.364	0.367
(n = 3,701)	Shake-out	0.101	0.098	0.098	0.092	0.095	0.097
	Decline	0.061	0.062	0.065	0.063	0.064	0.063

IV. Comparative Transition of Introduction-Stage Firms with *OC/TA*>= Mean *OC/TA* and *OC/TA*< Mean *OC/TA*

Existing Stage	Transition in Future Period	*Movement of % of firms*			
		High OC/TA	***Low OC/TA***	**t-stat.**	***p* value**
	Introduction	0.130	0.143	-2.731	0.026
	Growth	0.332	0.330	0.277	0.789
Introduction	Mature	0.384	0.367	2.679	0.055
	Shake-out	0.094	0.097	-0.982	0.364
	Decline	0.061	0.063	-1.933	0.094

Panel B: Transition of Decline-Stage Firms in the Next Five Years

I. Overall Transition of Decline-Stage Firms in the Next Five Years							
Existing Stage	**Transition in Future Period**	**t+1**	**t+2**	**t+3**	**t+4**	**t+5**	**Mean**
	Introduction	0.249	0.233	0.211	0.195	0.174	0.212
	Growth	0.165	0.228	0.255	0.279	0.296	0.244
Decline	Mature	0.155	0.201	0.230	0.263	0.277	0.225
(n = 2,786)	Shake-out	0.148	0.127	0.141	0.131	0.135	0.137
	Decline	0.283	0.211	0.162	0.132	0.119	0.181

II. Transition of Introduction-Stage Firms with *OC/TA*>= Mean *OC/TA*							
Existing Stage	**Transition in Future Period**	**t+1**	**t+2**	**t+3**	**t+4**	**t+5**	**Mean**
	Introduction	0.127	0.108	0.113	0.120	0.128	0.119
	Growth	0.332	0.318	0.344	0.330	0.331	0.331
Decline	Mature	0.380	0.398	0.361	0.365	0.378	0.376
(n = 1,187)	Shake-out	0.098	0.110	0.110	0.123	0.103	0.109
	Decline	0.063	0.066	0.072	0.062	0.060	0.065

III. Transition of Introduction-Stage Firms with *OC/TA*< Mean *OC/TA*							
Existing Stage	**Transition in Future Period**	**t+1**	**t+2**	**t+3**	**t+4**	**t+5**	**Mean**
	Introduction	0.125	0.148	0.136	0.133	0.141	0.137
	Growth	0.310	0.317	0.297	0.310	0.311	0.309
Decline	Mature	0.366	0.344	0.365	0.341	0.358	0.355
(n = 1,599)	Shake-out	0.109	0.110	0.110	0.133	0.117	0.116
	Decline	0.090	0.081	0.091	0.083	0.073	0.084

IV. Comparative Transition of Decline-Stage Firms with *OC/TA*>= Mean *OC/TA* and *OC/TA*< Mean *OC/TA*					
Existing Stage	**Transition in Future Period**	***Movement of % of firms***			
		High OC/TA	***Low OC/TA***	**t-stat.**	***p* value**
	Introduction	0.119	0.137	-3.925	0.002
	Growth	0.331	0.309	5.067	0.000
Decline	Mature	0.376	0.355	3.074	0.012
	Shake-out	0.109	0.116	-1.359	0.204
	Decline	0.065	0.084	-5.796	0.000

Taken together, these observations suggest that high OC/TA firms in both the introduction and decline stages tend to improve their position in *subsequent* periods, confirming the positive role of organization capital in the life cycle transition process.

2.4.4.2 Changes in Organization Capital across Life Cycle

My results show that firms with high (low) organization capital are likely to be in introduction and decline (growth and mature) stages compared with the likelihood of being in the shake-out stage. Now, I investigate whether the changes in organization capital across the life cycle stages show a similar pattern. Multinomial logistic regression results tabulated in Appendix 2.2 show that changes in the organization capital are significantly ($p<.01$) positive (negative) in decline (growth and mature) stages. Result for introduction stage is negative but insignificant. I argue that higher organization capital in introduction and decline stage originates from different premises. In introduction stage, there is relatively small portion of tangible asset compared to organization capital and hence the change in organization capital in this stage is not statistically significant. However, in decline stage, firms invest substantial amount in organization capital, which causes changes in organization capital to be positive and significant.

2.4.5 Sensitivity Analysis and Robustness Checks

2.4.5.1 Alternative FLC Stages as Benchmark

Recall that the regression results are interpreted with reference to shake-out stage as it is used as the benchmark. To ensure that the results are not specific to any benchmark FLC stage, I repeat estimations in Equation 2.1 for the association between organization capital and firm life cycle using other FLCs as benchmark. Table 2.6, Panel A shows that compared to introduction firms - growth, mature and shake-out (decline) firms are associated with significantly lower (higher) OC/TA and OC/PPE. Moreover, when mature stage is used as a benchmark, regression results suggest that OC/TA and OC/PPE are significantly higher in the introduction and decline (growth) stages, while evidence for shake-out stage is mixed. Furthermore, compared to any other stage, decline firms are associated with significantly higher ($p<.01$ mostly) OC/TA and OC/PPE. Overall, regression results corroborate the results reported earlier in the main analysis.

Table 2.6: Sensitivity Analysis and Robustness Checks

Panel A: Association between OC/TA (and OC/PPE) and Life Cycle Stages

Life Cycle Stage / Benchmark stage	Model 1 (OC/TA)					Model 2 (OC/PPE)				
	Introduction	**Growth**	**Mature**	**Shake-Out**	**Decline**	**Introduction**	**Growth**	**Mature**	**Shake-Out**	**Decline**
Introduction	-	-0.148***	-0.114***	-0.036**	0.072***	-	-0.003***	-0.006***	-0.001*	0.000
	-	(-11.249)	(-8.169)	(-2.395)	(5.010)	-	(-6.518)	(-9.159)	(1.729)	(0.727)
Growth	0.148***	-	0.034***	0.112***	0.220***	0.003***	-	-0.002***	-0.002***	0.004***
	(11.249)	-	(3.030)	(7.760)	(13.680)	(6.518)	-	(-4.359)	-3.680	(5.456)
Mature	0.114***	-0.034***	-	0.078***	0.186***	0.006***	0.002***	-	-0.005***	0.006***
	(8.169)	(-3.030)	-	(6.359)	(12.285)	(9.159)	(4.359)	-	-8.100	(8.952)
Shake-Out	0.036**	-0.112***	-0.078***	-	0.108***	0.001*	-0.002***	-0.005***	-	0.001**
	(2.395)	(-7.760)	(-6.359)	-	(7.554)	(1.729)	(-3.680)	(-8.100)	-	(2.435)
Decline	-0.072***	-0.220***	-0.186***	-0.108***	-	-0.000	-0.004***	-0.006***	0.001**	-
	(-5.010)	(-13.680)	(-12.285)	(-7.554)	-	(-0.727)	(-5.456)	(-8.952)	(2.435)	-

Robust z-statistics in brackets. Standard errors are clustered by firm.

Controls and industry and year fixed effects are included but not reported.

*** p<0.01, ** p<0.05, * p<0.10

Variable definitions are provided in appendix 2.1.

2.4.5.2 Alternative Specification of FLC

To mitigate the concerns that the results are driven by the choice of life cycle proxies, I use the two alternative measures of FLC proposed by DeAngelo et al. (2006), namely Retained Earnings to Total Assets (RE/TA) and Retained Earnings to Total Equity (RE/TE). DeAngelo et al. (2006) observe that firms with high RE/TA and RE/TE are typically more mature or old with declining investment, while firms with low RE/TA and RE/TE tend to be young and growing. Therefore, they argue that RE/TA and RE/TE are appropriate FLC proxies. Panel B of Table 2.6 reports the OLS estimates[16] of the relationship between organization capital (OC/TA or OC/PPE) and these two new alternative FLC measures. The coefficient of RE/TA (RE/TE) is negative and statistically significant (at $p<0.001$), regardless of whether organization capital is measured as OC/TA or OC/PPE. This suggests that organization capital decreases as RE/TA and RE/TE increases. More specifically, since firms in the mature stage tend to have more RE/TA and RE/TE, the regression results indicate that mature firms have a lower level of OC/TA and OC/PPE. Regression results also reveal that mature firms (firms with higher RE/TA and RE/TE) are large, profitable, efficient and incur more cost for capital expenditure and advertising (the coefficients of SIZE, ROE, ATO, CAPEX and ADVERT are positive and statistically significant). On the other hand, the coefficients of MTB and ΔSALE are negative and statistically significant. In sum, the coefficients of OC/TA and OC/PPE (main variable of interest) and the control variables have the predicted signs and significance. Thus, the results using RE/TA and RE/TE (alternative measures of FLC) are similar to those obtained in the main analysis (Table 2.4) and this helps justify that the results are not sensitive to the choice of life cycle proxy.

[16] Multinomial logistic regression is used to predict the probabilities of the different possible outcomes of a categorically distributed dependent variable. Since RE/TA and RE/TE (dependent variables) in Table 2.6, Panel B are continuous measures (not categorically distributed), I use OLS to estimate the association between the life cycle proxies (RE/TA and RE/TE) and organization capital.

Panel B: Alternative Specification of the Life Cycle

Dep. Var. =	(Model 1) *RE/TA*	(Model 2) *RE/TE*	(Model 3) *RE/TA*	(Model 4) *RE/TE*
OC/TA	**-0.320***** **(-16.615)**	**-0.241***** **(-9.058)**	-	-
OC/PPE	-	-	**-0.010***** **(-11.736)**	**-0.011***** **(-8.562)**
SIZE	0.104*** (14.461)	0.344*** (21.288)	0.136*** (17.339)	0.351*** (21.600)
MTB	-0.026*** (-7.062)	-0.413*** (-26.579)	-0.034*** (-8.681)	-0.418*** (-27.014)
LEV	-0.683*** (-12.665)	-0.036 (-0.413)	-0.640*** (-10.903)	-0.030 (-0.349)
ROE	0.246*** (11.410)	1.966*** (25.229)	0.291*** (12.147)	1.999*** (25.672)
ΔSALE	-0.175*** (-8.845)	-0.066 (-1.641)	-0.068*** (-2.990)	0.012 (0.300)
CAPEX	0.468*** (5.258)	1.954*** (9.795)	0.123 (1.338)	1.527*** (7.698)
AGE	0.109*** (9.397)	-0.002 (-0.086)	0.050*** (4.207)	-0.038* (-1.678)
ATO	0.237*** (12.153)	0.316*** (9.348)	0.102*** (6.151)	0.228*** (7.099)
ADVERT	0.992*** (3.219)	3.800*** (8.317)	0.179 (0.528)	3.448*** (7.480)
R&D	-0.178*** (-6.596)	0.161*** (4.888)	-0.092*** (-2.765)	0.276*** (8.241)
Constant	-0.146 (-1.118)	-0.582* (-1.839)	-0.315** (-2.159)	-0.655** (-2.004)
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Adj. R-squared	0.341	0.385	0.279	0.386
Observations	67,244	67,244	67,196	67,196
Number of Firms	6,760	6,760	6,757	6,757

Notes: Robust *t*-statistics in brackets.
Standard errors are clustered by firm. *** p<0.01, ** p<0.05, * p<0.10
Variable definitions are provided in the Appendix 2.1.

2.4.5.3 Alternative Specification of Organization Capital

To mitigate the concerns as to whether the main results are sensitive to the specification of organization capital, I use several alternative specifications.

Organization Capital Measure by Lev et al. (2009)

Lev et al. (2009) develop a firm-specific measure of organization capital that captures the contribution of organization capital to revenue growth and cost saving. They posit that firm-level efficiency in resource usage depends on organization capital. Therefore, in estimating organization capital, they compare the efficiency of using resources across companies in generating revenues as well as in cost containment. More clearly, Lev et al. (2009) assume a constant returns-to-scale production function and estimate the following equation annually and cross-sectionally for each industry.

$$\log\left(\frac{SALE_{it}}{SALE_{it-1}}\right) = b_{0t} + b_{0st}\log\left(\frac{SGA_{it}}{SGA_{it-1}}\right) + b_{1t}\log\left(\frac{PPE_{it}}{PPE_{it-1}}\right)$$

$$+b_{2t}\log\left(\frac{EMP_{it}}{EMP_{it-1}}\right) + \log\left(\frac{e_{it}}{e_{it-1}}\right) \qquad (2.6)$$

The coefficient estimates indicate industry-average contributions of organization capital (i.e., $b_{0st}\log\left(\frac{SGA_{it}}{SGA_{it-1}}\right)$) to revenue growth. These coefficient estimates are used to predict revenues without organization capital. Then, the predicted firm's revenues *without* firm-specific organization capital are subtracted from the firm's actual revenues to get AbSALE_{it}, which is the contribution of organization capital to the revenue of firm *i* in year *t*. A similar process is applied to compute the contribution of organization capital to cost containment; the difference between the predicted cost and actual cost, AbCOST_{it}, is the contribution of organization capital to cost containment. The contribution of organization capital to operating profits is thus given by $\text{AbProfit}_{it} = \text{AbSALE}_{it} + \text{AbCOST}_{it}$. Consistent with Lev et al. (2009), I capitalize and amortize AbProfit_{it} over five years to estimate organization capital from the annual contributions and scale the capitalized contributions of organization capital by total assets in year *t*.

Panel C: Alternative Specification of Organization Capital (Lev et al. 2009)

	(Model 1)	(Model 2)	(Model 3)	(Model 4)	(Model 5)	(Model 6)
Dep. Var.	**Introduc-tion**	**Growth**	**Mature**	**Decline**	**RE/TA**	**RE/TE**
OC/TA	**0.013**	**-0.620*****	**-0.466*****	**0.744*****	**-0.311*****	**-0.291*****
	(0.230)	(-11.536)	(-9.106)	(10.789)	(-16.505)	(-6.228)
SIZE	-0.151***	0.163***	0.188***	-0.181***	0.123***	0.350***
	(-10.575)	(14.451)	(17.199)	(-10.479)	(28.737)	(27.979)
MTB	0.026***	-0.004	-0.006	0.009	-0.021***	-0.401***
	(3.266)	(-0.559)	(-0.774)	(0.941)	(-9.140)	(-32.829)
LEV	2.772***	2.240***	0.284***	1.240***	-0.492***	-0.065
	(22.877)	(19.67)	(2.671)	(8.255)	(-15.623)	(-1.100)
ROE	-0.410***	0.185***	0.411***	-0.399***	0.256***	1.883***
	(-9.705)	(4.819)	(9.88)	(-8.065)	(20.535)	(33.202)
ΔSALE	0.632***	0.536***	-0.373***	0.194**	0.073***	0.107***
	(9.019)	(8.242)	(-5.606)	(2.385)	(4.945)	(2.82)
CAPEX	14.686***	17.872***	10.187***	3.817***	0.448***	1.943***
	(17.259)	(21.283)	(12.482)	(3.455)	(7.963)	(12.657)
AGE	-0.441***	-0.217***	0.005	-0.219***	0.013*	-0.083***
	(-14.919)	(-8.938)	(0.208)	(-5.929)	(1.853)	(-4.726)
ATO	0.366***	0.549***	0.520***	-0.649***	0.109***	0.258***
	(8.107)	(13.549)	(13.668)	(-9.564)	(10.041)	(8.972)
ADVERT	1.384**	-1.614***	-0.744	1.457**	-0.652***	2.476***
	(2.397)	(-2.882)	(-1.428)	(2.174)	(-3.398)	(6.364)
R&D	0.284***	0.110***	-0.702***	0.325***	-0.269***	0.091***
	(6.766)	(2.754)	(-11.398)	(7.912)	(-14.800)	(2.863)
Constant	-0.333	-1.301***	-0.366	1.007*	-0.327***	-1.092***
	(-0.639)	(-3.432)	(-0.842)	(1.764)	(-2.588)	(-3.591)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	70,754	70,754	70,754	70,754	69,791	69,791
Pseudo R^2/ Adj. R-squared				0.176	0.293	0.409

Notes: Model 1 to Model 4 estimate Equation (2.1) on the sample partitioned by life cycle stage as defined in Dickinson (2011). For Model 1 to Model 4, the indicator of the shake-out stage is omitted and thus the intercept term captures the effect of the shake-out stage. Other life cycle stage coefficients are compared thus with the shake-out stage. Model 5 and Model 6 show the regression estimates for DeAngelo et al. (2006)'s life cycle proxies and OC/TA.

Robust z-statistics/t-statistics in brackets. Standard errors are clustered by firm. *** p<0.01, ** p<0.05, * p<0.10
Variable definitions are provided in appendix 2.1.

Table 2.6, Panel C shows that my results are qualitatively similar when organization capital is estimated by using the methodology of Lev et al. (2009).[17] In particular, the coefficient of OC/TA has the expected signs for the different life cycle proxies and is mostly statistically significant. Moreover, marginal effect results reported in Panel D supports that introduction, shake-out and decline (growth and mature) firms are likely to be associated with more (less) organization capital, which also corroborate the marginal effect results reported earlier in the main analysis.

Panel D: Margin Effect of OC/TA - Estimated from Regression Results in Panel C

Margin effect – OC/TA		Delta-method		
	dy/dx	Std. Err.	Z	P>Z
OC/TA				
Introduction	0.033	0.003	9.63	0.000
Growth	-0.075	0.006	-12.47	0.000
Mature	-0.027	0.006	-4.36	0.000
Shake-out	0.026	0.003	7.46	0.000
Decline	0.042	0.002	17.83	0.000

Note: dy/dx = marginal effect

Organization Capital Measure Using 30% of SG&A Expenses

Considering the view that not all SG&A expenses contribute to generate organization capital, Eisfeldt and Papanikolaou (2014) use 30%[18] of SG&A expenses to construct firm-level proxies for the book stock of organization capital, which is:

$$OC_{i,t} = OC_{i,t-1}(1-\delta_0) + \frac{SGA_{i,t}}{cpi_t}\theta \qquad (2.7)$$

where θ = 30%, initial stock is set as $OC_{i,t_0} = \frac{\theta SGA_{i,t_0}}{g+\delta_0}$ and the other variables are as discussed in section 3.4. Results reported in appendix 2.3 show that the results are robust to the use of 30% of SG&A expenses in constructing the stock of organization capital.

[17] In the regression estimates, I use non-negative values of organization capital.
[18] Corrado et al. (2009) also find that organization capital is the single largest category of business intangible capital, which accounts for about 30% of all intangible assets in the United States.

Exclusion of First Five Years of the Stock of Organization Capital

I also drop the first five years of data for every firm to mitigate the effect of the initialization scheme in the perpetual inventory method, and test the association between organization capital and FLC. Regression results reported in appendix 2.4 show that the signs and significance of the regression estimates remain unchanged even after excluding five years of organization capital data.

Excluding Advertising Expenses from SG&A Expenses

As a part of the robustness check, I also exclude advertising expenses from SG&A expenses to estimate the stock of organization capital. Belo, Lin, & Vitorino (2014) argue that advertising expenses may contribute to the accumulation of brand capital, which Eisfeldt and Papanikolaou (2013) view as a different type of intangible capital to organization capital. Results reported in appendix 2.5 remain qualitatively similar to those obtained in the main analysis.

Overall, the results using alternative FLC benchmark, FLC specification and organization capital measures provide estimates that are similar to those obtained in the main analysis, confirming that the main results are not driven by the choice of specific life cycle proxy and organization capital estimate.

2.4.5.4 Endogeneity

My analysis so far suggests that organization capital is positively associated with the introduction and decline stages, while negatively associated with the growth and mature stages. However, the sign, magnitude and statistical significance of these estimates may be biased due to endogeneity, i.e., if organization capital (OC/TA) and the error term (ε) are correlated. Endogeneity can arise due to unobservable heterogeneity when unobservable firm-specific factors affect both organization capital and life cycle stages. In addition, there is a possibility of reverse causality between life cycle stages and organization capital. To mitigate these concerns, I adopt a Two-Stage Residual Inclusion (2SRI) approach to multinomial logistic regression for Dickinson (2011)'s life cycle proxy and Two-Stage Least Squared (2SLS) instrumental variable approach for DeAngelo et al. (2006)'s life cycle proxy because the 2SLS approach is only suitable for linear regression, while the 2SRI approach is more appropriate for nonlinear regression such as multinomial logistic regression.

Motivated by Terza, Basu, and Rathouz (2008), I adopt 2SRI, an alternative implementation of the two-stage IV approach, for the multinomial logistic regression model. Terza et al. (2008) show that in a nonlinear modeling framework, 2SRI is generally statistically consistent in this broader class and overwhelmingly outperforms two-stage predictor substitution (2SPS), a method that is commonly used to deal with endogeneity issues in linear regression frameworks. Similar to the 2SPS method, the first stage of the 2SRI procedure involves regressing the endogenous variable (organization capital) on selected instruments and the exogenous variables from the main analysis in Table 2.4, and the results are used to generate predicted values for the endogenous variables. In the second stage, residuals (rather than predicted values) from the first-stage are included as additional regressors with the endogenous and exogenous variables from the main analysis. To allay the concern with standard errors problem associated with two-stage estimation I use bootstrap method of standard error estimation approach.[19]

Contemporary studies extensively adopt the two-stage IV approach to address endogeneity concerns. However, this approach is appropriate only if the instrumental variables are correlated with the endogenous regressor but uncorrelated with the error term in the second-stage regression. In this context, good instruments are exogenous variables that are economically related to the organization capital variable proxy but are uncorrelated with the error term of the second-stage regression relating FLC to organization capital. Taking these views into account, I use three instrumental variables in the first-stage regression estimates: firm-level risk (proxied by the standard deviation of monthly stock return – STD_RET and standard deviation of Return on Equity (ROE) over the last three years – STD_ROE), one year ahead market share (Market $Share_{t+1}$) and growth in physical capital (proxied by growth in

[19] I use 1000 replications to generate the bootstrap standard errors.

property, plant and equipment - % ΔPPE). Motivated by the study of Eisfeldt and Papanikolaou (2013), I use STD_RET and STD_ROE as instrumental variables. Eisfeldt and Papanikolaou (2013) argue that since both shareholders and key talents have a claim to the cash flows accruing from organization capital, firms with high organization capital are more risky. I use one year ahead market share for two reasons. First, Lev et al. (2009) empirically show that organization capital is a source of future benefit and is associated with future operating performance. Second, Brynjolfsson et al. (2002) note that firms that put in place more organization capital experience greater output in subsequent years. Market share is defined as the sales of firm *i* in year *t* scaled by total industry sales in the same year, where an industry is defined in terms of the Fama–French 48-industry classification. Investment in organization processes, structures, worker knowledge, reporting, training, monitoring and incentive systems is costly (Brynjolfsson et al., 2002) and the firm's ability to invest in organization capital thus largely depends on its existing resources. Carlin et al. (2012) suggest that resource constraints may require a firm to substitute alternative forms of productive resources with organization capital. Eisfeldt and Papanikolaou (2013) empirically show that firms with high organization capital have lower investment rates in physical capital (10.1% vs. 12.6%). Therefore, I also use growth in PPE as an instrumental variable.

Table 2.7, Panel A (Section I) reports the first-stage regression results in which the endogenous variable, OC/TA, is regressed on the selected instruments and the exogenous variables from the analyses in Table 2.4. Consistent with the expectations, the coefficients of the instrumental variables (STD_RET, STD_ROE, Market Share$_{t+1}$ and *% ΔPPE*) are significant at $p<.01$, suggesting that organization capital (OC/TA) is positively associated with firm-level risk and future firm performance and negatively related to growth in PPE. Panel A of Table 2.7 (Models 1 to 4 in Section II) shows the results from the instrumental variable approach and suggests that the positive association between organization capital (OC/TA) and the introduction and decline stages and the negative association between organization capital (OC/TA) and the growth and mature stages remain robust after accounting for the endogeneity problem. Moreover, Models 5 and 6 also confirm the robustness of the result using DeAngelo et al. (2006) life cycle proxies (RE/TA and RE/TE). The estimated coefficients of the introduction (0.734), growth (-1.015), mature (-1.277) and decline (0.973) stages are significant (at $p < .001$) in the 2SRI model. Furthermore, the estimated coefficients for RE/TA and RE/TE are -1.292 and -1.635, respectively (both significant at $p<0.001$). These results suggest that endogeneity cannot explain the results in the main analysis that organization capital has a vital role in shaping the life cycle pattern.

In support of these instruments, I also conduct underidentification, weak identification, Hansen's overidentifying restrictions and Hausman's endogeneity tests. In Table 2.7, the underidentification test results (LM statistic) reveal that the excluded instruments are 'relevant'. The weak instrument test is performed to test whether the excluded instruments are sufficiently correlated with the included endogenous regressors—the goodness-of-fit of the 'first stage'. The test results show that the excluded instruments are correlated with the endogenous regressors because the Cragg–Donald Wald F-statistic is greater than is the Stock and Yogo (2005) critical value.[20] The results of Hansen's overidentifying restrictions test do not reject the null hypothesis that the instruments are uncorrelated with the error term ($p>0.10$), suggesting that they are correctly excluded from the second-stage regression and the validity of the instruments used for the 2SLS regression. Finally, for Model 1 to 4 (Models 5 and 6), I include (perform) the estimated residuals (Hausman, 1978 test) to ascertain whether the endogeneity problem is really a concern for the estimates. For my analysis, included residuals and Hausman's test strongly rejects (at $p<0.001$) the exogeneity of OC/TA, which justifies the use of the 2SRI and 2SLS regression estimates.[21]

[20] When the instrument is only weakly correlated with the regressor, IV methods provide highly biased estimates (Larcker & Rusticus, 2010).

[21] As a robustness check, I use the 2SRI model to test the endogeneity problem with DeAngelo et al. (2006)'s life cycle measures (RE/TA and RE/TE) and find that the results are qualitatively similar to those obtained by using 2SLS models.

Table 2.7: Endogeneity Test
Panel A: 2SRI/2SLS Regression

I: First-Stage Regressions		
Explanatory Variable	**OC/TA (Dickinson, 2011's FLC)**	**OC/TA (DeAngelo et al., 2006's FLC)**
Instruments		
STD_RET	6.860***	-
	(6.74)	
STD_ROE		0.014***
		(4.25)
Market Share$_{t+1}$	1.896***	3.463***
	(3.32)	(4.34)
% ΔPPE	-0.020***	-0.018***
	(-3.49)	(-3.97)
Unreported Control Variables Included in Regression		
All Variables in Main Specification	Yes	Yes
Year FE	Yes	Yes
Industry FE	Yes	Yes
Observation (N)	58,703	59,105
Adjusted R^2	0.172	0.330
Underidentification Test		
Kleibergen-Paaprk LM statistic	91.372	33.981
p-value	0.000	0.000
Weak Identification Test		
Cragg-Donald Wald F statistic	192.372	176.718
Stock and Yogo (2002) Critical value	22.3	22.3
Test of Overidentifying Restrictions		
Hansen's J-statistic	3.370	1.665
p-value	0.113	0.435

II: Second-Stage Regressions of Organization Capital on the Life Cycle Proxy						
Explanatory Variable	**Model 1 Introduction**	**Model2 Growth**	**Model 3 Mature**	**Model4 Decline**	**Model 5 RE/TA**	**Model 6 RE/TE**
Potentially Endogenous Variable						
OC/TA	**0.734*** **	**-1.015*** **	**-1.277*** **	**0.973*** **	**-1.292*** **	**-1.635*** **
	(4.63)	**(-6.74)**	**(-10.60)**	**(5.84)**	**(-11.494)**	**(-4.497)**
Unreported Control Variables Included in the Regression						
All Variables in Main Specification	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Hausman Test for the Effect of the Life Cycle (Coefficient 2SLS = Coefficient OLS)						
Estimated residuals/ Cluster-robust F-statistic	-0.699	0.928	1.221	-0.871	67.683	44.309
p-value	0.000	0.000	0.000	0.000	0.000	0.000
Observation (N)	58,703	58,703	58,703	58,703	59,105	59,105

Finally, I estimate the marginal effect of OC/TA for the second stage multinomial logistic regression results. Panel B reports that one unit increase in OC/TA may increase the likelihood of firms being stayed in the introduction stage (11.9%), shake-out stage (6.2%) and decline stage (5.9%) but it may reduce the likelihood of firms being stayed in the growth stage (-6.9%) and mature stage (-17.1%), respectively. Thus, the reported marginal effect of OC/TA in affecting the FLC stages are stronger than the effects presented in main analysis, implying robust role of OC/TA after controlling for endogeneity.

Panel B: Marginal Effect Results

Margin Effect – OC/TA		dy/dx	Delta-method Std. Err.	Z	P>Z
OC/TA					
	Introduction	0.119	0.014	8.58	0.000
	Growth	-0.069	0.026	-2.69	0.007
	Mature	-0.171	0.025	-6.94	0.000
	Shake-out	0.062	0.010	5.99	0.000
	Decline	0.059	0.007	8.75	0.000

Note: dy/dx = marginal effect

2.5 Concluding Remarks

This paper provides evidence of the association between organization capital and FLC. In this study, I posit that organization capital (e.g., business practices, processes, systems, designs and unique corporate culture) develops the resource base for the firm, which serves as a source of sustainable competitive advantage. Thus, firm-specific organization capital performs as one of the drivers of a firm's transition across different life cycle stages. My empirical results show that a firm's organization capital, indeed, contributes to its life cycle progression. In particular, the study reveals that compared with the shake-out stage, firms in the introduction (decline) stage are more likely to have more organization capital that equips them to move to (move back to) the growth and mature stages. Moreover, firms in the growth and mature stages tend to have less organization capital, as firms in these stages focus more on capitalizing the benefits from the existing stock of organization capital and acquiring tangible assets. My additional analysis shows that introduction- (decline-) stage firms with more organization capital tend to have a higher chance of moving to the growth and mature stages in subsequent years. These results concur with the findings of Lev et al. (2009) that organization capital is a source of future benefit and that it is associated with future firm performance. I triangulate the results by using different measures of organization capital and FLC proxies, and eventually find that they are robust.

Overall, the empirical evidence of the paper contributes to the growing body of literature that focuses on organization capital. My primary contribution is to extend this body of research by documenting the role of organization capital as a key determinant of the FLC progression. My findings strongly support the RBV of competitive advantage as well as FLC theory. The RBV suggests that the general patterns and paths in the evolution of organization capabilities depend on the existence and application of the bundle of valuable, interchangeable, immobile and imitable resources that generate the basis of the competitive advantage of a firm. I show that organization capital, as a source of competitive advantage, is associated with the progression of firms across different life cycle stages. My results also largely concur with the findings of Adizes (1979) that management practice, style and process influence the life and effectiveness of an enterprise. From a practitioner’s perspective, the results have direct implications for the financial management and strategic direction of the firm. My results provide evidence suggesting that organization capital could be the channel through which managers can lead firms to attain and maintain growth and mature stages, the prime stages of the FLC. Overall, this study contributes to the area of research that stresses the importance of organization capital as a major driver of firms’ (and national) growth and competitiveness.

Appendix 2.1: Variable Definition and Measurement

Variables	Definition and Measurement
	Dependent Variable
OC/TA	Organization capital measured as the stock of organization capital (for details, see section 2.3.4) scaled by lagged real total assets (AT).
OC/PPE	Organization capital estimated as the stock of organization capital scaled by lagged real PPE (PPENT).
	FLC Proxies
FLC	Categorical variables that capture firms' different stages in the life cycle (introduction =1, growth =2, mature =3, shake-out =4 and decline = 5).
RE/TA	Retained earnings as a proportion of total assets. Measured as: retained earnings(RE)/lagged total assets (AT).
RE/TA	Retained earnings as a proportion of total assets. Measured as: retained earnings(RE)/lagged total assets (AT).
	Control Variables
SIZE	Natural logarithm of market value of equity (PRCC_F X CSHO) at the beginning of the year.
MTB	Market-to-book ratio at the beginning of year, measured as the market value of equity (PRCC_F X CSHO) scaled by the book value of equity (CEQ).
LEV	Leverage, measured as total short-term and long-term debt (DLC + DLTT) scaled by lagged assets (AT).
ROE	Return on equity, measured as operating income (PI - XI) scaled by lagged equity (CEQ).
ΔSALE	Changes in sales (SALE) scaled by lagged sales (SALE).
CAPEX	Capital expenditure (CAPEX) scaled by lagged assets (AT).
AGE	Age is measured as the number of years since the firm was first covered by the Center for Research in Securities Prices (CRSP) (DATADATE – BEGDAT). For the regression analysis, I measure AGE as the natural log of (1+ age of the firm) .
ATO	Asset turnover ratio, measured as net sales (SALE) scaled by lagged total assets (AT).
ADVERT	Advertising expenses (XAD) scaled by lagged sales (SALE). I replace any missing values of XAD with 0.
R&D	R&D expenses (XRD) scaled by lagged PPE (PPEGT). I replace any missing values of XAD with 0.
Year	Dummy variables to control for fiscal year effect.
IND	Industry dummy (Fama–French 48-industry classification) to control for industry fixed effect.
	Instrumental Variables
STD_RET	Standard deviation of monthly stock return (RET).
STD_ROE	Standard deviation of ROE over the last three years.
Market $Share_{t+1}$	One year ahead market share, measured as the sales of firm *i* in year *t* (SALE) scaled by total industry sales in the same year, where an industry is defined in terms of the Fama–French 48-industry classification.
% ΔPPE	Growth in physical capital, measured as $PPEGT_t – PPEGT_{t-1}/ PPEGT_{t-1.}$

Appendix 2.2: Association between ΔOC/TA and Life Cycle Stages

Dep. Var.	(Model 1) Introduction	(Model 2) Growth	(Model 3) Mature	(Model 4) Decline
Δ *OC/TA*	**-0.026**	**-0.129*****	**-0.009****	**0.007*****
	(-1.466)	**(-4.096)**	**(-2.013)**	**(2.605)**
SIZE	-0.174***	0.207***	0.225***	-0.210***
	(-11.375)	(17.254)	(19.865)	(-11.475)
MTB	0.000	0.000	0.000	0.000
	(1.254)	(1.402)	(1.307)	(1.471)
LEV	2.176***	2.499***	0.519***	0.216
	(14.268)	(17.741)	(4.146)	(1.029)
ROE	-0.475***	0.099***	0.267***	-0.494***
	(-10.132)	(2.849)	(7.010)	(-9.711)
ΔSALE	0.724***	0.827***	0.094	0.386***
	(6.538)	(7.793)	(0.947)	(3.027)
CAPEX	3.863***	3.500***	1.027*	2.827***
	(6.443)	(5.820)	(1.853)	(4.775)
AGE	-0.590***	-0.366***	-0.067**	-0.421***
	(-16.125)	(-12.419)	(-2.405)	(-9.791)
ATO	0.682***	0.789***	0.643***	-0.564***
	(11.417)	(14.293)	(12.627)	(-6.896)
ADVERT	1.429**	-1.703***	-1.386***	1.780**
	(2.445)	(-2.899)	(-2.620)	(2.568)
R&D	0.050***	0.006	-0.238***	0.048***
	(3.140)	(0.398)	(-9.628)	(3.523)
Constant	1.274***	-0.551	0.168	2.244***
	(2.736)	(-1.273)	(0.366)	(4.122)
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Pseudo R^2				0.138
Log pseudo-likelihood				-68979.989
Observations	60,747	60,747	60,747	60,747

Notes: This table estimates the association between changes in OC/TA and firm life cycle stages on the sample partitioned by life cycle stage as defined in Dickinson (2011). The indicator for the shake-out stage is omitted and thus the intercept term captures the effect of the shake-out stage. Other life cycle stage coefficients are compared with the shake-out stage.

Robust z-statistics in brackets. Standard errors are clustered by firm.
*** p<0.01, ** p<0.05, * p<0.10
Variable definitions are provided in appendix 2.1.

Appendix 2.3: Organization Capital Measure Using 30% of SG&A Expenses

Dep. Var.	(Model 1) Introduction	(Model 2) Growth	(Model 3) Mature	(Model 4) Decline	(Model 5) RE/TA	(Model 6) RE/TE
OC/TA	**0.119****	**-0.374*****	**-0.261*****	**0.360*****	**-1.065*****	**-0.802*****
	(2.395)	**(-7.760)**	**(-6.359)**	**(7.554)**	**(-16.615)**	**(-9.058)**
SIZE	-0.215***	0.147***	0.195***	-0.186***	0.104***	0.344***
	(-14.035)	(12.065)	(16.627)	(-10.404)	(14.461)	(21.288)
MTB	0.027***	-0.004	-0.013**	0.000	-0.026***	-0.413***
	(4.056)	(-0.641)	(-1.962)	(0.032)	(-7.062)	(-26.579)
LEV	2.763***	2.516***	0.419***	0.783***	-0.683***	-0.036
	(20.330)	(19.377)	(3.713)	(4.441)	(-12.665)	(-0.413)
ROE	-0.404***	0.081**	0.284***	-0.448***	0.246***	1.966***
	(-9.868)	(2.500)	(8.155)	(-9.793)	(11.410)	(25.229)
ΔSALE	0.578***	0.440***	-0.173**	0.354***	-0.175***	-0.066
	(7.304)	(5.887)	(-2.304)	(4.211)	(-8.845)	(-1.641)
CAPEX	16.918***	18.996***	11.139***	4.459***	0.468***	1.954***
	(21.993)	(25.207)	(15.308)	(4.003)	(5.258)	(9.795)
AGE	-0.515***	-0.234***	-0.023	-0.338***	0.109***	-0.002
	(-16.247)	(-9.053)	(-0.933)	(-9.320)	(9.397)	(-0.086)
ATO	0.333***	0.574***	0.542***	-0.770***	0.237***	0.316***
	(6.327)	(12.896)	(12.973)	(-9.928)	(12.153)	(9.348)
ADVERT	1.356***	-1.094**	-0.689	1.170**	0.992***	3.800***
	(2.588)	(-2.221)	(-1.469)	(2.054)	(3.219)	(8.317)
R&D	0.194***	0.116**	-0.719***	0.167***	-0.178***	0.161***
	(3.457)	(2.210)	(-9.688)	(3.216)	(-6.596)	(4.888)
Constant	0.006	-1.388***	-0.595	1.191**	-0.146	-0.582*
	(0.014)	(-3.904)	(-1.476)	(2.385)	(-1.118)	(-1.839)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R^2/Adj. R^2				0.167	0.341	0.385
Log pseudo-likelihood				-75663.24		
Observations	68,048	68,048	68,048	68,048	67,244	67,244

Notes:

Robust z/t-statistics in brackets. Standard errors are clustered by firm.

*** p<0.01, ** p<0.05, * p<0.10

Variable definitions are provided in appendix 2.1.

Appendix 2.4: Exclusion of First Five Years of the Stock of Organization Capital

Dep. Var.	**(Model 1) Introduction**	**(Model 2) Growth**	**(Model 3) Mature**	**(Model 4) Decline**	**(Model 5) RE/TA**	**(Model 6) RE/TE**
OC/TA	**0.044****	**-0.124*****	**-0.102*****	**0.136*****	**-0.378*****	**-0.295*****
	(2.428)	**(-6.829)**	**(-6.914)**	**(7.701)**	**(-15.032)**	**(-7.673)**
SIZE	-0.242***	0.118***	0.177***	-0.179***	0.081***	0.332***
	(-13.068)	(8.480)	(13.374)	(-7.986)	(9.552)	(16.388)
MTB	0.030***	-0.004	-0.008	-0.001	-0.029***	-0.450***
	(3.135)	(-0.479)	(-1.045)	(-0.071)	(-5.597)	(-20.425)
LEV	2.863***	2.576***	0.321**	0.880***	-0.761***	0.088
	(16.940)	(16.640)	(2.371)	(4.031)	(-10.655)	(0.677)
ROE	-0.467***	-0.023	0.216***	-0.464***	0.251***	2.103***
	(-8.390)	(-0.561)	(4.898)	(-7.771)	(8.664)	(18.846)
ΔSALE	0.902***	0.854***	0.220**	0.439***	-0.181***	-0.361***
	(6.736)	(6.866)	(1.961)	(2.617)	(-5.230)	(-4.860)
CAPEX	18.127***	21.338***	13.240***	1.224	0.474***	1.966***
	(17.500)	(21.459)	(14.113)	(0.717)	(3.192)	(5.980)
AGE	-0.501***	-0.266***	-0.040	-0.330***	0.211***	0.190***
	(-9.454)	(-6.956)	(-1.119)	(-5.584)	(10.771)	(4.899)
ATO	0.329***	0.565***	0.531***	-0.716***	0.271***	0.396***
	(4.851)	(10.332)	(10.662)	(-6.945)	(9.908)	(8.264)
ADVERT	0.806	-0.825	-0.489	1.807**	1.954***	4.463***
	(1.005)	(-1.238)	(-0.789)	(2.106)	(3.177)	(5.675)
R&D	0.188**	0.137*	-0.805***	0.157**	-0.237***	0.092
	(2.094)	(1.662)	(-7.971)	(1.985)	(-4.709)	(1.348)
Constant	0.307	-0.993**	-0.156	1.625***	-0.470***	-1.261***
	(0.547)	(-2.047)	(-0.322)	(3.091)	(-3.323)	(-3.502)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R^2/Adj. R^2				0.155	0.353	0.350
Log pseudo-likelihood				-47536.21		
Observations	43,747	43,747	43,747	43,747	43,289	43,289

Notes: This table estimates the association between OC/TA and firm life cycle stages on the sample partitioned by life cycle stage as defined in Dickinson (2011) and DeAngelo et al. (2006). The indicator for the shake-out stage is omitted and thus the intercept term captures the effect of the shake-out stage. Other life cycle stage coefficients are compared with the shake-out stage.

Robust z-statistics in brackets. Standard errors are clustered by firm.
*** p<0.01, ** p<0.05, * p<0.10
Variable definitions are provided in appendix 2.1.

Appendix 2.5: Organization Capital Estimated after Excluding Advertising Expenses from SG&A Expenses

Dep. Var.	(Model 1) Introduction	(Model 2) Growth	(Model 3) Mature	(Model 4) Decline	(Model 5) RE/TA	(Model 6) RE/TE
OC/TA	**0.044*** [2.804]**	**-0.114*** [-7.453]**	**-0.083*** [-6.220]**	**0.120*** [7.993]**	**-0.346*** [-17.069]**	**-0.261*** [-9.258]**
SIZE	-0.214*** [-13.904]	0.147*** [12.046]	0.194*** [16.495]	-0.181*** [-10.152]	0.100*** [13.953]	0.341*** [21.103]
MTB	0.027*** [4.045]	-0.004 [-0.635]	-0.013* [-1.945]	0.000 [0.002]	-0.025*** [-6.983]	-0.414*** [-26.581]
LEV	2.764*** [20.310]	2.514*** [19.328]	0.413*** [3.655]	0.779*** [4.410]	-0.693*** [-12.844]	-0.055 [-0.620]
ROE	-0.403*** [-9.830]	0.080** [2.461]	0.284*** [8.145]	-0.448*** [-9.790]	0.240*** [11.191]	1.957*** [25.088]
ΔSALE	0.576*** [7.294]	0.446*** [5.970]	-0.167** [-2.234]	0.354*** [4.215]	-0.161*** [-8.250]	-0.055 [-1.360]
CAPEX	16.976*** [21.987]	19.058*** [25.187]	11.216*** [15.348]	4.447*** [3.972]	0.478*** [5.381]	1.985*** [9.909]
AGE	-0.516*** [-16.263]	-0.233*** [-9.004]	-0.021 [-0.864]	-0.342*** [-9.409]	0.113*** [9.747]	0.001 [0.021]
ATO	0.329*** [6.241]	0.572*** [12.830]	0.543*** [12.975]	-0.771*** [-9.928]	0.240*** [12.205]	0.320*** [9.397]
ADVERT	1.364*** [2.592]	-1.584*** [-3.201]	-1.079** [-2.297]	1.203** [2.139]	-0.010 [-0.036]	3.072*** [7.080]
R&D	0.193*** [3.442]	0.117** [2.229]	-0.715*** [-9.630]	0.166*** [3.190]	-0.173*** [-6.405]	0.166*** [5.027]
Constant	0.008 [0.017]	-1.361*** [-3.820]	-0.563 [-1.392]	1.219** [2.443]	-0.129 [-0.990]	-0.559* [-1.765]
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R^2/Adj. R^2				0.167	0.347	0.387
Log pseudo-likelihood				-75509.70		
Observations	67,894	67,894	67,894	67,894	67,094	67,094

Robust z/t-statistics in brackets. Standard errors are clustered by firm.

*** p<0.01, ** p<0.05, * p<0.10

Variable definitions are provided in appendix 2.1.

CHAPTER 3

MANAGEMENT-SPECIFIC ORGANIZATION CAPITAL VS. FIRM-SPECIFIC ORGANIZATION CAPITAL – ARE THEY THE SAME? EVIDENCE FROM AN ANALYSIS OF FIRM RISKS[✫]

3.1 Introduction

Despite considerable evidence that organization capital improves the productivity, efficiency and performance of the firm (Corrado et al., 2009; Fredrickson, 1986; Lev et al., 2009), there remains a clear divergence of opinion about the adhesiveness of such organization capital. One stream of research argues that organization capital is firm-specific as it is rooted in business practice, process and culture (e.g., Atkeson & Kehoe, 2005; Lev et al., 2009; Tomer, 1987), another stream of research argues that organization capital is embodied in an organization's employees and their social networks (e.g., Becker, 1993; Jovanovic, 1979; Prescott & Visscher, 1980), while some studies suggest that efficiency of organization capital is partly firm-specific and is embodied in the key talents of the firm (Eisfeldt & Papanikolaou, 2013).[22] These studies, however, do not *empirically* differentiate between management-specific (hereafter OC_MS) and firm-specific organization capital (hereafter OC_FS), but implicitly assume their identical implications on firm level outcomes, and as such, use both forms of organization capital interchangeably. I argue that this assumption is questionable. It is important to disentangle OC_FS from the OC_MS in terms of their differential effect on idiosyncratic, systematic and total risk.

Idiosyncratic risk is unique to a firm in the sense that it has little or no association with the market (Campbell et al., 2001; Morck, Yeung, & Yu, 2000). Systematic risk measures the sensitivity of a firm's stock return to the market (Olibe, Michello, & Thorne, 2008). Total risk captures the overall variation in the firm's

[✫] This chapter of the thesis has been accepted for presentation at AFAANZ Conference, 2015.

[22] See Section 3.2.2.3 for a detailed discussion of this.

stock return arising from idiosyncratic and systematic risk. Since both idiosyncratic and systematic risk have important implications for portfolio management, diversification strategy, managerial compensation policies, and valuation of employee stock options (March & Shapira, 1987; Weber, 2004), it is important to understand the causes and remedies of such risks. I examine the role of OC_MS and OC_FS in this process.

My interest in investigating the role of OC_MS in influencing firm risk stems from evidence that talented managers (i.e., managers with more organization capital) are more knowledgeable about a firm’s economics and industry dynamics, and are more capable of synthesizing information into reliable forward-looking estimates (e.g., Libby & Luft, 1993), making them more able to reduce information asymmetry and firm-specific risk (Baik, Farber, & Lee, 2011; Chemmanur, Paeglis, & Simonyan, 2009; Demerjian et al., 2013). Andreou, Ehrlich, and Louca (2013) find that firms with more managerial ability are associated with lower cash flow risk and better operating performance. Trueman (1986) suggests that more able managers have incentives to build reputation through more transparent and informative disclosure. Extensive literature suggests that disclosure quality reduces information asymmetry among informed and uninformed market participants (e.g., Diamond & Verrecchia, 1991), which reduces uncertainty about the future cash flow, and consequently reduce stock-return volatility (e.g., Leuz & Verrecchia, 2000). These two streams of research together thus suggest that talented managers, by way of credible information disclosure, can mitigate the information asymmetry associated with the future cash flow, which in turn, reduces idiosyncratic volatility.

Managerial compensation literature (e.g., Duan & Wei, 2005) suggests that top level management of the firm has ability and incentive to influence the composition of firm level risks. Individual shareholders hold diversified investment to reduce the firm-specific risk. Managers, on the other hand, are largely undiversified, as a substantial portion of their wealth is tied to the firm’s fortunes. Managers therefore value their firm’s stocks and option-based compensation much less than its market value (Meulbroek, 2001). Since undiversified managers are exposed to a firm's total risk, but the stock market compensates managers for bearing only the systematic risk (Duan & Wei, 2005; Meulbroek, 2001), undiversified managers have incentives to increase the systematic risk and reduce the exposure to firm-specific risk, which capable managers can do more efficiently. I thus conjecture that managers with more organization capital increase systematic risk, but decrease firm-specific risk.

My quest to examine the impact of OC_FS on firm risk came from recent findings that idiosyncratic OC_FS has become an increasingly important driving force in attaining productivity, growth and competitiveness (Corrado et al., 2009; Fredrickson, 1986). Since OC_FS, in the course of accumulation, stores, retains, integrates and institutionalizes knowledge about business practice, process, and systems within databases, documents, patents and manuals (Wright et al., 2001; Youndt et al., 2004), it becomes a critical component that guide the *future* actions of firms (Zahra et al., 2000). OC_FS, thus, enhances a firm's ability to cope with general market movement successfully, making the firm less susceptible to macro-economic shocks (systematic risk). However, return on OC_FS is highly uncertain. The same level of investment in organization capital may yield very different results, depending on the extent of success or failure in innovation process. Empirical studies also document high failure rates of business process redesign (e.g., Sauer & Yetton, 1997), and IT related organizational change projects (Kemerer & Sosa, 1991). Apart from this outcome uncertainty, OC_FS also suffers from estimation difficulty, as OC_FS is neither fully tracked nor publicly disclosed by the firm (Lev et al., 2009). The implicit, intangible and distinctive characteristics of OC_FS thus induce return uncertainty and estimation difficulty, which in turn increase valuation error and idiosyncratic volatility.

It is noteworthy that OC_MS, by dint of inherent ability, can ensure the efficient use of codified business practice, processes and systems and thereby reduce the return uncertainty associated with OC_FS. OC_MS, when interacted with OC_FS, can therefore play a more dominant role in reducing idiosyncratic risk. On the other hand, since talented managers are employed and usually adequately compensated by firms with more OC_FS (Eisfeldt & Papanikolaou, 2013; Lev et al., 2009), they have little incentive to increase systematic risk to enhance the value of their incentive-based compensation. OC_FS may help OC_MS to better cope with macroeconomic changes, and therefore OC_MS, when interacting with OC_FS, is likely to reduce systematic risk.

The discussion, so far, suggests that OC_MS reduces fundamental and information uncertainty, which in turn attenuates the idiosyncratic risk. On the other hand, OC_FS induces return uncertainty and estimation difficulty, which in turn accentuates idiosyncratic volatility. Studies have consistently documented that idiosyncratic risk, rather than systematic risk, constitutes more than 80% of variation in the risk of an individual stock (Goyal & Santa-Clara, 2003; Lui, Markov, & Tamayo, 2007). Following this line of findings and discussion, I argue that the impact of OC_MS and OC_FS on total risk will be the same as that on idiosyncratic risk.

To isolate OC_FS from OC_MS, I posit that OC_MS is determined by management ability. I therefore regress the management ability score, developed by Demerjian, Lev, and McVay (2012), on an overall measure of organization capital (Eisfeldt & Papanikolaou, 2013). The estimated residual from the regression (i.e., part of the overall organization capital that is not captured by the managerial talent (i.e., OC_MS)) is the organizational capital embodied in the firm (OC_FS). I use the market model, CAPM model and Fama-French (1993) three factor model to estimate systematic risk and idiosyncratic risk.

Using a large sample of U.S. data, this study finds that OC_MS decreases (increases) idiosyncratic and total (systematic) risk, while OC_FS increases (decreases) idiosyncratic and total (systematic) risk. For example, the results show that a one decimal point (i.e., 0.10) increase in the OC_MS of the average firm reduces (increases) idiosyncratic risk and total risk (beta) by 0.20% and 0.60% (8.80%), while a one decimal point increase in the OC_FS of the average firm reduces (increases) beta (idiosyncratic risk and total risk) by 0.60% and 1.4% (5.10%). Once interaction between OC_MS and OC_FS is allowed for, regression results reveal that OC_MS*OC_FS reduces idiosyncratic, systematic and total risk. These results are robust after controlling for other determinants of respective risks as well as alternative specifications of management ability and risk proxies. Additional analysis also indicates that OC_MS, individually and collectively (when interacted with OC_FS), plays an important role in increasing firm returns. To mitigate the endogeneity concern, I use a two-stage least squares (2SLS) instrumental variable approach and the results suggest that endogeneity cannot explain away the documented relationship.

This study contributes to the literature in several ways. *First,* to my knowledge, this is the first empirical study to systematically isolate OC_FS from OC_MS and examine their impact on a wide range of firm risks. I empirically show that the effect of organization capital on idiosyncratic, systematic and total risk differ remarkably based on whether organizational capital is management-specific or firm-specific. This study thus makes an important contribution to resolving competing views of the adhesiveness and effect of different forms of organization capital. *Second,* this paper extends the organization capital literature by directly examining the role of OC_MS and OC_FS in influencing firm risks. While prior research investigates the association of organization capital with cross sectional stock return (Eisfeldt & Papanikolaou, 2013), future operating and stock return performance (Lev et al., 2009), investment-cash flow sensitivity (Attig & Cleary, 2014a), and production possibility (Prescott & Visscher, 1980), little attention has been paid to the role of organization capital in influencing idiosyncratic, systematic and total risk. This paper bridges this gap in the literature.

Third, given that organization capital represents a source of productivity and efficiency and a key factor affecting a firm's long-term success and competitiveness (Atkeson & Kehoe, 2005; Brynjolfsson et al., 2002; Prescott & Visscher,1980), examining the link between organization capital and firm level risks should therefore help managers understand the effect of different forms of organization capital on a firm's riskiness. This study thus has an important implication for managerial strategic planning, such as portfolio formation, risk management and executive compensation. *Finally,* this study also contributes to the emerging literature on managerial ability. Although research efforts to understand the effect of management ability on information asymmetry, investment policies and financial performance are numerous (Baik et al. 2011; Chemmanur et al., 2009; Demerjian et al., 2013), little is known about how management ability affects idiosyncratic, systematic, and total risk. Thus, this study extends the literature on the determinants of firm risks by incorporating a human side into the equation. Meulbroek (2001) is the closest paper that links executives (more specifically executive compensation) with firm level risk. This study shows that executive equity-based compensation can change the risk profile of a firm. My paper, in contrast, focuses on the OC_MS that captures the efficiency of the managers in performing knowledge-based works and in framing firm policy. This finding may be of interest to stakeholders who would like to evaluate the role of management-specific organization capital as a potential factor in firm level risks.

The remainder of the paper is organized as follows. Section 2 reviews related literature and develops testable hypotheses. Research design, data collection and sample selection are presented in Section 3. Section 4 documents the results of the study, while Section 5 concludes the paper.

3.2. Literature Review and Hypothesis Development

3.2.1 Systematic Risk, Idiosyncratic Risk and Total Risk

Total risk at firm level can be disaggregated into two parts: systematic risk and idiosyncratic risk. Systematic risk measures the degree to which a firm's stock return co-varies with the economy as a whole. Finance and accounting research demonstrates that size, leverage, growth, earnings volatility and diversification influence a firm's systematic risk. Idiosyncratic risk, on the other end, reflects firm-specific return volatility, which arises primarily from a firm’s actions and independent of the common market movement. Campbell et al. (2001) suggest a number of possible explanations for the existence of idiosyncratic risk, including leverage, a higher incidence of conglomerates spin-offs, firm life cycle and option-based compensation. Irvine and Pontiff (2009) show that fundamental cash flow shocks affect idiosyncratic risk. Rajgopal and Venkatachalam (2011) recognize that deteriorating financial reporting quality is correlated with idiosyncratic volatility.

Prior studies consistently demonstrate that idiosyncratic risk, rather than systematic risk, constitutes the largest component of risk in an individual stock. Lui, Markov, and Tamayo (2007) suggest that idiosyncratic risk accounts for approximately 80% of the variation in a firm's stock. Likewise, Goyal and Santa-Clara (2003) show that idiosyncratic risk makes up almost 85% of the stock variance. Since high idiosyncratic risk reflects high uncertainty about expected cash flows, it can put the survival of a firm at risk, hinder efforts to acquire or divest firm stock, and affect the value of stock options.

3.2.2 Management-Specific and Firm-Specific Organization Capital

3.2.2.1 Management-Specific Organization Capital (OC_MS)

Management-specific organization capital, the ability of managers to comprehend the economies of the firm and to take prudent and timely economic decisions, has immense impact on firm policy and performance (e.g., Bertrand & Schoar, 2003; Demerjian et al., 2013; Rose & Shepard, 1997). Bertrand and Schoar (2003) suggest that managers differ in terms of their ability and style, which largely explains the heterogeneity in investment, financing and organizational practices of firms. Wasserman, Nohria, and Anand (2010, Chapter 2) find that CEOs have the most significant impact where opportunities are scarce or where CEOs have slack resources. Other studies also show that firms with more able managers are associated with less corporate tax avoidance and more favorable loan contract terms (Francis, Sun, & Wu, 2013; Francis, Hasan, & Zhu, 2013b), a lower likelihood and cost of insolvency (Leverty & Grace, 2012), and higher pay-for-performance sensitivities (Milbourn, 2003). These findings largely support the upper echelons theory of the strategic management literature (Hambrick & Mason, 1984), which suggests that managerial backgrounds and characteristics explain at least part of a firm's strategic choices and outcomes.

A related, yet embryonic, line of research investigates the role of managerial ability in a firm's information environment. Baik et al. (2011) find consistent evidence that the more able CEOs make more frequent and more accurate forecasts, and the market becomes more responsive to the news in management forecasts made by more able CEOs. In the same vein, Chemmanur, Paeglis, and Simonyan (2009) suggest that better and reputable managers can convey the intrinsic value of the firm more credibly to outsiders, reducing the information asymmetry about the firm in the equity market. Nonetheless, Francis et al. (2008) show that more reputed CEOs tend to have poorer earnings quality. Demerjian et al. (2013, p. 463) note that, "more able managers are associated with fewer subsequent restatements, higher earnings and accruals persistence, lower errors in the bad debt provision, and higher quality accrual estimations". In the context of this study, I argue that OC_MS is mostly driven by managerial ability to understand firm economy, industry and economic dynamics and to make prudent investment, financing and operational decisions. I therefore rely on management ability scores in estimating OC_MS.

3.2.2.2 Firm-Specific Organization Capital (OC_FS)

Firm-specific organization capital, "represented by the agglomeration of technologies—business practices, processes and designs" according to Lev et al. (2009, p. 277), "affects a firm's fundamental ability to generate superior operating, investment and innovation performance". The early management literature defines organization capital in terms of firm-specific management practice such as decentralization (Caroli & Reenen, 2001), high performance work systems (Bailey et al., 2000) and the opportunity to communicate with employees outside the work group, while the economics literature defines organization capital in terms of information assets (Prescott & Visscher, 1980) and estimates its effect on firm performance (e.g., Lev et al., 2009).

Studies extensively demonstrate that organization capital, in the form of superior business practices, processes, culture and organization design, is associated with more efficient production and stable business operation and transactions, which leads to better firm performance (Fredrickson, 1986; Lev et al., 2009). Attig and Cleary (2014a) demonstrate that organization capital reduces a firm's investment sensitivity to internal cash flow. Eisfeldt and Papanikolaou (2013) show that firms with more organization capital are more productive, have a higher Tobin's Q and higher risk-adjusted returns, and display a higher level of executive compensation. Lev et al. (2009) also find that organization capital is positively associated with long-term operating and stock performance. Atkeson and Kehoe (2005) demonstrate that organization capital represents more than 40% of the cash flow generated by all intangible assets in the US National Income and Product Accounts. Carlin et al. (2012) also recognize that organization capital is a significant source of firm value. In sum, OC_FS is valuable because it allows productive interaction between tangible and intangible resources for creating economic value and growth (Lev et al., 2009).

3.2.2.3 Organization Capital: Management-Specific or Firm-Specific?

Despite the overwhelming evidence that organization capital affects corporate productivity, performance and competitiveness, there are diverse views regarding the adhesiveness of such organization capital. One school of thought argues that organizational capital is embodied in an organization's employees and their social networks (e.g., Becker, 1993; Jovanovic, 1979; Prescott & Visscher, 1980). This view suggests that information about employee and task characteristics forms organization capital, which improves the match between employees and jobs. Conversely, another school of thought believes organization capital embodied in the organization itself, since it is rooted in organization practices, processes and systems, which do not change even if the employees of the organization are replaced (Atkeson & Kehoe, 2005; Lev & Radhakrishnan, 2005; Lev et al., 2009; Tomer, 1987).[23] Tomer (1990, p. 253) notes that, "the key to superior productivity lies in the quality of a company management system, not the quality of their labor or tangible capital or technological knowledge". Carlin et al. (2012) also view organization capital as an "intrafirm language". Evenson and Westphal (1995) relate organization capital to a firm's operating, investment, and innovation capabilities. Atkeson and Kehoe (2005) also follow this view and argue that organization capital is firm-specific.

[23] See Lev et al. (2009) for a detailed explanation on how organization capital is embodied in the organizational process.

Some studies, however, either explicitly or implicitly suggest that organization capital is embodied in the firm's key talent and its efficiency is firm-specific (Brynjolfsson et al., 2002; Eisfeldt & Papanikolaou, 2013). Therefore, both shareholders and managers have a claim to its cash flows. Black and Lynch (2005, pp. 206-207) also posit that, "organizational capital may interact with human capital and the ability of a firm to undertake organizational change may be a function of the human capital of its workforce". Given the importance of organization capital in enhancing the productivity and efficiency of the firm, and ongoing debate about whether organization capital is firm-specific or management-specific, this paper disentangles OC_FS from OC_MS and investigates whether both forms of organization capital affect firm risks in a similar manner.

3.2.3 Association of Management-Specific and Firm-Specific Organization Capital with Idiosyncratic Risk

3.2.3.1 Management-Specific Organization Capital (OC_MS) and Idiosyncratic Risk (IV)

It is well established that managerial ability improves the information environment of the firm and thereby mitigates the information asymmetry between insider and outside stockholders. Trueman (1986) and Baik et al. (2011) suggest that managers deploy transparency and informative disclosure mechanisms to reveal their superior ability and enrich their reputational capital. Demerjian et al. (2013) argue that superior knowledgeable of the underlying economies of the business helps more able managers to form more accurate judgments in corporate decision making and disclosure. Jiraporn, Liu, and Kim (2014) also provide consistent evidence that powerful CEOs are well insulated and have fewer incentives to withhold information, resulting in more transparency. Chemmanur et al. (2009) show that firms with reputable managers are associated with greater analyst followings, and lower forecast error and bid-ask spread, implying a lower level of information asymmetry. In a recent study, Andreou et al. (2013) show that during the crisis period firms with better management ability invest more, generate greater profitability and reduce the cash flow risk, suggesting that managerial ability reduces fundamental risk.

Extensive theoretical and empirical studies (e.g., Diamond & Verrecchia, 1991; Easley & O'Hara, 2004; O'Hara, 2003) suggest that financial disclosure affects the information environment (information risk) and consequently, its idiosyncratic volatility. Lambert, Leuz, and Verrecchia (2007) demonstrate that information risk increases market participant estimation of the variance of a firm's cash flow (i.e., idiosyncratic risk). By a similar token, Rajgopal and Venkatachalam (2011) and Bartram, Brown, and Stulz (2012) find that better quality accounting information reduces investor heterogeneity in future returns and thus reduces idiosyncratic volatility. Irvine and Pontiff (2009) show that idiosyncratic risk is positively associated with cash-flow volatility and economy-wide competition.

Studies of executive compensation (e.g., Coles, Daniel, & Naveen, 2006; Duan & Wei, 2005; Rajgopal & Shevlin, 2002; Ryan & Wiggins, 2002) also provide considerable evidence that compensation structure and managerial incentives influence the composition of firm level risks. Individual shareholders generally hold portfolios of stocks to diversify the firm-specific risk and obtain rewards (through expected returns) for the systematic component of risk. Compared to shareholders, managers are largely undiversified as managerial human capital and their fortune is mostly tied to firm performance (May, 1995). Since undiversified managers are exposed to the firm's total risk, but compensated for the systematic portion of that risk only, top level executives value stocks and options much less than its market value (Meulbroek, 2001). The lack of reward for bearing firm-specific risk makes this risk more costly to managers, motivating them to reduce idiosyncratic risk. On the other hand, since higher systematic risk enhances the value of the stock option (Duan & Wei, 2005), top executives strive to increase the systematic component of total risk. In sum, incentive-based compensation prompts managers to reduce idiosyncratic risk, and increase systematic risk.

These studies suggest that firms with more management-specific organization capital reduce information asymmetry through credible financial statements and earning forecasts, which improve the information environment and reduce heterogeneity among the investors in the firm's future cash flows. Undiversifiable managerial wealth also prompts to adopt strategies to reduce the firm-specific risk, including the cash flow risk. It is therefore not unreasonable to conjecture that OC_MS is negatively associated with idiosyncratic risk.

H1a: Management-specific organization capital reduces idiosyncratic risk.

3.2.3.2 Firm-Specific Organization Capital (OC_FS) and Idiosyncratic Risk (IV)

OC_FS is idiosyncratic in nature, yet improves a firm's operating and innovation abilities (Lev & Radhakrishnan, 2005). Investment in OC_FS, of course, does not guarantee that a firm will realize the potential benefit inherent in this investment (Tomer, 1990). Brynjolfsson et al. (2002) also suggest that firms may invest in certain business models, practices, processes and culture, some of which turn out to be effective for the firm, and it may take several years to realize the desired benefits. The considerable failure rates of business process redesign (e.g., Sauer & Yetton, 1997) and IT-related organizational change projects (Kemerer & Sosa, 1991) also signify the risk associated with OC_FS. Thus, investment in OC_FS involves substantial cash outflow, subjective decision making, trial and error, and unexpected successes and failures for a firm. In addition to the investment return uncertainty, shareholders in firms with high OC_FS are exposed to additional cash flow risks as both shareholders and key talent have a claim on the cash flow accruing from organization capital (Eisfeldt & Papanikolaou, 2013).

Firms with high OC_FS are also exposed to valuation uncertainty. Studies show that firms, through endogenous learning by doing, acquire and develop organizational practices, process, procedures, and culture over the years (Atkeson & Kehoe, 2005; Ericson & Pakes, 1995; Rosen, 1972) that are tacit in nature (Lev et al., 2009). The tacit and idiosyncratic nature of such an agglomeration of organization practices and culture are difficult to measure and thus do not have market value

(Brynjolfsson et al., 2002). OC_FS is neither fully tracked by a firm[24], nor completely disclosed in financial statements (Brynjolfsson et al., 2002; Lev et al., 2009). Black and Lynch (2005) also suggest that investment in organizational practice, process, change or re-engineering, in an accounting sense, only results in an increase in expenses (especially SG&A) rather than an increase in the assets of a firm, although such outlays are likely to generate future cash flow for several years. Owing to the tacit and idiosyncratic nature, OC_FS is therefore difficult and costly for external investors to monitor and measure.

The uncertainty relating to the success of investment in OC_FS, appropriation of cash flow between shareholder and key talent, and valuation difficulty arising from the tacit and idiosyncratic nature of OC_FS has important implications for a firm's idiosyncratic risk. Pástor and Veronesi (2003) show that idiosyncratic return volatility tends to be higher for firms with more uncertainty about future profitability and with more volatile profitability. Chan, Lakonishok, and Sougiannis (2001) also find that firms with more corporate innovation are associated with higher firm-specific volatility. The cash flow, return and valuation uncertainty associated with OC_FS thus suggests that idiosyncratic volatility is likely to be greater for firms with more OC_FS, leading to the following hypothesis:

H1b: Firm-specific organization capital increases idiosyncratic risk.

3.2.3.3 Interaction Effect of Management-Specific and Firm-Specific Organization Capital on Idiosyncratic Risk

When taken in isolation, the above discussion suggests that OC_MS (OC_FS) reduces (increases) idiosyncratic risk. Considering the differential role of OC_MS

[24] For example, the cost of on-the-job training and the extensive efforts of employees to better educate themselves and improve the efficiency of a firm's production, research, and selling processes are not normally recorded by the accounting system.

and OC_FS in effecting idiosyncratic risk, a natural question arises about which form of organization capital plays a more dominant role in influencing idiosyncratic risk.

I argue that since OC_MS is associated with more information disclosure and, therefore, with less information asymmetry, this component of organization capital may play a more crucial role in alleviating heterogeneity among the investors about the firm value and return. Even though cash flow appropriation risk and valuation uncertainty relating to OC_FS still prevails, management-specific organization capital, by dint of its superior capability, is likely to utilize OC_FS in more efficient manner, reducing the uncertainty regarding the success of OC_FS in generating expected outcome. It is therefore reasonable to conjecture that:

H1c: Management-specific organization capital, when interacting with firm-specific organization capital, plays a more dominant role in reducing idiosyncratic risk.

3.2.4 Association of Management-Specific and Firm-Specific Organization Capital with Systematic Risk

3.2.4.1 Management-Specific Organization Capital (OC_MS) and Systematic Risk (BETA)

Section 3.2.3.1 explains that since undiversified managers bear the total risk (both idiosyncratic and systematic risk), in order to adequately compensate them, their compensation would need to be commensurate with total volatility, however, since undiversified managers are compensated only for the systematic component of total risk, they value incentive-based compensation much less than its market value. This prompts managers to increase the systematic portion of risk to increase their expected return (Duan & Wei, 2005; Meulbroek, 2001; Tian, 2004).

In the context of this paper, I argue that managers with more OC_MS have an incentive to increase the operational size of the firm, as managerial pay and prestige are associated with firm size. In enhancing the firm size, managers opt for a diversification strategy. Amihud and Lev (1981) also show that managers engage in conglomerate mergers to decrease their largely undiversifiable "employment risk". Studies show that firms with high general, financial and managerial competencies pursue unrelated diversification (Montgomery & Singh, 1984), which other studies (Montgomery & Singh, 1984; Olibe et al., 2008; Porter, 1985) suggest as a source of systematic risk. Thus, managerial incentives for higher pay and prestige encourage managers to increase the systematic risk, lending support to the following hypothesis:

H2a: Management-specific organization capital is positively associated with systematic risk.

3.2.4.2 Firm-Specific Organization Capital (OC_FS) and Systematic Risk (BETA)

The strategic management literature (e.g., Barney, 1986; Montgomery & Wernerfelt, 1988) has long recognized the importance of organization capital in shaping a firm’s competitive advantage. Traditionally, firms in the same industry competed with each other based on quality and price, which encouraged firms to invest mostly in physical capital. Firm performance, in that setting, was largely determined by the general market condition, leading to a positive co-movement among the firms. However, nowadays, firms compete intensively with unique and inimitable intangible assets, business practice, process, and culture (Quinn, Anderson, & Finkelstein, 2005), making quality and price the entry tickets to the marketplace, and making the industry- and economy-wide shock less pronounced for these firms.

Firms, in the years of their existence, accumulate organization capital though learning by doing (Ericson & Pakes, 1995), most of which can be documented and archived. Such codified, integrated, and stored firm-specific knowledge can guide the firm's *future* actions (Hansen, Nohria, & Tierney, 1999; Zahra et al., 2000). OC_FS therefore helps a firm to retain its leading position in the market place for long periods of time, despite changes in industry dynamics and economic conditions. Lev et al. (2009) suggest that OC_FS enabled Wal-Mart in retail, Microsoft in software, Southwest among airlines, DuPont in chemicals, Exxon in oil and gas, and Intel in microprocessors to maintain a dominant presence in their respective industries. Demand for the products of firms with more organization capital is less affected by common risk factors. Therefore, it is reasonable to contend that OC_FS weakens the co-movement among the firms, leading firms with more organization capital to be less associated with systematic risk. The following hypothesis is developed to test this proposition:

H2b: Firm-specific organization capital is negatively associated with systematic risk.

3.2.4.3 Interaction Effect of Management-Specific and Firm-Specific Organization Capital on Systematic Risk

My earlier discussion suggests that OC_MS increases systematic risk, and OC_FS reduces this risk. One interesting question is how both OC_MS and OC_FS, when interacting, affect systematic risk. Eisfeldt and Papanikolaou (2013) find that key talent accounts for a significant fraction of corporate earnings in high organization capital firms. They also note that talented managers in high organization capital firms share the cash flows accruing from organization capital. Lev et al. (2009) also show that executive compensation, both total compensation and pay-for-performance sensitivity of equity, is positively associated with OC_FS. Carlin et al. (2012) show that firms with more organization capital have lower employee turnover. These findings imply that key executives with high organization capital are usually well paid, reducing their incentives to enhance the value of incentive-based compensation by exposing firms with more systematic risk. Accumulated OC_FS helps more able managers to cope with industry- and economy-wide challenges. I therefore argue that OC_MS, in the presence of OC_FS, is likely to negatively affect systematic risk.

H2c: Management-specific organization capital, when interacting with firm-specific organization capital, reduces systematic risk.

3.2.5 Management-Specific and Firm-Specific Organization Capital and Total Risk

The total risk of a firm entails both idiosyncratic risk and systematic risk. Studies (e.g., Goyal & Santa-Clara, 2003; Lui et al., 2007) have shown that idiosyncratic risk accounts for more than 80% of the variation in a firm's stock return. Since idiosyncratic risk constitutes a significantly large component of total risk, the trade-off of OC_MS in reducing idiosyncratic risk and increasing systematic risk tends to support the view that OC_MS reduces the total risk of a firm. By the same token, the role of OC_FS in increasing idiosyncratic risk and reducing systematic risk tends to support the theory that OC_FS increases the total risk of a firm, leading to the following hypotheses:

H3a: Management-specific organization capital reduces the total risk of a firm.

H3b: Firm-specific organization capital increases the total risk of ae firm.

Recall from my discussion in Section 3.2.3.3 that OC_MS, when interacting with OC_FS, is expected to play a more dominant role in reducing idiosyncratic risk. In the preceding section I noted that idiosyncratic risk constitutes the greatest component of total risk. Based on that argument, I thus hypothesize that OC_MS, when interacting with OC_FS, plays the dominant role in reducing total risk.

H3c: Management-specific organization capital, when interacting with firm-specific organization capital, reduces the total risk.

3.3 Research Design

3.3.1 Sample and Data

I collected data for this study from four sources: managerial ability scores from Sarah McVay's website[25], the corresponding financial information from the Compustat

[25]This data was originally used in Demerjian et al. (2012), which is used in various subsequent studies (e.g., Demerjian et al., 2013; 2014; Francis et al. 2013a; 2013b). This data can be accessed from

database, stock returns, prices and trading volume data from the Center for Research in Security Prices (CRSP), and finally daily factor data (e.g., SMB, HML, and UMD) from Kenneth R. French's web site[26]. I begin with the managerial ability data for all firms from 1980 to 2012, as used in Demerjial et al. (2013). I then exclude financial (SIC 6000 - 6999) and utility (SIC 4900 - 4949) firms, and stock traded outside NYSE, AMEX and NASDAQ (EXCHG =11, 12 and 14). I also exclude observations with missing values in the measurement of the key dependent, independent and control variables. To avoid the undesirable influence of outliers, I winsorize key variables in the extreme 1% of the respective distributions. Table 3.1 presents the sample selection (Panel A) and industry distribution of the sample (Panel B). Variable definitions are presented in the appendix 3.1.

Table 3.1: Sample Selection and Distribution of the Sample

Panel A: Data and Sample	
Description	**Total number of observations**
Management ability data available from 1980 to 2012 from Demergian (2012)	190,843
Less:	
Financial and utility firms (5,162+ 346)	(5,508)
Firms listed outside NYSE, AMEX and NASDAQ	(77,314)
Firms with missing values for organization capital variable	(22,731)
Firms with missing values for risk variables	(4,014)
Firms with missing values for the variables used in the regression model	(6,143)
Final Sample	**75,133**

Panel A of Table 3.1 shows that there are 190,843 firm-year observations, initially with management ability score. The exclusion of financial and utility firms (5,508 firm years), firms listed outside NYSE, AMEX and NASDAQ (77,314 firm years), and firms with missing values for the organization capital variable, risk variables and control variables used in the regression model (22,731, 4,014, and 6,143 firm years, respectively) yield a final sample of 75,133 firm year observations.

http://faculty.washington.edu/smcvay/abilitydata.html. I thank the authors for making this data publicly available.

[26]http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html#Research. I thank Kenneth French for making this data available.

The number of observations in any given regression varies depending on the model-specific data requirements.

Panel B: Industry Distribution		
Industry name	**Total Number of Observations**	**% of Observations**
Consumer nondurables	5,760	7.67%
Consumer durables	2,503	3.33%
Manufacturing	12,782	17.01%
Oil, gas and coal extraction and products	4,897	6.52%
Chemicals and allied products	2,857	3.80%
Business equipment	17,912	23.84%
Telephone and television transmission	2,172	2.89%
Wholesale, retail and some services	9,653	12.85%
Healthcare, medical equipment and drugs	7,289	9.70%
Other	9,308	12.39%
Total	**75,133**	100.00%

Table 3.1, Panel B reports the composition of the sample by the 12 industry groups. The sample is unevenly distributed across industries (with the largest samples being in the business equipment (23.84%) and manufacturing (17.01%) industries, respectively).

3.3.2 Dependent Variables: Firm Risks

I use daily stock returns as a basis of calculating annual estimates of idiosyncratic and systematic risk. I run the following market model, CAPM and Fama-French (1993) three-factor regressions for each firm in each year. I require at least 175 daily observations to compute idiosyncratic and systematic risk.

Market Model

$$R_{i,t} = \alpha_i + \beta_i\left(R_{m,t}\right) + \varepsilon_{i,t}, \qquad i = 1, \dots, N \; and \; t = 1, \dots, T \qquad (3.1)$$

where $R_{i,t}$ is the raw stock return on day t for firm i, $R_{m,t}$ is the daily return from the CRSP value-weighted market index, α_i (or alpha) is the intercept term, β_i (or beta) is the slope coefficient that captures systematic risk, and $\varepsilon_{i,t}$ is an error term. The standard deviation of the residuals from the above regression model is my annual measure of idiosyncratic risk.

CAPM Model

$$R_{i,t} - R_{f,t} = \alpha_i + \beta_i(R_{m,t} - R_{f,t}) + \varepsilon_{i,t}, \qquad i = 1, \ldots, N \text{ and } t = 1, \ldots, T \quad (3.2)$$

where $R_{i,t}$ is the stock return on day t for firm i, $R_{f,t}$ is the simple daily return from holding a 30-day risk-free treasury-bill and the remaining variables are as in Equation (3.1).

Fama-French (1993) Model

$$R_{i,t} - R_{f,t} = \alpha_i + \beta_i(R_{m,t} - R_{f,t}) + \gamma_i SMB_t + \varphi_i HML_t + \varepsilon_{i,t}, \qquad (3.3)$$

where SMB_t and HML_t are the size premium (Small Minus Big) and the value premium (High Minus Low), collected from Kenneth French's website, and the remaining variables are as in equation (3.1)[27].

Following earlier studies (e.g., Armstrong & Vashishtha, 2012; Bargeron, Lehn, & Zutter, 2010; Chen, Steiner, & Whyte, 2006) I estimate total risk as the standard deviation of monthly stock return (STD_RET) and rolling standard deviation of monthly stock return over the prior three years (STD_RET_3).

3.3.3 Independent Variable: Estimation of Management-Specific and Firm-Specific Organization Capital

3.3.3.1 Management-Specific Organization Capital (OC_MS)

OC_MS is reflected in the managerial ability to efficiently generate revenues from given economic resources. Identifying a reliable proxy for managerial ability is

[27] As I intend to examine the idiosyncratic risk of individual firms and relate it to firm-specific characteristics, consistent with Brown and Kapadia (2007), I use this methodology as opposed to that proposed by Campbell et al. (2001), which produces average values of idiosyncratic risk for a set of firms (all listed firms in their paper) and which cannot serve my purpose.

complex, simply because a manager's reputational assessment is multidimensional. Prior literature uses media citations and industry-adjusted returns as indirect proxies for managerial ability (Milbourn, 2003; Rajgopal, Shevlin, & Zamora, 2006). These indirect proxies have, however, been subjected to criticism, such as, prior abnormal stock returns include information above and beyond management's control. Demerjian et al. (2012) use data envelopment analysis (*DEA*) to evaluate the relative efficiency of firm level managers in converting certain inputs (e.g., Net PP&E; Net Operating Leases; Net R&D; Purchased Goodwill; Other Intangible Assets; Cost of Inventory; and SG&A Expenses) into outputs (revenue, income, etc.). Using an optimization procedure incorporating these variables, the authors calculate firm efficiency, and then regress it on six firm characteristics that affect firm efficiency: firm size, firm market share, cash availability, life cycle, operational complexity, and foreign operations. The residual term derived from this regression is the component reflecting managerial ability.[28] Given its superior power to capture managerial ability and operational efficiency relative to their industry peers, I use Demerjian et al.'s (2012) score as my primary proxy for OC_MS. Since OC_MS is mostly driven by managerial ability, I use OC_MS and managerial ability interchangeably.

3.3.3.2 Firm-Specific Organization Capital (OC_FS)

To derive OC_FS, I first estimate overall organization capital (OC) at firm level, and then regress this overall organization capital on OC_MS. The residual term from this regression (i.e., part of the overall organization capital that is not captured by the OC_MS) is my estimate of OC_FS.

I follow Eisfeldt and Papanikolaou (2013) to estimate overall organization capital based on SG&A expenses. Lev et al. (2009) argue that SG&A expenses include costs relating to developing information systems, employee training, R&D, consultant fees and brand promotion, which aid in building organization capital. I

[28] For a detailed exposition of the measurement of managerial talent using DEA, please refer to Demerjian et al. (2012, pp. 1235-1238).

calculate the stock of overall organization capital each year by accumulating the deflated value of SG&A expenses based on the following equation:

$$OC_{i,t} = OC_{i,t-1}(1-\delta_0) + \frac{SGA_{i,t}}{cpi_t} \tag{3.4}$$

where $OC_{i,t}$ (and δ_0) denote the stock of organization capital at time t (and depreciation rate of OC), while SGA and cpi_t are SG&A expenses and the consumer price index, respectively.

The initial stock of overall organization capital is estimated as:

$$OC_{i,t_0} = \frac{SGA_{i,t_0}}{g+\delta_0}, \tag{3.5}$$

Following Eisfeldt and Papanikolaou (2013), I use a depreciation rate of 15%. Growth (g) in the flow of organization capital is estimated as the average real growth of firm-level SG&A expenses. I replace any missing values of SG&A with zero.

Finally, firm-specific organization capital ($OC\_FS_{i,t}$) is estimated as the residual from the following regression model:

$$OC_{i,t} = OC\_MS_{i,t} + IND_{DUMMIES} + YEAR_{DUMMIES} \tag{3.6}$$

where *OC* and *OC_MS* denote overall organization capital and management-specific organization capital, respectively.[29]

[29] Carlin et al. (2012) argue that firms in rapidly changing industries are less likely to invest in organization capital because such industries have a greater technology obsolescence risk, which reduces the usefulness of a firm's organization capital in the future. Eisfeldt and Papanikolaou (2013) show that firms accumulate stocks of organization capital over the years. Therefore, I include industry and year dummies to control for the effects of industry and time in the regression model, however, inferences from the subsequent analysis remain the same even if I do not control for industry and year effect.

3.3.4 Control Variables

My regression models incorporate a number of control variables that prior studies suggest affect idiosyncratic, systematic and total risk. Large firms tend to diversify their businesses more efficiently and are less prone to bankruptcy (Titman & Wessels, 1988), therefore these firms experience lower return volatility (Pástor & Veronesi, 2003). Olibe et al. (2008) contend that large firms are associated with less systematic risk due to economics of scale and superior ability to cope with economic changes. Hence, I control for firm size (SIZE) in the regression model. Rajgopal and Venkatachalam (2011) suggest that leverage (LEV) increases stockholder risk associated with a firm's cash flow, suggesting a positive relationship between stock return volatility and financial leverage. Hong and Sarkar (2007) and Hamada (1972) also argue that systematic risk is an increasing function of leverage ratio. Cao, Simin, and Zhao (2008) and Rajgopal and Venkatachalam (2011) show that firms with more growth opportunities are likely to experience higher idiosyncratic volatility. Unexpected earnings associated with growth opportunities are riskier than normal earnings which generate a positive association between growth and risk (Botosan & Plumlee, 2005). I control for firm growth by using the market to book (MTB) ratio. Studies (e.g., Pástor & Veronesi, 2003; Wei & Zhang, 2006) have shown that a decrease in corporate earnings and an increase in earnings volatility account for the growth in idiosyncratic volatility. With respect to systematic risk, Hong and Sarkar (2007) show that equity beta is an increasing function of earnings volatility. These studies generally argue that high profitability and stock return, and lower volatility in profit can enhance a company's ability to lower financial instability and thus lessen idiosyncratic and systematic risk, and therefore, in the regression models, I control for firm profitability (PM), stock return (RET) and cash flow risk (STD_CFO).

Irvine and Pontiff (2009) suggest that competition among firms has important implications for idiosyncratic risk. Irvine and Pontiff (2004) also show that increasing competition leads to increasing cash flow variability, which increases idiosyncratic risk. I therefore control for market competition using Herfildile Index (HINDEX). Cao et al. (2008) argue that the future cash flows of younger firms are more uncertain than those of older firms, indicating that a firm's age (AGE) affects firm-specific volatility. Beaver, Kettler, and Scholes (1970) show the negative impact of dividend payout on systematic risk. In the regression model, I therefore control for firm age (AGE) and dividend (DIV).

3.3.5 Empirical Model

I test the association of OC_FS and OC_MS with firm risks with the following regression models:

$$Idiosyncratic\ Risk_{i,t} = \alpha_0 + \beta_1 OC\_MS_{i,t} + \beta_2 OC\_FS_{i,t} + \beta_3 OC\_MS_{i,t} * OC\_FS_{i,t} + \beta_4 SIZE_{i,t} + \beta_5 LEV_{i,t} + \beta_6 MTB_{i,t} + \beta_7 PM_{i,t} + \beta_8 STD\_CFO_{i,t} + \beta_9 HINDEX_{i,t} + \beta_{10} AGE_{i,t} + \beta_{11} RET_{i,t} + YEAR_{DUMMIES} + IND_{DUMMIES} + \varepsilon_{i,t} \quad (3.7)$$

$$Systematic\ Risk_{i,t} = \alpha_0 + \tau_1 OC\_MS_{i,t} + \tau_2 OC\_FS_{i,t} + \tau_3 OC\_MS_{i,t} * OC\_FS_{i,t} + \tau_4 SIZE_{i,t} + \tau_5 LEV_{i,t} + \tau_6 MTB_{i,t} + \tau_7 PM_{i,t} + \tau_8 STD\_CFO_{i,t} + \tau_9 DIV_{i,t} + YEAR_{DUMMIES} + IND_{DUMMIES} + \varepsilon_{i,t} \quad (3.8)$$

$$TOTAL\ Risk_{i,t} = \alpha_0 + \gamma_1 OC\_MS_{i,t} + \gamma_2 OC\_FS_{i,t} + \gamma_3 OC\_MS_{i,t} * OC\_FS_{i,t} + \gamma_4 SIZE_{i,t} + \gamma_5 LEV_{i,t} + \gamma_6 MTB_{i,t} + \gamma_7 PM_{i,t} + \gamma_8 STD\_CFO_{i,t} + \gamma_9 HINDEX_{i,t} + \gamma_{10} AGE_{i,t} + \gamma_{11} RET_{i,t} + YEAR_{DUMMIES} + IND_{DUMMIES} + \varepsilon_{i,t} \quad (3.9)$$

3.4 Empirical Findings and Discussion

3.4.1 Descriptive Statistics

Table 3.2, Panel A presents the descriptive statistics for the key variables used in the study. The results indicate that the annual estimates of mean idiosyncratic volatility based on market model and CAPM model are 3.2% and 3.2% whereas the volatility measure based on the Fama-French three factor model is 3.1%. Moreover, the mean (median) systematic volatility - BETA is 0.859 (0.878). The mean (median) of total risk (STD_RET) is 13.6% (11.7%). The mean values of OC_MS and OC_FS are -0.005 and 0.000 respectively. Owing to regression residuals, as in Demerjian et al. (2012, 2013), these values are close to 0. Descriptive statistics show that the average firm has a SIZE of 5.603, leverage (LEV) ratio of 16.9% of total assets, market to book (MTB) ratio of 2.603, profit margin (PM) of -3.30%, cash flow volatility (STD_CFO) of 6.70%, AGE of 16.63 years, stock return (RET) of 18.80% and dividend payout (DIV) of 10.5%.

Table 3.2:

Panel A: Descriptive Statistics

Variables	**N**	**Mean**	**Standard deviation**	**25%**	**Median**	**75%**
Risk Related Variables						
IV_MKT	75133	0.032	0.018	0.019	0.027	0.039
IV_CAPM	75133	0.032	0.018	0.019	0.027	0.039
IV_FF3	75133	0.031	0.018	0.019	0.027	0.039
BETA	75133	0.859	0.591	0.425	0.801	1.224
STD_RET	75133	0.136	0.076	0.083	0.117	0.166
STD_RET_3	71884	0.136	0.065	0.046	0.090	0.122
OC Variables						
OC_MS[a]	75133	-0.005	0.136	-0.090	-0.011	0.072
OC_FS[a]	75133	0.000	1.652	-0.907	-0.336	0.333
Control Variables						
SIZE	75133	5.603	1.968	4.178	5.47	6.912
LEV	75133	0.169	0.177	0.009	0.127	0.267
MTB	75133	2.603	3.364	1.119	1.827	3.051
PM	75133	-0.033	0.882	0.005	0.058	0.119
STD_CFO	75133	0.067	0.115	0.014	0.03	0.069
HINDEX	75133	0.442	0.150	0.322	0.405	0.513
AGE	75133	16.633	15.144	5.879	12.055	21.858
RET	75133	0.188	0.643	-0.196	0.083	0.403
DIV	75133	0.105	0.287	0.000	0.000	0.141

Note: [a]For the regression analysis I use decile values for these variables. In the descriptive statistics I present the untransformed variable for ease of interpretation.

Variable definitions are provided in appendix 3.1.

Panel B: Correlation Matrix

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
IV_CAPM (1)	1.000														
IV_FF3 (2)	0.999	1.000													
BETA (3)	*0.003*	-0.011	1.000												
STD_RET (4)	0.731	0.724	0.210	1.000											
OC_MS (5)	-0.112	-0.112	0.016	-0.077	1.000										
OC_FS (6)	0.170	0.173	-0.129	0.086	0.034	1.000									
SIZE (7)	-0.494	-0.497	0.288	-0.314	0.028	-0.273	1.000								
LEV (8)	-0.060	-0.059	-0.024	-0.041	-0.113	-0.155	0.246	1.000							
MTB (9)	-0.019	-0.022	0.134	0.054	0.106	0.011	0.022	-0.068	1.000						
PM (10)	-0.193	-0.192	-0.032	-0.179	0.140	-0.053	0.103	*-0.006*	-0.032	1.000					
STD_CFO (11)	0.343	0.342	0.094	0.340	-0.046	0.166	-0.223	-0.072	0.111	-0.213	1.000				
HINDEX (12)	-0.066	-0.064	-0.072	-0.081	-0.023	-0.023	-0.033	0.020	-0.046	0.036	-0.064	1.000			
AGE (13)	-0.349	-0.347	-0.028	-0.312	0.008	0.098	0.350	0.038	-0.085	0.101	-0.200	0.095	1.000		
RET (14)	-0.011	-0.011	0.066	0.162	0.057	-0.021	-0.034	-0.029	0.223	0.060	0.033	*0.000*	-0.011	1.000	
DIV (15)	-0.227	-0.225	-0.068	-0.212	0.019	*-0.003*	0.172	0.045	*-0.001*	0.059	-0.110	0.034	0.173	-0.021	1

Notes:
All numbers except those in *italics* are significant at $p<0.01$
Variable definitions are provided in appendix 3.1.

3.4.2 Correlation

Table 3.2, Panel B reports the pair-wise correlation between the variables included in the regression models. As expected, OC_MS is negatively correlated ($p<0.01$) with idiosyncratic volatility and total volatility, while significantly positively correlated with systematic risk (BETA). On the other hand, OC_FS is positively correlated ($p<0.01$) with idiosyncratic risk and total risk, while this is significantly ($p<.01$) negatively correlated with systematic risk (BETA). As consistent with Demerjian et al. (2012) SIZE, RET and PM are positively correlated ($p<.01$) with the OC_MS. Furthermore, consistent with prior findings (Jiang, Xu, & Yao, 2009; Fu, 2009) idiosyncratic risk (IV_CAPM and IV_FF3) is negatively correlated ($p<.01$) with SIZE, LEV, RET and MTB). Conversely, systematic risk (BETA) is positively (negatively) correlated ($p<.01$) with SIZE, MTB, STD_CFO and RET (PM, HINDEX, AGE and DIV), implying that large and growth firms with volatile cash flow and returns are associated with more systematic risk, while mature firms with more market share and dividend payouts are associated with less systematic risk. Overall, the correlations reported in the table are in the expected direction and thus provide strong support for the validity of my key measures and constructs.

3.4.3 Regression Results

3.4.3.1 Association of Management-Specific (OC_MS) and Firm-Specific (OC_FS) Organization Capital with Idiosyncratic Risk (IV)

Panel A of Table 3.3 presents the regression results for the association of OC_MS and OC_FS with idiosyncratic risk (proxied by IV_MKT, IV_CAPM and IV_FF3 and labeled as Model 1, Model 2, and Model 3, respectively) with clustered standard errors at the firm level (Equation 3.7). I also examine the impact of interaction between OC_MS and OC_FS (OC_MS*OC_FS) on idiosyncratic volatility. Note that I create decile ranks of OC_MS and OC_FS by year and industry to make the score more comparable across time and industries and to mitigate the influence of extreme observations. These ranked OC_MS and OC_FS are used in the regression analysis. As expected, the regression coefficients on OC_MS in Model 1 to Model 3 are negative (β_1 = -0.002, -0.002 and -0.002, respectively) and significant ($p<.01$), while that on OC_FS are positive (β_2 = 0.006, 0.006, and 0.006, respectively) and significant ($p<.01$). Thus, the regression coefficients for OC_MS and OC_FS do not reject H1a and H1b, implying that management (firm) specific organization capital reduces (increases) idiosyncratic volatility of the firm. In terms of economic significance, regression results suggest that controlling for other firm characteristics, a one decimal point (i.e., 0.10) increase in the OC_MS (OC_FS) of the average firm reduces (increases) idiosyncratic volatility by 0.20% (0.60%). Negative and significant coefficients for OC_MS support the view that managerial talents can reduce information asymmetry and uncertainty about future cash flow, causing a reduction in investor heterogeneity about future returns. Positive and significant coefficients for OC_FS support the assertion that OC_FS, owing to its high outcome and valuation uncertainty, induces heterogeneity among investors about future return, causing an increase in idiosyncratic volatility.

Coefficients for OC_MS*OC_FS (β_3 = -0.005, -0.005, and -0.005, respectively) suggest the dominant and significant ($p<0.01$) role of OC_MS in reducing idiosyncratic risk, lending support to H1c. Thus, the above base effects and interaction effects, overall, indicate that the role of OC_MS in reducing idiosyncratic risk accentuates in the presence of OC_FS, while the role OC_FS in increasing idiosyncratic risk attenuates in the presence of OC_MS. In particular, the role of OC_MS in reducing idiosyncratic risk is expected to accentuate from -0.002 to -0.007 when OC_FS moves from the lowest (10%) to the highest decile (100%). However, the impact of OC_FS in increasing idiosyncratic risk attenuates from 0.006 to 0.001 when OC_MS moves from the lowest to the highest decile. These results support my conjecture that when OC_FS and OC_MS are interacting, OC_MS play a more dominant role in reducing idiosyncratic risk.

The regression results in Table 3.3, Panel A show that the coefficients for the most of the control variables have the predicted signs and statistical significance. For example, consistent with the empirical findings (e.g., Brown & Kapadia, 2007; Chen, Huang, & Jha, 2012; Ferreira & Laux, 2007; Rajgopal & Venkatachalam, 2011) SIZE, PM, AGE (LEV, STD_CFO) are negatively (positively) associated with the idiosyncratic risk, implying that large, profitable and mature (levered and volatile cash flow) firms are exposed to less (more) idiosyncratic risk. The positive (negative) coefficient of RET (MTB) is consistent with the findings of Brown and Kapadia (2007) and Chen et al. (2012), respectively.

Table 3.3: Regression Results

Panel A: Association of Management- and Firm- Specific Organization Capital with Idiosyncratic Risk

Dep. Var.	**(Model 1) IV_MKT**	**(Model 2) IV_CAPM**	**(Model 3) IV_FF3**
OC_MS	-0.002***	-0.002***	-0.002***
	(-3.58)	(-3.60)	(-3.55)
OC_FS	0.006***	0.006***	0.006***
	(8.15)	(8.11)	(8.26)
OC_MS * OC_FS	-0.005***	-0.005***	-0.005***
	(-4.99)	(-4.97)	(-4.95)
SIZE	-0.004***	-0.004***	-0.004***
	(-47.33)	(-47.43)	(-47.34)
LEV	0.008***	0.008***	0.008***
	(12.75)	(12.74)	(12.84)
MTB	-0.000***	-0.000***	-0.000***
	(-11.32)	(-11.32)	(-11.85)
PM	-0.001***	-0.001***	-0.001***
	(-8.81)	(-8.80)	(-8.73)
STD_CFO	0.025***	0.025***	0.025***
	(27.01)	(26.97)	(26.52)
HINDEX	-0.001	-0.001	-0.001
	(-0.84)	(-0.86)	(-0.82)
AGE	-0.003***	-0.003***	-0.003***
	(-17.88)	(-17.89)	(-17.50)
RET	0.000***	0.000***	0.000***
	(4.19)	(4.14)	(3.95)
Constant	0.048***	0.048***	0.048***
	(22.05)	(22.33)	(22.02)
YEAR FE	Yes	Yes	Yes
INDUSTRY FE	Yes	Yes	Yes
Observations (N)	75,133	75,133	75,133
Adj. R-squared	0.49	0.49	0.49

Notes:
Robust t-statistics in brackets.
*** p<0.01, ** p<0.05, * p<0.10
Variable definitions are provided in appendix 3.1.

3.4.3.2 Association of Management-Specific (OC_MS) and Firm-Specific (OC_FS) Organization Capital with Systematic Risk (BETA)

Next I examine the association of OC_MS and OC_FS with systematic risk (BETA) and test whether OC_MS and OC_FS, when interacting, strengthen or weaken the relationship. As argued before, undiversifiable talented managers (i.e., OC_MS) pursue strategies (e.g., conglomerate mergers (Amihud & Lev, 1981)) to decrease their "employment risk", which in turn increases systematic risk (Porter, 1985) and managerial payoff. Conversely, codified, integrated and institutionalized firm-specific knowledge about business practice and process (OC_FS) assist a firm to successfully cope with general market shock, making the firm less susceptible to systematic risk. Since OC_FS are associated with higher compensation (Eisfeldt & Papanikolaou, 2013; Lev et al., 2009) and lower employment risk (Carlin et al., 2012), managerial incentives for increasing the systematic risk should attenuate for these firms. Since accumulated OC_FS assists talented managers to cope with macro-economic movement, the interaction of OC_MS and OC_FA should decrease the systematic risk.

Table 3.3, Panel B reports regression results for Equation (3.8), where I use three proxies for systematic risk. The regression results show that the coefficients on OC_MS (OC_FS) are positive (negative) and statistically significant for systematic risk (the coefficients on OC_MS (OC_FS) are 0.088 (-0.051) with an associated t-statistic of 3.68 (-2.10) for BETA). These coefficients for OC_MS and OC_FS lend support to H2a and H2b. These results are also economically significant: controlling for other firm characteristics, a one standard deviation increase in the OC_MS (OC_FS) of the average firm in Model 1increases (reduces) systematic risk by 2.536% (1.464%).

Panel B: Association of Management- and Firm-Specific Organization Capital with Systematic Risk

Dep. Var.	(Model 1) **BETA**
OC_MS	0.088***
	(3.68)
OC_FS	-0.051**
	(-2.10)
OC_MS * OC_FS	-0.169***
	(-4.47)
SIZE	0.106***
	(40.17)
LEV	-0.156***
	(-6.69)
MTB	0.021***
	(19.16)
PM	-0.024***
	(-5.84)
STD_CFO	0.675***
	(21.04)
DIV	-0.193***
	(-21.63)
Constant	0.281***
	(4.06)
YEAR FE	Yes
INDUSTRY FE	Yes
Observations (N)	75,133
Adj. R-squared	0.26

Notes:
Robust t-statistics in brackets.

Now, I concentrate on the coefficient for the interaction variable (*OC_MS * OC_FS*) which indicates the combined effect of OC_MS and OC_FS in influencing systematic risk. The coefficients for the interaction variable are negative (τ_3 = -0.169 and significant (at p<.01), suggesting that interaction between OC_MS and OC_FS reduces systematic risk. The base coefficient and interaction coefficient, together, in Model 1 imply that the effect of OC_MS on systematic risk is expected to decrease from 0.071 to -0.081 when OC_FS moves from the lowest (10%) to the highest decile (100%), however, the impact of OC_FS on systematic risk is expected to increase from -0.068 to -0.220 when OC_MS moves from the lowest to the highest decile. The interaction coefficients thus imply that OC_MS, when interacted with

OC_FS, play a more crucial role in reducing the systematic risk of the firm. Overall, my analysis as shown in Table 3.3 lends support to the findings of Teece et al. (1997) that managerial and organizational process and abilities determine a firm's ability to react and adapt to ever-changing business environments.

3.4.3.3 Association of Management-Specific (OC_MS) and Firm-Specific (OC_FS) Organization Capital with Total Risk

Table 3.3, Panel C reports the regression results for Equation 3.9. Model 1 (Model 2) shows the association of OC_MS and OC_FS with respect to STD_RET (STD_RET_3). As expected, OC_MS reduces (Υ_1 = -0.006 and -0.005) total risk significantly (both at $p<.05$), while OC_FS increases (Υ_2 = 0.014 and 0.005) total firm risk. Interaction between OC_MS and OC_FS reduces (Υ_3 = -0.019 and -0.010) total risk significantly (both at $p<0.01$). The sign and significance of the variables in this regression table (Panel C) are largely consistent with the results reported in Panel A of Table 3.3, lending support to the findings of Lui et al. (2007) and Goyal and Santa-Clara (2003) that idiosyncratic risk makes up the dominant part of total stock variance and thus the results reported in Panel C are driven mostly by the idiosyncratic risk.

The coefficients for most of the control variables have the predicted signs and statistical significance. For example, consistent with the empirical findings (e.g., Armstrong & Vashishtha, 2012; Chen et al., 2006) SIZE, PM, AGE (LEV, STD_CFO, RET) are negatively (positively) associated with the total risk, signifying that large, profitable and mature (levered and volatile cash flow) firms are exposed to less (more) total risk.

Panel C: Association of Management- and Firm- Specific Organization Capital with Total Risk

Dep. Var.	(Model 1) STD_RET	(Model 2) STD_RET_3
OC_MS	-0.006**	-0.005**
	(-2.47)	(-2.02)
OC_FS	0.014***	0.005*
	(5.39)	(1.84)
OC_MS * OC_FS	-0.019***	-0.010***
	(-4.71)	(-2.58)
SIZE	-0.009***	-0.010***
	(-32.22)	(-31.17)
LEV	0.028***	0.024***
	(11.55)	(9.67)
MTB	-0.000***	0.000
	(-3.34)	-0.06
PM	-0.007***	-0.005***
	(-10.03)	(-9.72)
STD_CFO	0.125***	0.159***
	(32.38)	(35.57)
HINDEX	-0.009***	-0.009**
	(-2.61)	(-2.53)
AGE	-0.013***	-0.014***
	(-25.31)	(-24.27)
RET	0.023***	0.010***
	(41.68)	(27.38)
Constant	0.190***	0.194***
	(22.56)	(21.22)
YEAR FE	Yes	Yes
INDUSTRY FE	Yes	Yes
Observations (N)	75,133	71,884
Adj. R-squared	0.39	0.48

Notes:
Robust t-statistics in brackets.
*** p<0.01, ** p<0.05, * p<0.10
Variable definitions are provided in appendix 3.1.

3.4.4 Additional Analysis

Association of Management-Specific (OC_MS) and Firm-Specific (OC_FS) Organization Capital with Return

In this section, I examine the association of OC_MS and OC_FS with return. I use four proxies of return: yearly stock return (RET), profitability (PM), return on equity (ROE), and return on assets (ROA). Regression results in Table 3.4 shows that OC_MS is positively and significantly ($p<.01$) associated with firm return, while OC_FS is negatively and significantly ($p<.01$) associated with firm return. The coefficients for the interaction variable (OC_MS*OC_FS) are positive and significant, suggesting that OC_MS, when interacting with OC_FS enhances firm return. For example, in Model 1 OC_MS increase stock return from 5.31% to 10.2% when OC_FS moves from the lowest decile to the highest decile. A similar interpretation holds for Model 2 to Model 4. The negative association between OC_FS and a firm return weaken in the presence of OC_MS. For example, in Model 1 the negative relationship between OC_FS and RET attenuates from -11.20% to -6.3% when OC_MS moves from the lowest to the highest decile. These results, together, imply that OC_MS individually and collectively (when interacted with OC_FS) play important role in increasing firm return. These results have important implications in reconciling my findings with those of prior studies. For example, Eisfeldt and Papanikolaou (2013) and Lev et al. (2009) found that organization capital is associated with superior operating and stock return performance. My results indicate that associations between organization capital and return reported in prior studies are mainly driven by the management-specific organization capital.

Table 3.4: Additional Analysis

Panel A: Association of Management- and Firm-Specific Organization Capital with Return

Dep. Var.	**(Model 1) RET**	**(Model 2) PM**	**(Model 3) ROE**	**(Model 4) ROA**
OC_MS	0.048***	0.348***	0.199***	0.089***
	(3.18)	(6.59)	(11.27)	(12.92)
OC_FS	-0.117***	-0.182***	-0.208***	-0.165***
	(-7.21)	(-2.79)	(-9.05)	(-16.58)
OC_MS * OC_FS	0.054**	0.208**	0.200***	0.143***
	(2.08)	(2.30)	(5.79)	(9.72)
SIZE	-0.021***	0.066***	0.044***	0.022***
	(-16.09)	(14.64)	(21.39)	(23.92)
LEV	-0.016	-0.197***	-0.160***	-0.174***
	(-1.06)	(-5.37)	(-5.77)	(-21.68)
MTB	0.039***	-0.008***	-0.009**	0.003***
	(26.94)	(-3.28)	(-2.46)	(6.30)
BETA	0.063***	-0.101***	-0.032***	-0.026***
	(13.57)	(-9.44)	(-5.13)	(-12.55)
CAP_INT	-0.085***	0.271***	0.059***	0.035***
	(-6.18)	(5.97)	(2.89)	(4.61)
DIV	-0.025***	0.071***	0.074***	0.031***
	(-4.54)	(10.13)	(10.17)	(13.63)
Constant	0.390***	-0.364***	-0.074	-0.004
	(6.43)	(-4.84)	(-1.07)	(-0.10)
YEAR FE	Yes	Yes	Yes	Yes
INDUSTRY FE	Yes	Yes	Yes	Yes
Observations (N)	75,059	75,059	75,059	75,059
Adj. R-squared	0.19	0.06	0.07	0.22

Notes:
Robust t-statistics in brackets.
*** p<0.01, ** p<0.05, * p<0.10
Variable definitions are provided in appendix 3.1.

3.4.5 Sensitivity Analysis

3.4.5.1 Alternative Specification of Management-Specific Organization Capital (OC_MS)

The main management-specific organization capital measure used in the study is the managerial efficiency metric developed by Demerjian et al. (2012). To mitigate concerns as to whether the results are sensitive to the specification of OC_MS, following prior studies (e.g., Fee & Hadlock, 2003; Milbourn, 2003; Rajgopal et al., 2006), I use industry-adjusted value-weighted stock return as an alternative specification.[30] When industry-adjusted stock returns are used as an alternative proxy to disentangle OC_FS from the OC_MS, I continue to find consistent evidence that OC_MS reduces (increases) idiosyncratic risk and total risk (systematic risk), while OC_FS increases (reduces) idiosyncratic risk and total risk (systematic risk), all of which are significant at $p<0.01$. Results in Table 3.5, Panel A, further show that, when OC_MS and OC_FS are interacting, they significantly ($p<0.01$) reduce idiosyncratic, systematic and total risk.

3.4.5.2 Alternative Specification of Risks

In my main analysis I use three measures of idiosyncratic risk: market model, CAPM and the Fama-French three factor model. In this section, I re-estimate my analysis using the three-factor Fama-French (1993) model including a momentum factor as in Carhart (1997). Panel B of Table 3.5 shows that regression results using alternative estimates of risk corroborate the conclusions of the main analyses.

3.4.5.3 Regression Results from Bootstrapped Standard Errors

Recall that in estimating the OC_FS, I regress OC_MS on overall organizational capital and the predicted values from the regression are used as a proxy for OC_FS.

[30] Correlation between the management ability score of Demerjian et al. (2012) and industry-adjusted value weighted stock return is 0.191, suggesting that these two variables measure different aspects of management specific organization capital.

Table 3.5: Sensitivity Analysis

Panel A: Alternative Specification of Management-Specific Organization Capital

Variables	(Model 1) IV_MKT	(Model 2) IV_CAPM	(Model 3) IV_FF3	(Model 4) BETA	(Model 5) STD_RET
OC_MS	-0.010***	-0.010***	-0.011***	0.667***	-0.009***
	(-18.45)	(-18.50)	(-19.43)	(36.97)	(-3.38)
OC_FS	0.001***	0.001***	0.001***	-0.009***	0.005***
	(10.21)	(10.18)	(10.29)	(-3.63)	(8.90)
OC_MS *OC_FS	-0.001***	-0.001***	-0.001***	-0.053***	-0.009***
	(-3.73)	(-3.75)	(-3.75)	(-5.74)	(-4.00)
SIZE	-0.004***	-0.004***	-0.004***	0.109***	-0.010***
	(-43.21)	(-43.31)	(-43.23)	(40.71)	(-26.45)
LEV	0.009***	0.009***	0.009***	-0.064***	0.039***
	(13.75)	(13.71)	(13.71)	(-2.77)	(12.93)
MTB	-0.000***	-0.000***	-0.000***	0.014***	-0.000**
	(-9.43)	(-9.41)	(-9.63)	(12.99)	(-2.54)
PM	-0.002***	-0.002***	-0.002***	-0.029***	-0.010***
	(-8.64)	(-8.64)	(-8.57)	(-5.91)	(-9.12)
STD_CFO	0.026***	0.026***	0.026***	0.771***	0.039**
	(23.11)	(23.11)	(22.69)	(20.20)	(2.27)
HINDEX	-0.000	-0.000	-0.000		-0.011***
	(-0.42)	(-0.43)	(-0.41)		(-2.68)
AGE	-0.003***	-0.003***	-0.003***		-0.016***
	(-17.82)	(-17.85)	(-17.50)		(-21.95)
RET	0.000***	0.000***	0.000***		0.029***
	(4.13)	(4.09)	(3.75)		(32.78)
DIV				-0.179***	
				(-20.41)	
Constant	0.049***	0.050***	0.049***	0.161**	0.203***

	(21.35)	(21.51)	(21.02)	(2.31)	(21.80)
YEAR FE	Yes	Yes	Yes	Yes	Yes
INDUSTRY FE	Yes	Yes	Yes	Yes	Yes
Observations	70,024	70,024	70,024	70,024	70,024
Adj. R-squared	0.49	0.49	0.49	0.29	0.32

Notes: Robust t-statistics in brackets.
*** p<0.01, ** p<0.05, * p<0.10.
Variable definitions are provided in appendix 3.1.

Panel B: Alternative Specification of Risk

Dep. Var.	**(Model 1)** **IV_FF4**
OC_MS	-0.002***
	(-3.63)
OC_FS	0.006***
	(8.29)
OC_MS * OC_FS	-0.005***
	(-4.95)
SIZE	-0.004***
	(-47.99)
LEV	0.008***
	(12.90)
MTB	-0.000***
	(-11.90)
PM	-0.001***
	(-8.72)
STD_CFO	0.025***
	(26.59)
HINDEX	-0.001
	(-0.80)
AGE	-0.003***
	(-17.59)
RET	0.000***
	(4.13)
DIV	
Constant	0.047***
	(22.03)
YEAR FE	Yes
INDUSTRY FE	Yes
Observations	75,133
Adj. R-squared	0.49

Notes:
Robust t-statistics in brackets.
*** p<0.01, ** p<0.05, * p<0.10
Variable definitions are provided in appendix 3.1.

To allay concerns regarding the standard error problem associated with two-stage estimation, I use the bootstrap method in the standard error estimation approach.[31] My regression estimates using the bootstrap method of standard error estimation are qualitatively similar to those obtained in the main analysis. For example, the coefficients (t-value) of OC_MS, OC_FS, and OC_MS*OC_FS for Model 1 in Panel A of Table 3 are -0.002 (-6.26), 0.006 (14.21), and -0.005 (-8.34), respectively. Similar results hold for other proxies of idiosyncratic risk, systematic risk, and total risk. Thus, the regression results using the bootstrap standard error estimation corroborate the conclusions from the main analyses.

3.4.5.4 Firm Fixed Effects Analysis

Readers may be concerned that inferences about the association of OC_MS and OC_FS with idiosyncratic, systematic and total risk are based on a pooled cross-section and time-series regression where multiple annual observations for the same firm are used. While the robust cluster estimator in the regression models mitigates such concerns, I examine the robustness of the results by estimating a firm fixed-effects version of Equation (3.7), Equation (3.8) and Equation (3.9), where every firm and every year in the sample is assigned a dummy variable. Firm fixed-effects results reported in appendix 3.2 suggest that the results in the main analysis are robust to the use of firm fixed effect model, implying that my results are not driven by the omitted unknown time invariant firm characteristics.

3.4.5.5 Continuous Value of OC_MS and OC_FS

In my main analysis, as consistent with Demerjian et al. (2013), I create decile ranks of OC_MS and OC_FS by year and industry to make the score more comparable across time and industries. In the robustness check I re-examined the findings using the continuous value of OC_MS and OC_FS. Appendix 3.3 indicates that results using the continuous value remain significant at the conventional level with the expected signs.

[31] I use 10,000 replications to generate the bootstrap standard errors.

3.4.5.6 Endogeneity Test: Two-Stage Least Squares (2SLS) Regression

To allay concerns that the endogenous relationship between the main independent variables (OC_MS, OC_FS and OC_MS*OC_FS) and the error term (ε) confounds the findings reported in the study, I adopt a two stage instrumental variable approach to re-examine the findings reported in Table 3.3.

I use industry means of OC_MS, OC_FS and OC_MS*OC_FS (i.e., OC_MS_IND, OC_FS_IND and OC_MS_IND*OC_FS_IND) and three firm-level variables (namely, PRODUCTIVITY, EMP and %ΔPPE) as instruments. Industry mean values are estimated for each 2-digit SIC level in each year. By construction and in theory, these industry level variables (i.e., the industry mean of OC_MS, OC_FS and OC_MS*OC_FS) should have a strong positive relationship with their respective OC at firm level, and there is no clear reason to believe that these variables have any direct impact on firm level risks other than through their effect on the OCs at firm level. PRODUCTIVITY is a dummy variable that takes a value of 1 if the firm's productivity (measured as sales scaled by total assets) is above the industry mean in the year t, and 0 otherwise. Eisfeldt and Papanikolaou (2013) show that firms with more organization capital are more productive, implying that there is positive association between productivity and firm level organization capital proxies. Eisfeldt and Papanikolaou (2013) also demonstrate that firms with more organization capital are more labor intensive, suggesting a positive relationship between number of employees in a firm (EPM) and organization capital. A firm's ability to invest in organization capital largely depends on its existing resources. Carlin et al. (2012) suggest that resource constraints may require a firm to substitute alternative forms of productive resources with organization capital. Eisfeldt and Papanikolaou (2013) empirically show that firms with high organization capital have lower investment rates in physical capital (10.1% vs. 12.6%). I therefore also use growth in PPE (%ΔPPE) as an instrumental variable.

Table 3.6, Panel A, reports that coefficients for the instrumental variables are highly significant (mostly at $p<.01$), suggesting that industry mean values and included firm level variables have a significant effect on OC_MS, OC_FS and OC_MS*OC_FS. For example, OC_MS is positivity associated with industry mean

OC_MS_IND (β = 0.419, p<.01), OC_MS_IND*OC_FS_IND (β = 0.128, p<.01), PRODUCTIVITY (β = 0.028, p<.01), and negatively associated with OC_FS_IND (β = -0.068, p<.01). Instruments are also generally significantly associated with OC_FS and OC_MS*OC_FS.

The results in Table 3.6, Panel B, suggest that the association of organization capital proxies (OC_MS, OC_FS and OC_MS*OC_FS) and firm level risks (idiosyncratic, beta and total risk) remain robust after accounting for the endogenous relationship between the organization capital proxies and firm level risks. For example, the estimated coefficients and *p* values for the association between idiosyncratic risk and OC_MS (-0.003 and *p*<.05), OC_FS (0.005 and *p*<.01) and OC_MS*OC_FS (-0.004 and *p*<.05) in the two stage least squares (2SLS) regression suggest that endogeneity cannot explain away the demonstrated relationship. Similar results hold for the association of organization capital proxies (i.e., OC_MS, OC_FS and OC_MS *OC_FS) and systematic risk and total risk in the 2SLS regression models. I obtain qualitatively similar results for other risk proxies (market and CAPM based models). In sum, the 2SLS results suggest that the demonstrated relationship in Table 3.3 remains robust even after addressing endogeneity concerns.

In Table 3.6, under-identification test results (LM statistic) reveal that the excluded instruments are "relevant". The weak instrument test results show that the excluded instruments are correlated with the endogenous regressors because the (corrected) Cragg-Donald Wald F statistic is greater than Stock and Yogo's (2005) critical value at 5% maximal IV relative bias. Results from Hansen's over-identifying restrictions test provide mixed evidence. Model 1 does not reject the null hypothesis (*p*>.10), suggesting that the instruments are uncorrelated with the error term, correctly excluded from the second stage regression, and therefore "valid" instrument for the 2SLS regression. Model 2 and Model 3 reject the null hypothesis (*p*<.01), however, implying that the included instruments are correlated with the error term. Note that the results of Hansen's over-identification test cannot be overemphasized because in a recent study Parente and Silva (2012, p.315) note that tests of overidentifying restrictions "give little information on whether the instruments are correlated with the errors of the underlying economic model, and on whether parameters of interest can be successfully identified". Deaton (2010), in this regard, argued that the validity of the moment conditions implied by the economic model is an identifying assumption that cannot be tested. Finally, Hausman's (1978) test significantly rejects (better than $p<.05$) the exogeneity of the management and firm-specific organization capital proxies, justifying the use of the 2SLS regression estimates.

Table 3.6: Endogeneity

Panel A: First-Stage Regressions			
Explanatory Variable	**(Model 1) OC_MS**	**(Model 2) OC_FS**	**(Model 3) OC_MS*OC_FS**
Instruments			
I. First-Stage regressions for idiosyncratic risk and organization capital proxies			
OC_MS_IND	0.419***	-0.063***	0.147***
	(148.85)	(-30.67)	(76.12)
OC_FS_IND	-0.068***	0.397***	0.138***
	(-30.55)	(133.77)	(71.61)
OC_MS_IND * OC_FS_IND	0.128***	0.131***	0.228***
	(51.72)	(58.14)	(117.36)
PRODUCTIVITY	0.028***	0.030***	0.026***
	(12.29)	(13.83)	(12.88)
EMP	0.002	0.012***	0.007***
	(1.03)	(7.50)	(4.67)
II. First-Stage regressions for beta and organization capital proxies			
OC_MS_IND	0.867***	-0.074*	-0.107***
	(20.89)	(-1.78)	(-3.25)
OC_FS_IND	-0.040	0.856***	-0.095***
	(-0.94)	(22.55)	(-2.80)
OC_MS_IND * OC_FS_IND	0.036	-0.036	0.993***
	(0.51)	(-0.53)	(16.71)
PRODUCTIVITY	0.084***	0.138***	0.119***
	(17.58)	(28.59)	(29.43)
%ΔPPE	0.143***	0.209***	-0.039***
	(32.90)	(50.61)	(-11.88)
III. First-Stage regressions for total risk (SD_RET) and organization capital proxies			
OC_MS_IND	0.419***	-0.064***	0.147***
	(149.15)	(-31.04)	(76.46)
OC_FS_IND	-0.069***	0.397***	0.138***
	(-31.16)	(133.96)	(71.49)
OC_MS_IND * OC_FS_IND	0.128***	0.131***	0.228***
	(52.05)	(57.97)	(117.53)
PRODUCTIVITY	0.029***	0.030***	0.026***
	(12.74)	(13.66)	(13.07)
EMP	0.002	0.011***	0.007***
	(1.45)	(7.37)	(4.88)

Unreported Control Variables Included in Regression			
All Variables in Main Specification	Yes	Yes	Yes
Year/Industry FE	Yes	Yes	Yes
Under-identification Test			
Kleibergen-Paaprk LM statistic	1524.043	617.215	1524.372
p-value	0.000	0.000	0.000
Weak Identification Test			
Cragg-Donald Wald F statistic	1929.564	1806.535	1930.439
Stock and Yogo (2005) Critical Value [5% maximal IV relative bias]	9.53	9.53	9.53
Test of Over-identifying Restrictions			
Hansen's J-statistic	2.812	159.357	28.338
p-value	0.245	0.000	0.000

Panel B: Second-Stage Regressions

Explanatory Variable	IV_FF_3	BETA	SD_RET
OC_MS	-0.003**	0.229***	-0.010*
	(-2.10)	(4.06)	(-1.71)
OC_FS	0.005***	-0.130**	0.010*
	(3.53)	(-2.30)	(1.82)
OC_MS * OC_FS	-0.004**	-0.283***	-0.017*
	(-2.00)	(-2.94)	(-1.82)
Unreported Control Variables Included in the Regression			
All Variables in Main Specification	Yes	Yes	Yes
Year/Industry FE	Yes	Yes	Yes
Hausman Test for the Effect of the OC_MS, OC_FS and OC_MS * OC_FS (Coefficient 2SLS = Coefficient OLS)			
Cluster-robust F-statistic	8.977	162.94	16.994
p-value	0.0296	0.000	0.000
Observation (N)	73376	74901	73376

Notes: ***, **, and * represent statistical significance at the 1%, 5%, and 10% level respectively (two-tailed test). *OC_MS_IND, OC_FS_IND and OC_MS * OC_FS_IND* are industry mean of OC_MS, OC_FS and OC_MS*OC_FS, respectively estimated for each 2-digit SIC level in each year. *PRODUCTIVITY* is a dummy variable that take a value of 1 if the firm's productivity (measured as sales scaled by total assets) is above the industry mean in the year t, and 0 otherwise. *EMP* is the natural log of number of employee for each firm in each year and finally, *%ΔPPE* is the growth in physical capital (proxied by growth in property, plant and equipment).
Variable definitions are provided in appendix 3.1.

3.5 Conclusion

This paper examined the impact of management- and firm-specific organization capital on a wide range of firm level risks. The literature relating to organization capital does not differentiate between management-specific (OC_MS) and firm-specific organization capital (OC_FS), but rather uses these terms interchangeably. These studies, thus, implicitly assume the identical impact of different forms of organization capital on firm level outcome. In this paper I disentangle OC_FS from OC_MS and show their differential effect on firm level risks. My empirical results show that OC_MS reduces (increases) idiosyncratic and total (systematic) risk, while OC_FS increases (reduces) systematic (idiosyncratic and total) risk. OC_MS, when interacting with OC_FS, negatively affects idiosyncratic, systematic and total risk, suggesting the dominant role of OC_MS in reducing the risks of the firm. Additional analysis shows that OC_MS also plays dominant role in improving the stock return and operating performance of a firm. I triangulate my results by using different measures of management-specific organization capital and proxy for different types of risk, and eventually find that they are robust.

Overall, the empirical evidence contributes to the growing body of literature that focuses on organization capital. My primary contribution is to extend this body of research by systematically isolating OC_FS from OC_MS and demonstrating their differential role on a wide range of firm risks. This study thus contributes to resolving the competing views on the embodiments and effect of different forms of organization capital. While prior studies examine the relationship of organization capital with cross sectional stock return (Eisfeldt & Papanikolaou, 2013), future operating and stock return performance, production possibility (Prescott & Visscher, 1980), little attention has been paid to the role of organization capital in influencing firm risks. This paper bridges this gap in the literature by linking OC_MS and OC_FS with idiosyncratic, systematic and total risk. My study also extends the emerging literature on managerial ability by providing empirical evidence that managerial ability (i.e., OC_MS) increases (decreases) systematic (idiosyncratic and total) risk. Even though a good number of studies examine the effect of management ability on information asymmetry and financial performance (Baik et al., 2011; Chemmanur et al., 2009; Demerjian et al., 2013), little is known about how this influences idiosyncratic, systematic and total risk. In this paper, I contribute to the literature on the determinants of firm level risks by incorporating a human side into the equation. Overall, my study contributes to the area of research that stresses the importance of organization capital and managerial ability as two major drivers of a firm's (and national) growth and competitiveness.

Appendix 3.1: Variable Definition and Measurement

Variables	Definition and Measurement
Dependent Variable – Idiosyncratic Risk	
IV_MKT	Idiosyncratic volatility estimated from market model (Equation 3.1).
IV_CAPM	Idiosyncratic volatility estimated from CAPM model (Equation 3.2).
IV_FF3	Idiosyncratic volatility estimated from Fama-French (1993) model (Equation 3.3).
	Systematic Risk
BETA	Systematic risk estimated from market model (Equation 3.1).
	Total Risk
STD_RET	Standard deviation of stock return, estimated as standard deviation of firm-specific monthly returns over the fiscal year.
STD_RET_3	Rolling standard deviation of stock return, estimated as standard deviation of firm-specific monthly returns over the prior three years.
Main Independent Variable – Firm Specific and Management Specific Organization Capital	
OC_MS	The decile rank (by industry and year) of the management ability score, which is from Demerjian et al. (2012).
OC_FS	The decile rank (by industry and year) of the firm specific organization capital, which is estimated from the residual from Equation (3.9).
*OC_MS*OC_FS*	Interaction between *OC_MS* and *OC_FS*.
Control Variables	
SIZE	Natural logarithm of total assets.
LEV	Leverage, measured as total long-term debt scaled by lagged assets.
MTB	Market-to-book ratio, measured as the market value of equity scaled by the book value of equity.
PM	Profitability, measured as operating income scaled by sales.
STD_CFO	Standard deviation of cash flow from operation scaled by total assets over the prior three years.
HINDEX	Herfindahl index, a measure of competition among firms in the industry.
AGE	Age is measured as the number of years since the firm was first covered by the Center for Research in Securities Prices (CRSP). For the regression analysis, I measure AGE as the natural log of (1+ age of the firm).
RET	Yearly holding period return.
DIV	Dividend payout ratio, measured as dividend to common stock scaled by operating income. I replace missing values of dividend to common stock with 0.
Year	Dummy variables to control for fiscal year effect
IND	Industry dummy (Two-digit SIC codes) to control for industry fixed effect.

Appendix 3.2: Firm Fixed Effects Analysis

Panel A: Association of Management- and Firm-Specific Organization Capital with Idiosyncratic Risk

Variables	**(Model 1) IV_MKT**	**(Model 2) IV_CAPM**	**(Model 3) IV_FF3**
OC_MS	-0.002***	-0.002***	-0.002***
	(-3.01)	(-3.03)	(-3.10)
OC_FS	0.008***	0.008***	0.008***
	(9.94)	(9.95)	(10.14)
OC_MS * OC_FS	-0.005***	-0.005***	-0.005***
	(-5.03)	(-5.01)	(-4.97)
SIZE	-0.003***	-0.003***	-0.003***
	(-17.89)	(-17.89)	(-18.21)
LEV	0.009***	0.009***	0.009***
	(12.12)	(12.13)	(12.23)
MTB	-0.000***	-0.000***	-0.000***
	(-9.53)	(-9.52)	(-10.07)
PM	-0.001***	-0.001***	-0.001***
	(-6.26)	(-6.27)	(-6.20)
SD_CFO	0.014***	0.014***	0.014***
	(14.79)	(14.76)	(14.51)
HINDEX	0.003**	0.003**	0.003**
	(2.40)	(2.38)	(2.25)
AGE	-0.002***	-0.002***	-0.002***
	(-7.11)	(-7.17)	(-6.76)
RET	0.000***	0.000***	0.000***
	(4.77)	(4.73)	(4.59)
Constant	0.044***	0.045***	0.044***
	(34.98)	(35.34)	(34.81)
YEAR FE	Yes	Yes	Yes
Observations (N)	75,133	75,133	75,133
Adj. R-squared	0.65	0.65	0.65

Notes: Robust t-statistics in brackets
*** p<0.01, ** p<0.05, * p<0.10
Variable definitions are provided in appendix 3.1.

Panel B: Association of Management- and Firm-Specific Organization Capital with Systematic Risk

Variables	(Model 1) BETA
OC_MS	0.131***
	(5.55)
OC_FS	-0.082***
	(-2.76)
OC_MS * OC_FS	-0.139***
	(-3.71)
SIZE	0.123***
	(15.29)
LEV	-0.160***
	(-5.78)
MTB	0.017***
	(16.10)
PM	-0.013***
	(-2.92)
SD_CFO	0.335***
	(11.00)
DIV	-0.053***
	(-7.71)
Constant	0.387***
	(9.13)
YEAR FE	Yes
Observations (N)	75,133
Adj. R-squared	0.48

Notes: Robust t-statistics in brackets
*** p<0.01, ** p<0.05, * p<0.10
Variable definitions are provided in appendix 3.1.

Panel C: Association of Management- and Firm-Specific Organization Capital with Total Risk

Variables	(Model 1) STD_RET	(Model 2) STD_RET_3
OC_MS	-0.005*	-0.000
	(-1.79)	(-0.04)
OC_FS	0.023***	0.006*
	(7.02)	(1.88)
OC_MS * OC_FS	-0.018***	-0.006*
	(-4.22)	(-1.67)
SIZE	-0.006***	-0.008***
	(-7.57)	(-10.98)
LEV	0.035***	0.024***
	(11.69)	(8.83)
MTB	-0.000***	0.000*
	(-2.77)	(1.65)
PM	-0.000	-0.000
	(-0.50)	(-0.38)
SD_CFO	0.066***	0.099***
	(16.40)	(23.34)
HINDEX	0.012**	0.011**
	(2.06)	(2.01)
AGE	-0.019***	-0.016***
	(-13.89)	(-10.80)
RET	0.022***	0.006***
	(40.97)	(17.59)
Constant	0.185***	0.195***
	(37.16)	(39.65)
YEAR FE	Yes	Yes
Observations (N)	75,133	71,884
Adj. R-squared	0.53	0.68

Notes: Robust t-statistics in brackets
*** p<0.01, ** p<0.05, * p<0.10
Variable definitions are provided in appendix 3.1.

Appendix 3.3: Continuous Value of Management-Specific and Firm-Specific Organization Capital

Panel A: Association of Management- and Firm- Specific Organization Capital with Idiosyncratic Risk

Variables	(Model 1) IV_MKT	(Model 2) IV_CAPM	(Model 3) IV_FF3
OC_MS	-0.010***	-0.010***	-0.010***
	(-14.55)	(-14.52)	(-14.47)
OC_FS	0.001***	0.001***	0.001***
	(12.23)	(12.21)	(12.44)
OC_MS*OC_FS	-0.003***	-0.003***	-0.003***
	(-5.74)	(-5.74)	(-5.78)
SIZE	-0.004***	-0.004***	-0.004***
	(-46.63)	(-46.75)	(-46.66)
LEV	0.008***	0.008***	0.008***
	(12.96)	(12.93)	(13.00)
MTB	-0.000***	-0.000***	-0.000***
	(-11.61)	(-11.59)	(-12.12)
PM	-0.001***	-0.001***	-0.001***
	(-8.21)	(-8.22)	(-8.13)
SD_CFO	0.023***	0.023***	0.023***
	(24.84)	(24.82)	(24.35)
HINDEX	-0.001	-0.001	-0.001
	(-1.21)	(-1.22)	(-1.19)
AGE	-0.003***	-0.003***	-0.003***
	(-18.95)	(-18.97)	(-18.57)
RET	0.000***	0.000***	0.000***
	(4.63)	(4.60)	(4.41)
Constant	0.048***	0.049***	0.048***
	(22.79)	(23.09)	(22.79)
INDUSTRY FE	Yes	Yes	Yes
YEAR FE	Yes	Yes	Yes
Observations	75,133	75,133	75,133
Adj. R-squared	0.49	0.49	0.49

Notes: Robust t-statistics in brackets
*** p<0.01, ** p<0.05, * p<0.10
Variable definitions are provided in appendix 3.1.

Panel B: Association of Management- and Firm- Specific Organization Capital with Systemic Risk

VARIABLES	(Model 1) BETA
OC_MS	0.050*
	(1.93)
OC_FS	-0.021***
	(-9.14)
OC_MS*OC_FS	-0.036*
	(-1.87)
SIZE	0.122***
	(45.35)
LEV	-0.150***
	(-6.53)
MTB	0.021***
	(19.08)
PM	-0.026***
	(-6.12)
SD_CFO	0.667***
	(20.96)
DIV	-0.205***
	(-24.57)
Constant	0.353***
	(4.99)
INDUSTRY FE	Yes
YEAR FE	Yes
Observations	75,133
Adj. R-squared	0.27

Notes: Robust t-statistics in brackets
*** p<0.01, ** p<0.05, * p<0.10
Variable definitions are provided in appendix 3.1.

Panel C: Association of Management- and Firm- Specific Organization Capital with Total Risk

VARIABLES	(Model 1) STD_RET	(Model 2) STD_RET_3
OC_MS	-0.034***	-0.023***
	(-12.41)	(-8.50)
OC_FS	0.002***	0.001***
	(7.76)	(4.20)
OC_MS* OC_FS	-0.013***	-0.008***
	(-5.88)	(-3.64)
SIZE	-0.009***	-0.009***
	(-30.94)	(-30.15)
LEV	0.029***	0.025***
	(12.05)	(10.22)
MTB	-0.000***	-0.000
	(-3.54)	(-0.10)
PM	-0.006***	-0.005***
	(-9.70)	(-9.47)
SD_CFO	0.119***	0.154***
	(30.42)	(34.25)
HINDEX	-0.010***	-0.009***
	(-2.82)	(-2.66)
AGE	-0.014***	-0.015***
	(-26.57)	(-25.63)
RET	0.023***	0.010***
	(42.09)	(27.90)
Constant	0.191***	0.192***
	(23.00)	(21.31)
INDUSTRY FE	Yes	Yes
YEAR FE	Yes	Yes
Observations	75,133	71,884
Adj. R-squared	0.40	0.48

Notes: Robust t-statistics in brackets
*** p<0.01, ** p<0.05, * p<0.10
Variable definitions are provided in appendix 3.1.

CHAPTER 4

CORPORATE LIFE CYCLE AND COST OF EQUITY CAPITAL[☆]

4.1 Introduction

In this paper I investigate whether firm life cycle[32] affects the cost of equity capital. The firm life cycle theory suggests that firms, like living organisms, pass through a series of predictable patterns of development and that the resources, capabilities, strategies, structures, and functioning of the firm vary significantly with the corresponding stages of development (Miller & Friesen, 1980, 1984; Quinn & Cameron, 1983). Life cycle theory provides management with some parameters, guidelines, and diagnostic tools to assess the transition of the firm from one stage to the next. Hence, understanding the essence of the life cycle can help firms to utilize valuable resources in the most optimal way to outperform their peers (Adizes, 1979) and to achieve and retain the prime life stage. Recent research in financial economics and accounting (e.g., DeAngelo et al., 2006, 2010; Dickinson, 2011) also recognizes that life cycle stages have important implications for understanding the financial performance of firms.

The concept of cost of equity capital is of paramount importance in accounting and finance research. It is frequently used in the estimation of equity risk premiums, firm valuation and capital budgeting, and investment management practices (Câmara, San-Lin, & Yaw-Huei, 2009; Hou, Van Dijk, & Zhang, 2012). The cost of equity depends on a firm's economic fundamentals, industry dynamics and overall national economic conditions (Banz, 1981; Fama & French, 1989; Gebhardt, Lee, & Swaminathan, 2001). Previous research indicates that firm-specific

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[32] I use the terms 'firm life cycle', 'corporate life cycle', and 'organizational life cycle' interchangeably throughout this paper.

determinants of the cost of equity include size, leverage, financial strength, level of disclosure, and overall riskiness of the firm. As the resource base and corresponding competitive advantages of the firm vary across the life cycle, the investors' demand for a risk premium could potentially vary accordingly. Together, these two streams of research suggest that the firm life cycle has important implications for attracting investors, which eventually increases the liquidity of shares and lowers the cost of equity capital. However, there has been little research on the interrelationship. Hence, I make a significant contribution to the literature by investigating the association between corporate life cycle and cost of equity to reveal whether, and how, the cost of equity capital of the firm varies with the corresponding change in the stage of the firm's life cycle.

This study is primarily motivated by the 'dynamic resource-based view' of the firm, which articulates that the general patterns and paths in the evolution of organizational capabilities change over time. This resource-based view analyzes firms from the resource side rather than from the product side, and posits that the existence and application of the bundle of valuable, interchangeable, immobile, and imitable resources generate the basis of the competitive advantage of a firm and of the heterogeneity in organizational capabilities (Penrose, 1959; Rumelt, 1984; Wernerfelt, 1984). Dynamic resource-based theory incorporates the founding, development, and maturity of capabilities and thereby suggests that the competitive advantages and disadvantages in terms of resources and capabilities evolve over time in important ways (Helfat & Peteraf, 2003). Thus, the evolution of the firm's competitiveness, in terms of its resource base and capabilities, is the foundation of the firm's life cycle.

The essence of firm life cycle theory suggests that investment and financing decisions and operating performance of the firm are greatly influenced by the change in the firm's organizational capabilities (life cycle stages). Management accounting literature (Rappaport, 1981; Richardson & Gordon, 1980) provides evidence that performance measures differ across life cycle stages. In a recent study, DeAngelo et al. (2010) demonstrated that corporate life cycle has a significant influence on the probability that a firm will engage in secondary equity offerings. Other studies

(Bulan, Subramanian, & Tanlu, 2007; Coulton & Ruddock, 2011; DeAngelo et al., 2006; Fama & French, 2001) acknowledge the role of the firm life cycle in determining the dividend payout policy of the firm. Berger and Udell (1998), in a related study, document that different capital structures are optimal at different points in the cycle. Evidence in accounting literature also suggests that investors' valuation of firm is a function of the life cycle stage of the firm (Anthony & Ramesh, 1992). Based on those studies, I also posit that the life cycle has significant influences on the firm's ability to attract investors, which eventually affects the ex-ante cost of equity capital of the firm.

Using a sample of Australian listed companies, I find that compared to the shake-out stage, the cost of equity is significantly higher in the introduction and decline stages, while it is lower in the growth and mature stages of the firm life cycle. Moreover, my results show that the cost of equity decreases as the retained earnings as a proportion of total assets (RE/TA) increase. These results conform with the findings of Bender and Ward (1993) showing that financing strategy and structures of firms evolve over the firm's life cycle. My results are robust to alternative measures of the cost of equity, firm life cycle, and potential endogeneity concerns.

This study contributes to the literature in several ways. *First,* I extend life cycle literature by directly examining the role of firm life cycle in influencing the cost of equity. While prior research investigates the role of the firm life cycle in dividend and capital structure decisions, little attention has been paid to the role of the firm life cycle in determining the cost of equity capital. Although Easley and O'Hara's (2004, p. 1574) model predicts that the "…life cycle of a firm may also influence its cost of capital. In particular, it seems reasonable that a firm with a long operating history will be better known by investors …the greater the prior precision, the lower the cost of capital", they did not examine the validity of this prediction empirically. In this paper I attempt to fill this gap in the literature and in doing so augment our understanding of the role of the corporate life cycle in major financial policies. *Second,* the cost of equity represents the return that the investors require on their investment in the firm and thus it is a key factor in long-term investment decisions. Examining the link between the firm life cycle and the cost of equity, therefore, should help managers to understand the effect of the life cycle on the financing costs of firms, and hence this study has important implications for strategic planning. Indeed, the cost of equity capital could be the channel through which capital markets encourage firms to reach and maintain maturity, the prime stage, in their life cycle. *Third,* given the importance of the firm life cycle and the cost of equity capital in the literature, and the longstanding interest in trying to understand their determinants, an empirical study of the association between corporate life cycle and cost of equity is timely.

The remainder of the paper is organized into four sections. In Section 4.2, I review prior related studies and develop testable hypotheses. Section 4.3 focuses on the research design, data sources, and sample selection. Section 4.4 documents results of the study, while Section 4.5 concludes this chapter.

4.2 Literature Review and Hypotheses Development

4.2.1 Corporate Life Cycle: Theory

The corporate life cycle theory suggests that firms, like the organic body, tend to progress in a linear fashion through predictable stages of development sequentially from birth to decline and that their strategies, structures, and activities correspond to their stages of development (Gray & Ariss, 1985; Miller & Friesen, 1980, 1984; Quinn & Cameron, 1983). Strategy and management researchers have adopted the firm life cycle model from the biological sciences (Van De Ven & Poole, 1995) and have incorporated it into business research since the 1960s. Penrose (1959) provided a general theory of growth for firms and argues that it depends on the firm's resources and productive opportunities. Chandler (1962) argued that organizational structure follows the growth strategy of the firm to avail itself of external opportunities. Subsequent studies in organizational science reveal the grounds behind the existence of the firm life cycle. For example, the resource-based theory of Wernerfelt (1984) suggests that resources are the ultimate source for establishment and maintenance of competitive advantage. He argued that a firm possesses resources, a subset of which allows it to achieve competitive advantage over other firms, and a subset of those helps it to attain superior long-term performance. In a more recent study, Helfat and Peteraf (2003) argued that the resource-based view must incorporate the emergence, development, and progression of organizational resources and capabilities over time and hence they introduced a more comprehensive and vibrant view, ‘the dynamic resource-based theory’. This view suggests that the resource base that forms the foundation of competitive advantage and disadvantage comes about over a period of time and also may shift over time. They explained that portfolios of resources and capacities and the characteristics of firms change over time, and this variation results in different stages in the firm life cycle.

The firm life cycle has important implications in management and business strategy. Each stage in the firm life cycle enforces unique characteristics and demands which entail organizational structures, personnel, leadership styles, and decision-making processes appropriate to meet the requirements (Kazanjian, 1988). Koberg, Uhlenbruck, and Sarason (1996) documented that the effect of organizational and environmental attributes on innovation is moderated by the firm’s life cycle stage. However, much of the work in the field of management, entrepreneurship, and strategy is conceptual rather than empirical.

There are some recent empirical studies that investigate the effect of the firm life cycle on corporate financial decisions. Bender and Ward (1993) reported that the financial structure of firms changes over the life cycle. Berger and Udell (1998) argued that small and young firms generally resort to private equity and debt markets, while larger and more mature firms mainly rely on public markets. Richardson (2006) suggested that a firm is more likely to undertake relatively larger, growth-oriented investments in the initial stage while, in the mature stage, its investments are more likely to be geared towards maintenance of assets-in place. Fama and French (2001), Grullon et al. (2002), DeAngelo et al. (2006), and Coulton and Ruddock (2011) documented that mature and profitable firms are more likely to pay dividends, while young firms with higher growth options are less likely to do so.

These archival studies suggest that the firm life cycle has important implications for corporate financing decisions, especially in the area of the cost of equity capital.

4.2.2 Cost of Equity: Theory

Cost of equity is the return that shareholders require on their investment in the firm and is extensively used in the valuation of investment projects and estimation of equity risk premiums (Câmara et al., 2009).

Firm-specific factors such as firm size, age, riskiness, liquidity of stock, leverage, and disclosure quality determine the cost of equity. Moreover, other factors such as the industry and the economy also influence the cost of equity. Transparency and availability of information about management and potential earnings of large firms reduce uncertainty levels. Hence, investors in larger firms require less return on their investment, which effectively reduces the cost of equity (Banz, 1981; Berk, 1995; Witmer & Zorn, 2007). Firm age or maturity affects equity price and thereby the cost of equity (Pástor, Sinha, & Swaminathan, 2008). Transaction cost (e.g., commission, fees, and other charges) is higher for less liquid stock and hence investors require more return for these securities. Shareholders are the residual claimants and hence an increase in the financial leverage also increases the risk to the shareholders. This effectively increases the cost of equity (Witmer & Zorn, 2007). Firms in different industries have different costs of equity depending on the nature of their business (Gebhardt et al., 2001). Moreover, the cost of equity is higher under weak economic conditions, while it is lower under strong economic conditions (Fama & French, 1989).

4.2.3 Association between Corporate Life Cycle and Cost of Equity Capital

Firms in different life cycle stages differ in their ability to raise funds from the market (Berger & Udell, 1998). Firms at the earlier stage of the life cycle are relatively small, unknown, and are less closely followed by analysts and investors.

Hence, these firms suffer from substantial information asymmetry. This information asymmetry may cause equity mispricing (Myers & Majluf, 1984), which is positively related to riskiness and the cost of capital (Armstrong et al., 2011). On the other hand, mature firms have a longer existence in the market and they are more closely followed by analysts and investors. Hence, these firms suffer from less information asymmetry and are less risky. Easley and O'Hara (2004) also noted that firms with a long operating history are better known by investors, improving the precision of information about the firm and lowering the cost of capital. Investors generally prefer securities with low estimation risk, low transaction costs, and/or less information asymmetry (Botosan, 2006). A greater demand for securities with these characteristics enhances the liquidity of the stocks (Diamond & Verrecchia, 1991), which influences the cost of equity (O'Hara, 2003). Prior studies (Gebhardt et al., 2001) overwhelmingly showed that firm maturity is associated with a decline in systematic risk.

In addition, resource-based theory assumes that firms differ in terms of their bundle of resources (e.g., financial, physical, human capital, technological, reputation, and organizational resources) and capabilities (Barney, 1991; Dierickx & Cool, 1989), and that these firm-specific resources and capabilities are crucial in explaining the firm's growth and performance (Penrose, 1959). According to this view, the resource base and capabilities of mature firms are large, diverse and rich, while those of young and declining firms are small, concentrated, and limited. This resource base and its accompanying superior competitive advantages and capacities help mature firms to benefit from cheaper and easier sources of finance. More specifically, as the life cycle affects the perceived riskiness of the firm, mature stage firms should be in a better position to raise adequate capital at a lower cost. I therefore hypothesize that:

H_1: Compared to the shake-out stage of the firm life cycle[33]*, the cost of equity is lower in the mature stage of the firm life cycle.*

[33] As Dickinson (2011) remarks, the literature clearly spells out the role of different stages of the firm life cycle except for the shake-out stage. As a result, the expected sign of this stage is unclear. Thus, in developing my hypothesis, I use the shake-out stage as a basis of comparison with other stages of the firm life cycle.

Although firms in the growth stage of the life cycle have an insufficient resource base, these firms are promising and have strong potential. Organizational theory suggests that growth firms maintain greater information asymmetry, benefiting from product development and market movement (Aboody & Lev, 2000; Barth, Kasznik, & McNichols, 2001; Smith & Watts, 1992). However, prior studies also suggest that characteristics of growth firms attract greater analyst coverage, attaining potential benefits from private information acquisition (Barth et al., 2001; Lehavy, Li, & Merkley, 2011). Greater analyst coverage in turn reduces mispricing and information asymmetry (Barth et al., 2001; Brennan and Subrahmanyam, 1995). Furthermore, growth firms are more likely to receive coverage in the business press (Bentley et al., 2013). Bushee et al. (2010) show that firms with greater press coverage are associated with lower levels of information asymmetry. Moreover, growth firms have greater incentives to reduce information asymmetry via voluntary disclosure to possibly attract 'strategic investors[34], who intend to invest in growth firms to benefit from the future success of the firm. In summary, greater analyst following, press coverage, and voluntary disclosures reduce the information asymmetry of growth firms, which eventually reduces the cost of capital. Hence, I hypothesize that:

H_2: Compared to the shake-out stage of the firm life cycle, the cost of equity is lower in the growth stage of the firm life cycle.

Firms in the introduction stage have limited resources and resource combinations, while those in the decline stage have downgraded resources. Dickinson (2011) provides empirical evidence that both introduction and decline stages are associated with negative earnings per share, return on net operating assets, and profit margin. As investments in these firms are relatively less attractive, analysts are reluctant to cover these firms. Hence, introduction and decline firms cannot raise capital unless investors are properly compensated (Nickel & Rodriguez, 2002), which effectively increases the cost of equity. Therefore, I hypothesize that:

[34] Strategic investors invest in young companies that have the potential to bring something of value to investors or to create synergy with the existing business of the investor. An independent venture capitalist only cares about financial gain, while the strategic investor also cares about the new venture's strategic effect (Hellmann, 2002).

H_3: Compared to the shake-out stage of the firm life cycle, the cost of equity is higher in the introduction and decline stages of the firm life cycle.

4.3 Research Method

4.3.1 Sample and Data

The sample for this study is drawn from the population of companies listed on the Australian Securities Exchange (ASX) and covered by the I/B/E/S International database for the period 1990–2012. This yields an initial sample of 8020 firm-year observations. Data for the control variables, except beta, are extracted from the Aspect Financial Analysis databases. Data for beta and fiscal year end stock price are collected from DataStream and DatAnalysis Morningstar, respectively. Moreover, the risk-free rate (10-year Treasury note rates) is collected from the Reserve Bank of Australia website.[35] To avoid the undesirable influence of outliers I winsorize continuous variables at the 1st and 99th percentiles. I exclude the financial sector as the accounting practice, risk, and complexity characteristics of financial institutions are substantially different from those of other firms. I also exclude observations with missing values in the computation of cost of equity and control variables and lose 545, 189, and 196 firm years for price/earnings to growth ratio (PEG), modified PEG ratio (MPEG), and Ohlson and Juettner-Nauroth (2005) (OJ) models, respectively. This produces a final sample of 3888, 3563, and 3482 firm-year observations for the PEG (Easton, 2004) model, MPEG (Easton, 2004) model, and OJ model (Ohlson & Juettner-Nauroth, 2005), respectively. Table 4.1, Panel A presents the sample distribution by cost of equity models.

Panel B of Table 4.1 shows that sample size increases over the sample period, with the largest samples of 292 and 289 in the years 2008 and 2011, respectively. Panel C shows that the sample is unevenly distributed across industries with the largest samples being in industrial (24.72%) and consumer discretionary (21.04%) sectors.

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[35] http://www.rba.gov.au/statistics/tables/index.html

Table 4.1: Sample Selection and Distribution of the Sample

Panel A: Sample Selection by Models

Description	**Pooled**	**Easton PEG (2004)**	**Easton MPEG (2004)**	**Ohlson and Juettner-Nauroth (2005)**
I/B/E/S forecasted EPS (fiscal year 1990-2012)	8020	8020	8020	8020
Less firm years dropped due to:				
Model's specific requirement[36]	2250	2250	2250	2342
Absence of forecasted DPS1	N/A	N/A	707	703
Financial sector and delisted firms	1337	1337	1311	1297
Missing values on control valuables	545	545	189	196
Final sample	**3888**	**3888**	**3563**	**3482**

Panel B: Distribution by Year (Pooled)

Year	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**
N	35	46	46	43	46	87	120	118
Year	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
N	127	145	162	230	223	188	191	231
Year	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**Total**
N	252	275	292	216	262	289	264	3888

[36] For estimating the cost of equity, I exclude cases where eps2>eps1>0 are not met.

Panel C: Distribution by Sectors and Cost of Equity Models

Name of the Sector	Pooled	Easton PEG (2004)	Easton MPEG (2004)	Ohlson and Juettner-Nauroth (2005)
Consumer Discretionary	818	818	770	765
Consumer Staples	362	362	322	320
Energy	283	283	246	231
Health Care	266	266	250	243
Industrials	961	961	918	912
Information Technology	273	273	263	258
Materials	776	776	656	621
Telecommunication Services	79	79	69	65
Utilities	70	70	69	67
Total	**3888**	**3888**	**3563**	**3482**

4.3.2 Empirical Model

I test the relationship between the cost of equity and the firm life cycle using four measures of cost of equity and three measures of firm life cycle proxies. To control for individual firm heterogeneity, I use the following fixed effect model:

$$R_{i,t} = \alpha_0 + \sum_{j=1}^{4} \beta_j CLC\_DUM_{i,t} + \beta_5 SIZE_{i,t} + \beta_6 BM_{i,t} + \beta_7 BETA_{i,t} + \beta_8 LOSS_{i,t-1} + \beta_9 LEV_{i,t} + \beta_{10} ZSCORE_{i,t} + \sum_t \alpha_t YEAR_t + a_i + \varepsilon_{i,t} \quad (4.1)$$

My main variable of interest is *CLC_DUM*. Based on the dynamic resource-based view and the life cycle theory, I predict β_1 and β_4 to be positive for H_3 and β_2 and β_3 to be negative for H_1 and H_2. Variables are as defined in appendix 4.1.

4.3.3 Measurement of Variables

4.3.3.1 Estimation of Corporate Life Cycle

Assessing the life cycle stage at the firm level is difficult because an individual firm is composed of many overlapping, but distinct, product life cycle stages. Moreover, firms can compete in multiple industries and their product offerings can be fairly diverse (Dickinson, 2011). To overcome this estimation problem, I follow the methodologies of Dickinson (2011) and DeAngelo et al. (2006) to develop proxies for the firms' stage in the life cycle.[37] Dickinson (2011) deployed data from the firm's cash flow statement. She argued that cash flow captures differences in a firm's profitability, growth, and risk and, hence, that one may use the cash flow from operating (CFO), investing (CFI), and financing (CFF) to group firms in life cycle stages such as 'introduction', 'growth', 'mature', 'shake-out', and 'decline'. The methodology is, introduction, if CFO<0, CFI<0, and CFF>0; growth, if CFO>0, CFI<0, and CFF>0; mature, if CFO>0, CFI<0, and CFF<0; decline, if CFO<0, CFI>0, and CFF≤ or ≥0; and the remaining firm years are classified under the shake-out stage. Identification of life cycle stages based on Dickinson (2011) combines the implications from diverse research areas such as production behavior, learning/experience, investment, market share, and entry/exit patterns. As a result, this process can capture the performance and allocation of resources of the firm.

Following DeAngelo et al. (2006), I use retained earnings as a proportion of total assets (RE/TA) as a proxy for corporate life cycle. This proxy measures the extent to which a firm is self-financing or reliant on external capital. A high RE/TA implies that the firm is more mature or older with declining investment, while firms with a low RE/TA tend to be young and growing (DeAngelo et al., 2006).

[37] Anthony and Ramesh (1992) provided one of the first empirical procedures for classifying firms in different life cycle stages. However, I do not use their method for several reasons, (1) this classification scheme requires at least six years of data availability for each firm, which reduces my sample size significantly, (2) the life cycle proxy in this procedure is 'ad hoc' and relies on portfolio sorts to classify the firm in different life cycle stages, and (3) Dickinson (2011) showed that life cycle classification based on Anthony and Ramesh's (1992) procedure leads to an erronous classification of firm life cycle stages.

4.3.3.2 Estimation of Cost of Equity

Cost of equity can be measured using both the implied approach and the realized approach. Estimation of implied cost of equity involves calculating the internal rate of return that equates the stock prices to the present value of forecasted cash flows (Hou et al., 2012). On the other hand, the realized approach uses ex-post stock returns to estimate the cost of equity. However, estimates based on ex-post realized stock returns suffer from measurement errors such as imprecise estimates of factor risk premium and risk loading (Fama & French, 1997)[38]. Hence, researchers are increasingly relying on the implied cost of equity capital[39]. In line with previous studies, I use implied approaches to estimate the cost of equity. In particular, I use Easton (2004) and Ohlson and Juettner-Nauroth (2005) models, as modified by Gode and Mohanram (2003). I choose these measures because Botosan and Plumlee (2005) documented that Easton's (2004) PEG ratio model and the target price (or dividend discount) method, introduced by Botosan and Plumlee (2002), are preferable measures of the cost of equity as both dominate the other alternatives in the sense that they are consistently and predictably related to various risk measures[40]. In addition, I use the Ohlson and Juettner-Nauroth (2005) (OJ) model modified by Gode and Mohanram (2003) because this model is theoretically rigorous yet parsimonious, and provides a simple closed form solution for the implied cost of capital. Consistent with prior studies (Chen, Chen, & Wei, 2009; Hail & Leuz, 2006; Hou et al., 2012), I also use a simple average of three models due to the lack of consensus on precision of the estimation of implied cost of equity capital.

[38] Pástor et al. (2008) documented that estimation of the cost of equity that uses forward estimates of earnings outperforms measures based on realized returns.

[39] Most Australian studies on the cost of equity adopt the realized approach to estimate the cost of equity. For example, Gray, Koh, and Tong (2009) used industry-adjusted earnings-to-price ratios and Monkhouse (1993) used the capital asset pricing model (CAPM) to estimate the cost of equity. However, Azizkhani, Monroe, and Shailer (2010) used the PEG approach. Moreover, some cross-country studies (Gray et al., 2009; Hail & Leuz, 2006; Khurana & Raman, 2004) used the implied approach to estimate the cost of equity with a limited sample size.

[40] The necessary forecasted data for the target price (or dividend discount) method are not available for Australian companies. Using forecasted eps4 and eps5 for Australian companies to calculate the cost of equity would significantly reduce the sample size.

4.3.4 Control Variables

I control for a number of risk factors and firm characteristics likely to determine the cost of equity capital. Firm size reduces the cost of equity capital because large firms have a lower probability of default (Berger & Udell, 1995), are followed more by analysts, and are more liquid (Witmer & Zorn, 2007). I use the natural log of total assets to measure firm size (SIZE). I control for the effect of systematic risk (BETA)[41], as this is positively associated with the cost of equity capital (Harris & Marston, 1992; Lintner, 1965; Mossin, 1966; Sharpe, 1964). Growth opportunity is characterized by uncertainty and risk and, therefore, is expected to be positively associated with the cost of equity capital (Boone, Khurana, & Raman, 2008; Chan, Hamao, & Lakonishok, 1991; Fama & French, 1992; Khurana & Raman, 2004). I use book-to-market ratio (BM) as growth proxy. I also control for loss as the continuous negative earnings stream of a firm could influence investors to consider that the firm will abandon its resources (Collins, Pincus, & Xie, 1999). I include an indicator variable coded 1 for firm-year observations with negative earnings in the previous year, and 0 otherwise. I include leverage (LEV) as a proxy for riskiness of the firm. The higher the level of leverage, the greater the perceived risk associated with the firm and, consequently, the higher the cost of equity capital (Fama & French, 1992; Gebhardt et al., 2001; Modigliani & Miller, 1958; Petersen & Rajan, 1994). I measure financial leverage as (short-term debt + long-term debt)/shareholders' equity. Finally, I include Altman's (1968) Z score (ZSCORE) to control for the bankruptcy risk.[42] Altman's Z score is an unsystematic risk factor and Dichev (1998) suggested that it is separate from the size and book-to-market factors. However, I acknowledge the inherent limitation of Altman's model in using historical information to predict current bankruptcy.

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[41] Datastream calculates beta over a five-year period by regressing the share price against the respective Datastream total market index, using log changes of the closing price on the first day of each month.

[42] Altman's Z score = 1.2(Working Capital/Total Assets) + 1.4(Retained Earnings/Total Assets) + 3.3(Earnings Before Interest & Tax/Total Assets) + 0.6(Market Value of Equity/Total Liabilities) + 0.999(Sales/Total Assets). A higher score indicates better financial health and hence lower probability of financial distress.

4.4 Empirical Results and Discussion

4.4.1 Descriptive Statistics

Table 4.2 reports the descriptive statistics for the key variables included in the regression models. Panel A shows that the mean (median) cost of equity (simple average of the three cost of equity estimates) for the sample is 17.8% (14.0%) with a standard deviation of 12.9%. Owing to limited study of Australian listed firms using the same models for calculating the cost of equity capital, a reliable comparison of this estimate is difficult. The closest possible comparison is with Khurana and Raman (2004) and Azizkhani et al. (2010). Using a sample of Australian firms, Khurana and Raman (2004) found that the mean costs of equity, estimated by the PEG (Easton, 2004) model, are 10.3% and 10.7% and that the median costs of equity are 9.1% and 9.7% for the firms audited by Big and non-Big Auditors, respectively. Furthermore, using a sample of 2,170 Australian firms during the period 1995–2005, Azizkhani et al. (2010) found that the mean costs of equity, estimated by the same model, are 10.8% and 14.3% for the firms audited by Big and non-Big Auditors, respectively.[43] The reported mean (median) cost of equity for this paper estimated by the PEG (Easton, 2004) model with a sample of 3888 firm years from 1990–2012 is 15.6% (11.8%).[44] Botosan (1997) used a US sample to estimate the cost of equity based on Ohlson (1995) and showed that the cost of equity is 20.1%. Therefore, an average cost of equity of 17.8% for this study is consistent with prior studies. Table 4.2 shows that there is a large dispersion among the sample firms in terms of control variables, and this dispersion indicates a considerable diversity in the sample.

Panel A also shows that the mean (median) RE/TA is 0.038 (0.089). The mean values of SIZE (19.903), ZSCORE (3.893), and $LOSS_{t-1}$ (0.105) suggest the presence of large and financially sound firms in the sample. Moreover, the mean (0.805) and median (0.566) BM suggest that the sample firms have valuable growth

[43] Moreover, the cost of equity estimates of Truong and Partington (2007) for Australian firms are in the range of 10% to 17%.

[44] My results differ from those of Azizkhani et al. (2010) for several reasons. (a) My sample size and sample period differ from that of their study. More specifically, my sample covers the period of the global financial crisis, which is associated with increased risk and cost of equity. (b) I winsorize the cost of equity estimates at the 1% level (both sides), while they exclude the extreme values. (c) Azizkhani et al. (2010) used the square root of the numerator only, while I use the square root of both numerator and denominator, which is consistent with Easton's (2004) original model.

opportunities. The mean BETA (0.954) is slightly lower than that of Azizkhani et al. (2010) (1.02) and higher than that of Chen, Jorgensen, and Yoo (2004) (0.75).

Table 4.2: Descriptive Statistics

Panel A: Pooled Descriptive Statistics

Variables	N	Mean	Standard Deviation	25%	Median	75%
$R_{Average}$	3888	0.178	0.129	0.105	0.140	0.202
RE/TA	3888	0.038	0.338	0.009	0.089	0.184
SIZE	3888	19.903	1.680	18.706	19.775	21.082
BM	3888	0.805	0.905	0.311	0.566	0.942
BETA	3888	0.954	0.779	0.474	0.857	1.305
$LOSS_{t-1}$	3888	0.105	0.307	0.000	0.000	0.000
LEV	3888	0.544	0.588	0.150	0.420	0.720
ZSCORE	3888	3.893	4.071	1.899	2.835	4.401

Note: Variables are in appendix 4.1.

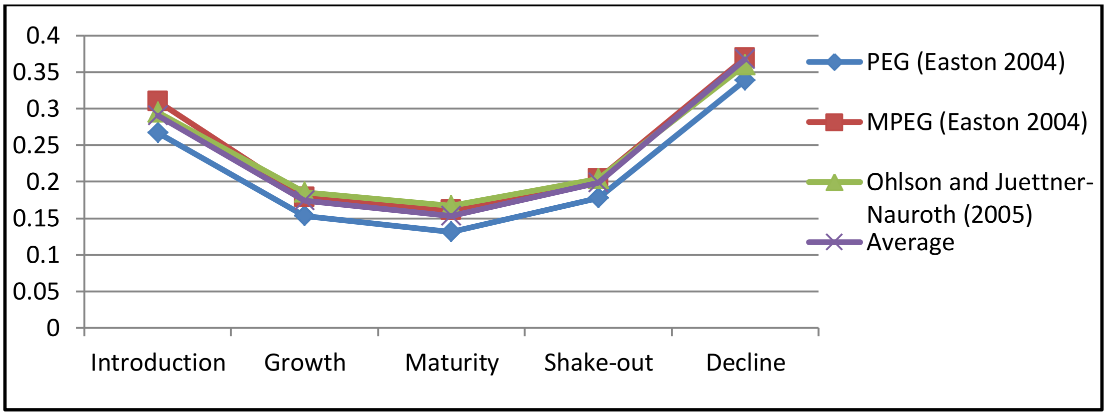
Panel B: Life Cycle-wise Cost of Equity Using Different Models

Model	Statistics	Pooled	Introduc-tion	Growth	Mature	Shake-out	Decline
R_{PEG} (Easton 2004)	Mean	0.156	0.267	0.154	0.132	0.178	0.339
	Median	0.118	0.204	0.119	0.108	0.133	0.268
	Std. Dev.	0.123	0.198	0.110	0.091	0.136	0.222
R_{MPEG} (Easton 2004)	Mean	0. 185	0.310	0.179	0.162	0.204	0.369
	Median	0. 147	0.229	0.144	0.137	0.161	0.277
	Std. Dev.	0.133	0.230	0.120	0.095	0.142	0.256
$R_{(Ohlson\ and\ Juettner\text{-}Nauroth\ 2005)}$	Mean	0.187	0.295	0.185	0.167	0.204	0.359
	Median	0.154	0.227	0.154	0.144	0.164	0.259
	Std. Dev.	0.119	0.200	0.113	0.089	0.124	0.229
$R_{Average}$	Mean	0.178	0.291	0.174	0.154	0.199	0.368
	Median	0.140	0.217	0.140	0.129	0.154	0.293
	Std. Dev.	0.129	0.211	0.117	0.095	0.143	0.236

Panel B of Table 4.2 exhibits the life cycle-wise (Dickinson, 2011) cost of equity under different models. All the models show that the cost of equity is lowest at the mature stage, while it is comparatively higher at the introduction and decline stages. The lowest cost of equity at mature stage firms indicates that they are, on average, the least risky compared to firms at other stages.

Panel C of Table 4.2 shows that the cost of equity under all models shows a U-shaped pattern across the life cycle stages.

Panel C: Life cycle-wise Mean Cost of Equity Using Different Models



Panel D of Table 4.2 reports life cycle-wise descriptive statistics for the sample firms. Firms in the mature stage are characterized by stability, while firms in the decline stage are in a transition phase (Dickinson, 2011). Consistent with Dickinson (2011), I find that highest (lowest) observations belong to the mature (decline) stage with 47.07% (1.52%) of observations. The overall results of Panel D of Table 4.2 show that mature firms, consistent with their lower riskiness, have the lowest BETA, lowest rate of $LOSS_{t-1}$, and highest ZSCORE. Moreover, the descriptive statistics show that firms in the introduction and decline stages are relatively more risky, with BETA of 1.154 and 1.425 as opposed to 0.978 and 0.895 in the growth and mature stages. Hence, as shown in Panel B, investors demand a relatively higher risk premium, with an average cost of equity of 29.1% and 36.8%, for firms in these stages compared to 17.4% and 15.4% in the growth and mature stages. Further analysis reveals that SIZE and RE/TA progressively increase as firms move from the introduction to mature stage and that these estimates then decline as firms move from the mature to the decline stage. The opposite pattern is observed for the average cost of equity, BETA, and $LOSS_{t-1}$. The estimates in Panel D of Table 4.2 are also consistent with Dickinson (2011), signifying the reliability of my estimates.

Panel D: Life Cycle-wise Descriptive Statistics

Variables	Statistics	Introduction	Growth	Mature	Shake-out	Decline
	Mean	-0.280	0.049	0.103	-0.003	-0.482
RE/TA	Median	-0.072	0.077	0.120	0.081	-0.300
	Std. Dev.	0.551	0.236	0.292	0.360	0.728
	Mean	18.884	20.033	19.979	19.936	18.999
SIZE	Median	18.831	19.926	19.875	19.832	19.070
	Std. Dev.	1.478	1.573	1.712	1.722	1.828
	Mean	0.775	0.780	0.782	1.003	0.979
BM	Median	0.571	0.560	0.538	0.725	0.704
	Std. Dev.	0.931	0.850	0.905	0.990	1.239
	Mean	1.154	0.978	0.895	0.932	1.425
BETA	Median	1.063	0.888	0.808	0.825	1.255
	Std. Dev.	1.012	0.767	0.710	0.861	1.004
	Mean	0.500	0.097	0.046	0.156	0.407
$LOSS_{t-1}$	Median	0.000	0.000	0.000	0.000	0.000
	Std. Dev.	0.493	0.297	0.209	0.363	0.495
	Mean	0.700	0.636	0.480	0.472	0.559
LEV	Median	0.470	0.520	0.350	0.340	0.230
	Std. Dev.	0.797	0.582	0.531	0.575	0.866
	Mean	3.477	3.323	4.393	3.835	3.773
ZSCORE	Median	1.959	2.579	3.231	2.657	1.611
	Std. Dev.	5.665	3.295	4.019	4.489	7.275
	N	271	1356	1830	372	59

Note: Variables are in appendix 4.1.

4.4.2 Correlation Analysis

Table 4.3 reports the Pearson correlations among the cost of equity, life cycle proxies, and control variables. As expected, the cost of equity is positively correlated (at $p<0.01$) with introduction, shake-out, and decline stages and negatively correlated (at $p<0.01$) with the mature stage of the life cycle. Moreover, consistent with

Table 4.3: Correlation Matrix

	$R_{\_Average}$	Introduction	Growth	Mature	Shake-out	Decline	RETA	SIZE	BM	BETA	LOSS	LEV	ZSCORE
$R_{\_Average}$	1.00												
Introduction	0.239***	1.000											
Growth	-0.021	-0.200***	1.000										
Mature	-0.178***	-0.258***	-0.690***	1.000									
Shake-out	0.053***	-0.089***	-0.238***	-0.307***	1.000								
Decline	0.182***	-0.034**	-0.091***	-0.117***	-0.040**	1.000							
RETA	-0.416***	-0.258***	0.022	0.181***	-0.040**	-0.191***	1.000						
SIZE	-0.319***	-0.166***	0.057***	0.043***	0.006	-0.067***	0.239***	1.000					
BM	0.271***	-0.009	-0.020	-0.024	0.071***	0.024	-0.019	0.021	1.000				
BETA	0.196***	0.07***	0.023	-0.071***	-0.009	0.075***	-0.169***	-0.040**	-0.008	1.000			
LOSS	0.327***	0.272***	-0.019	-0.182***	0.054***	0.122***	-0.430***	-0.207***	0.006	0.157***	1.000		
LEV	0.006	0.065***	0.114***	-0.119***	-0.04**	0.003	-0.100***	0.254***	-0.019	-0.097***	-0.020	1.000	
ZSCORE	-0.145***	-0.028*	-0.102***	0.116***	-0.005	-0.004	0.191***	-0.255***	-0.213***	0.015	-0.011	-0.331***	1.000

This table presents the correlations among cost of equity, life cycle proxies, and control variables. The values in the matrix are Pearson correlation coefficients and ***, **, and * denote significance at 1%, 5%, and 10% levels respectively (two-tailed tests). All the variables are as defined in appendix 4.1.

expectations, the cost of equity estimates is also negatively correlated ($p<0.01$) with RE/TA. Finally, the correlations among cost of equity estimate and BM, BETA, and $LOSS_{t-1}$ are positive and significant ($p<0.01$), while the correlation of cost of equity with SIZE and ZSCORE is negative and significant ($p<0.01$). Overall, the correlations among estimates of cost of equity, life cycle proxies, and the control variables are all in the expected direction.

4.4.3 Univariate t-test

Table 4.4 reports the mean difference test of cost of equity capital for different stages of the firm life cycle. It shows that all cost of equity estimates significantly decrease ($p<0.01$) from the introduction to growth stage, from the growth to mature stage, from the introduction to mature stage, and from the introduction to the shake-out stage of the firm life cycle. However, the mean cost of equity increases significantly from the mature to the shake-out stage ($p<0.01$), from the shake-out to the decline stage ($p<0.01$), from the introduction to the decline stage ($p<0.05$ mostly), from the growth to the shake-out stage ($p<0.01$), and finally from the growth to the decline stage ($p<0.01$).

Table 4.4: Mean Difference Test of Cost of Equity

Mean Difference Test Of Cost Of Equity Using Dickinson's (2011) Life Cycle Proxies				
Estimates	**Cost of Equity (stage 1)**	**Cost of Equity (stage 2)**	***t* statistics for differences**	***p*-values**
	Introduction	**Growth**		
R_{PEG}	0.267	0.154	-9.153	0.000
R_{MPEG}	0.309	0.178	-8.783	0.000
R_{OJ}	0.295	0.185	-7.855	0.000
$R_{Average}$	0.291	0.174	-8.822	0.000
	Growth	**Mature**		
R_{PEG}	0.154	0.132	-5.969	0.000
R_{MPEG}	0.178	0.162	-4.137	0.000
R_{OJ}	0.185	0.167	-4.694	0.000
$R_{Average}$	0.174	0.154	-5.309	0.000
	Mature	**Shake-out**		
R_{PEG}	0.132	0.178	6.253	0.000
R_{MPEG}	0.162	0.204	5.033	0.000
R_{OJ}	0.167	0.204	4.847	0.000
$R_{Average}$	0.154	0.199	5.884	0.000
	Shake-out	**Decline**		
R_{PEG}	0.178	0.338	5.404	0.000
R_{MPEG}	0.204	0.369	4.567	0.000
R_{OJ}	0.204	0.359	4.698	0.000
$R_{Average}$	0.199	0.368	5.347	0.000
	Introduction	**Mature**		
R_{PEG}	0.267	0.132	-11.078	0.000
R_{MPEG}	0.309	0.162	-10.057	0.000
R_{OJ}	0.295	0.167	-9.284	0.000
$R_{Average}$	0.291	0.154	-10.540	0.000
	Introduction	**Shake-out**		
R_{PEG}	0.267	0.178	-6.387	0.000
R_{MPEG}	0.309	0.204	-6.326	0.000
R_{OJ}	0.295	0.204	-5.919	0.000
$R_{Average}$	0.291	0.199	-6.194	0.000
	Introduction	**Decline**		
R_{PEG}	0.267	0.338	2.286	0.025
R_{MPEG}	0.309	0.369	1.559	0.123
R_{OJ}	0.295	0.359	1.833	0.071
$R_{Average}$	0.291	0.368	2.312	0.023
	Growth	**Shake-out**		
R_{PEG}	0.154	0.178	3.165	0.001
R_{MPEG}	0.178	0.204	2.911	0.004
R_{OJ}	0.185	0.204	2.341	0.019
$R_{Average}$	0.174	0.199	3.085	0.002
	Growth	**Decline**		
R_{PEG}	0.154	0.338	6.371	0.000
R_{MPEG}	0.178	0.369	5.394	0.000
R_{OJ}	0.185	0.359	5.363	0.000
$R_{Average}$	0.174	0.368	6.279	0.000

4.4.4 Association between Cost of Equity and Firm Life Cycle

4.4.4.1 Firm fixed effect estimation

Table 4.5 reports the fixed effect estimates of the relationship between the cost of equity and the firm life cycle. As firm fixed effects and year dummies are specified in the regressions, their estimates are constant at firm level and year level, respectively. All other control variables (such as SIZE, BM, BETA, $LOSS_{t-1}$, LEV, and ZSCORE) are measured at firm-year level. The regression coefficients on control variables remain constant in the sample.

Table 4.5, Panel A, shows the regression results for different measures of the cost of equity and Dickinson's (2011) life cycle proxies. The life cycles of firms are categorized into five stages, introduction, growth, mature, shake-out, and decline. Five dummy variables are thus created for each of the five stages. However, to avoid the problem of dummy variable trap multicollinearity in the regression model, one of the stages is dropped. As the shake-out stage of the life cycle is ambiguous in theory (Dickinson, 2011), I drop this stage in the regression model. The regression results suggest that, compared to the shake-out stage, the introduction and decline stages of the firm life cycle are significantly positively associated with the cost of equity, while the growth and mature stages of the life cycle are negatively associated with all estimates of the cost of equity ($p<.01$). The results also reveal that investors demand less risk premium for large and financially sound firms (the coefficients on SIZE and ZSCORE are both negative and significant at $p<.01$). On the other hand, demand for risk premium is higher for growth and risky firms, with positive and statistically significant coefficients for BM, BETA, $LOSS_{t-1}$, and LEV.

Table 4.5, Panel B, shows the results for different measures of the cost of equity and RE/TA, a life cycle proxy proposed by DeAngelo et al. (2006). The coefficients on RE/TA are negative and significant ($p<.01$) across all cost of equity measures, suggesting that investors' demand for the cost of equity decreases as RE/TA increases[45]. Moreover, the coefficients on most of the control variables, for

[45] I also test the association between retained earnings as a proportion of total equity (RE/TE - another life cycle proxy of DeAngelo et al. (2006)) and cost of equity. My results are robust with the use of RE/TE. For brevity, results are tabulated in appendix 4.2.

example, SIZE, BM, LEV, and ZSCORE have the predicted signs and significance, suggesting that the model specification is reasonable.

Table 4.5: Association between Cost of Equity and Firm Life Cycle

Panel A: Association Between Cost of Equity and Life Cycle Proxies Using Dickinson's (2011) Model

Variables	Pred. Sign	(Model 1) Easton 2004 R_{PEG}	(Model 2) Easton 2004 R_{MPEG}	(Model 3) OJ 2005 R_{OJ}	(Model 4) $R_{Average}$
Intercept	?	0.503*** (6.72)	0.458*** (5.75)	0.438*** (5.86)	0.475*** (6.11)
Introduction	+	0.017 (1.57)	0.032*** (2.65)	0.024** (2.32)	0.019* (1.68)
Growth	-	-0.015*** (-2.84)	-0.014*** (-2.89)	-0.012*** (-2.68)	-0.017*** (-3.08)
Mature	-	-0.015*** (-3.13)	-0.014*** (-2.89)	-0.014*** (-3.00)	-0.016*** (-3.28)
Decline	+	0.076*** (2.96)	0.061** (2.12)	0.055** (1.99)	0.069*** (2.62)
SIZE	-	-0.017*** (-4.76)	-0.016*** (-3.78)	-0.014*** (-3.57)	-0.015*** (-4.13)
BM	+	0.033*** (7.46)	0.042*** (7.89)	0.040*** (8.14)	0.038*** (7.63)
BETA	+	0.006* (1.75)	0.012*** (3.06)	0.011*** (3.04)	0.007* (1.93)
$LOSS_{t-1}$	+	0.031*** (3.44)	0.014* (1.66)	0.012 (1.46)	0.025*** (2.77)
LEV	+	0.016*** (3.36)	0.019*** (3.16)	0.016*** (3.47)	0.020*** (3.70)
ZSCORE	-	-0.004*** (-6.25)	-0.004*** (-5.76)	-0.004*** (-5.40)	-0.005*** (-6.40)
Year Dummy		Yes	Yes	Yes	Yes
Firm Fixed Effect		Yes	Yes	Yes	Yes
Adj. R-squared		0.761	0.783	0.770	0.757
Observations (N)		3,888	3,564	3,483	3,888
Number of Firms		704	679	656	704

Robust *t*-statistics in brackets
*** p<0.01, ** p<0.05, * p<0.10
Variable definitions are provided in appendix 4.1.

Table 4.5: Association between cost of equity and firm life cycle

Panel B: Association between Cost of Equity and RE/TA (Life Cycle Proxy of DeAngelo (2006))

Variables	**Pred. Sign**	**(Model 1) Easton 2004 R_{PEG}**	**(Model 2) Easton 2004 R_{MPEG}**	**(Model 3) OJ 2005 R_{OJ}**	**(Model 4) $R_{Average}$**
Intercept	?	0.415***	0.364***	0.377***	0.392***
		(5.47)	(4.95)	(5.50)	(5.09)
RE/TA	-	-0.058***	-0.051***	-0.034**	-0.056***
		(-4.14)	(-3.10)	(-2.41)	(-3.81)
SIZE	-	-0.012***	-0.011***	-0.011***	-0.011***
		(-3.31)	(-2.88)	(-3.09)	(-2.94)
BM	+	0.032***	0.041***	0.040***	0.037***
		(6.86)	(7.52)	(7.88)	(7.19)
BETA	+	0.004	0.010***	0.010***	0.005
		(1.23)	(2.61)	(2.68)	(1.43)
$LOSS_{t-1}$	+	0.027***	0.011	0.011	0.020**
		(3.14)	(1.29)	(1.35)	(2.34)
LEV	+	0.013***	0.017***	0.015***	0.017***
		(2.84)	(2.87)	(3.29)	(3.24)
ZSCORE	-	-0.003***	-0.004***	-0.003***	-0.004***
		(-4.85)	(-4.75)	(-4.68)	(-5.23)
Year Dummy		Yes	Yes	Yes	Yes
Firm Fixed Effect		Yes	Yes	Yes	Yes
Adj. R-squared		0.759	0.781	0.767	0.755
Observations (N)		3,888	3,563	3,482	3,888
Number of Firms		704	679	656	704

Robust *t*-statistics in brackets

*** p<0.01, ** p<0.05, * p<0.10

Variable definitions are provided in appendix 4.1.

Overall, my evidence is consistent with the resource-based theory and life cycle explanation for the cost of equity of the firm. Controlling for known determinants of the cost of equity (SIZE, BM, BETA, $LOSS_{t-1}$, LEV, and ZSCORE) and individual firm heterogeneity, I find that the cost of equity is negative and significant in the growth and mature stages, while it is positive and significant in the introduction and decline stages when compared to the shake-out stage. The reported results support the notion that, in the early stages of the life cycle, firms have a limited resource base. These firms do not have a long-term relationship with the financial market and consequently do not enjoy the opportunity to raise capital at the same cost as firms in the growth and mature stages. Growth firms have good potential, disclose more information to reduce information asymmetry, and hence can attract growth and strategic investors, thereby enabling capital to be raised at a lower cost. Moreover, mature firms have positive goodwill and good credit history. Thus, these firms have access to less expensive capital. The cost of equity is higher in the decline stage because potential investors do not want to invest money into a declining firm unless they are properly compensated for the risk. The important bottom line of the analysis is that all the life cycle proxies and cost of equity estimates uniformly and strongly support the view that firms' cost of equity varies significantly with the stages in the firms' life cycle.

4.4.5 Two Stage Least Squares (2SLS) Regression

The fixed effect estimation suggests a significantly negative association between the growth and mature stages and the cost of equity, while there is a positive association between the introduction and decline stages and cost of equity. However, the sign, magnitude, or statistical significance of these estimates may be biased due to endogeneity. That is, if the life cycle proxy and the error term in Equation (4.1) are correlated. To address this concern, I adopt a two-stage instrumental variable approach to re-examine the fixed effect panel regression findings reported in Table 5. However, this approach is appropriate only if the instrumental variables are correlated with the endogenous regressor but uncorrelated with the error term of the second-stage regression. In this context, good instruments are exogenous variables that are economically related to the life cycle proxy but are uncorrelated with the error term of the second stage regression relating the cost of equity to the life cycle. Hence, I use the average cost of equity (simple average of all non-missing observations), industry life cycle stages and firm-level variables (e.g., AGE, LOSS - dummy variable that takes a value of 1 if the firm has a net loss in the current year, and 0 otherwise, and number of analysts following a firm) as instruments for firm life cycle proxies.

I use the average cost of equity because it is expected to exhibit lower measurement error than any of the individual measures (Chen et al., 2009; Hou et al., 2012). Use of industry life cycle stages as instruments can be justified on the premise that industry level life cycle has a profound effect on the firm level life cycle stages[46]. Lumpkin and Dess (2001) suggested that the industry life cycle affects a firm's strategy on proactiveness or competitive aggressiveness. Therefore, it is expected that industry-level growth, performance, and financial solvency of the firm have a direct effect on the overall performance of the firm, eventually shaping the life cycle stages. Firm-level operating performance is one of the key indicators of the firm's stage in the life cycle (Dickinson, 2011). Firms in the introduction and decline stages generally have negative operating performance, while firms in the growth and mature stages have strong operating performance. Hence, I use a dummy variable for loss of the firm, which reflects stages of the firm life cycle. I use firm age and number of analysts following a firm on the basis that these variables provide good indications for the firm stage in life cycle. Prior studies (Lang & Lundholm, 1996) documented that analysts prefer to follow large companies with high visibility and lower performance volatility. Pástor and Pietro (2003) suggested that firm age is a "natural proxy" for investors' uncertainty about profitability of the firm.

Table 4.6, Panel A, reports that coefficients on the instrumental variables are significant at the conventional level, suggesting that industry life cycle and included firm level variables have a significant effect on firm life cycle stages. Firm age is positively associated with the mature stage, but negatively associated with the introduction and growth stages. Furthermore, results show that introduction and decline firms are positively related with loss, while growth and mature firms are negatively related with loss. The coefficient on RE/TA and the number of analysts following a firm show that analysts follow large and mature firms.

[46] I use firm level life cycle stages data to calculate industry level life cycle stage.

Table 4.6: Two Stage Least Squares (2SLS) Regression

Panel A: First-Stage Regressions of Life Cycle Proxies and Validity of Instruments

Explanatory Variable	Introduction	Growth	Mature	Decline	RE/TA
Instruments					
ILC[47]- Introduction	0.701***	-0.180	0.032	-0.046	-
	(6.68)	(-0.85)	(0.15)	(-1.02)	
ILC– Growth	0.022	0.768***	-0.162	0.026	-
	(0.29)	(5.00)	(-1.03)	(0.76)	
ILC– Mature	0.090	-0.284**	0.793***	0.023	0.048
	(1.39)	(-2.20)	(5.90)	(0.84)	(1.13)
ILC– Decline	-0.042	0.162	0.127	0.749***	-
	(-0.19)	(0.37)	(0.29)	(4.55)	
AGE	-0.071***	-0.116**	0.087*	0.009	-
	(-3.29)	(2.11)	(1.66)	(0.99)	
Loss	0.105***	-0.132***	-0.108***	0.066***	-0.140***
	(4.05)	(-3.35)	(-2.98)	(3.60)	(-5.97)
No. of Analyst	0.010	-0.010	0.014	-0.014*	0.021**
	(0.92)	(-.41)	(0.56)	(-1.71)	(2.13)
Unreported Control Variables Included in Regression					
All Variables in Main Test	Yes	Yes	Yes	Yes	Yes
Year Dummy	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
Observation (N)	3069	3069	3069	3069	3069
Adjusted R^2	0.066	0.109	0.100	0.065	0.521
Underidentification Test					
Kleibergen-Paap rk LM statistic				57.948	38.468
p-value				0.000	0.000
Weak Identification Test					
Corrected Cragg-Donald Wald F statistic				34.960	36.924
Stock and Yogo (2005)10% maximal IV size (Critical Value)				31.50	22.30
Test of Overidentifying Restrictions					
Hansen's J-statistic				5.743	2.911
p-value				0.125	0.233

[47] ILC stands for Industry life cycle

Panel B. Second-Stage Regressions of Cost of Equity on Life Cycle Proxy					
Explanatory Variable					
Potentially endogenous instrumented variable					
Life cycle proxy	0.175***	-0.090**	-0.134***	0.229**	-0.483***
	(2.90)	(-2.04)	(-3.03)	(2.18)	(-5.04)
Unreported Control Variables Included in Regression					
All Variables in Main Test	Yes	Yes	Yes	Yes	Yes
Year Dummy	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
Hausman Test for the Effect of Life Cycle (coefficient 2SLS = coefficient OLS)					
Cluster-robust F-statistic				45.545	40.731
p-value				0.000	0.000

Results in Table 4.6, Panel B, suggest that the relationship between life cycle proxies and the cost of equity remain robust after accounting for the endogenous relationship between the life cycle proxies and the implied cost of equity capital. The estimated coefficients (and *p* values) of introduction (0.175 and $p<.01$), growth (-0.090 and $p<.05$), mature (-0.134 and $p<.01$), decline (0.229 and $p<.05$), and RE/TA (-0.483 and $p<.01$) in the fixed effect two stage least squares (2SLS) regression suggest that endogeneity cannot explain away the expected relationship between the life cycle and the cost of equity capital[48].

In support of the instruments, I also conduct underidentification, weak identification, Hansen's overidentifying restrictions and Hausman's endogeneity tests. In Table 4.6, underidentification test results (LM statistic) reveal that the excluded instruments are "relevant". The weak instrument test results show that the excluded instruments are correlated with the endogenous regressors because the (corrected) Cragg-Donald Wald F statistic (34.96) is greater than Stock and Yogo's (2005) critical value (i.e., 31.5) at 10%. It is worth noting that Stock and Yogo (2005) provided critical values only for a range of possible circumstances up to three endogenous regressors. However, there are four endogenous regressors (proxies for four life cycle stages) in Dickinson (2011) life cycle measures and thus, Stock and

[48] I perform Hausman's (1978) specification test to examine whether the fixed effect and random effect instrumental variable approaches are suitable. Test results suggest that the data support the fixed effect model in estimating the relationship.

Yogo (2005) cannot provide critical value in this circumstance. To address this problem, I follow the approach proposed by Angrist and Pischke (2008) and recently modified by Sanderson and Windmeijer (2013) and estimate a corrected version of the first stage F statistic that is suitable for my setting of more than three endogenous variables. The corrected Cragg-Donald Wald F statistic shows that a weak instrument is not a concern with my estimates. Results from Hansen's overidentifying restrictions test do not reject the null hypothesis (p>.10), suggesting that instruments are uncorrelated with the error term and are correctly excluded from the second stage regression, which reflects the validity of the instruments used for the 2SLS regression. Finally, Hausman's (1978) test significantly rejects (p<.001) the exogeneity of the firm life cycle proxies, justifying the use of the 2SLS regression estimates.

4.4.6 Additional Analysis and Robustness Check

4.4.6.1 Alternative Measure of Cost of Equity

To mitigate the concerns that the results are driven by the choice of cost of equity estimates, I adopt an alternative approach to measure the cost of equity. For this purpose, I use the Easton and Monahan (2005) model to calculate the ex-ante cost of equity:

$$P_{it} = \frac{eps_{i\,t+1} + r \times dps_{it} + eps_{i\,t+2}}{(1+r)^2 - 1} \tag{4.2}$$

where, *p, eps, r,* and *dps* denote price, earning per share, cost of equity, and dividend per share, respectively. Table 4.7 reports the results of the sensitivity analysis with R_{PE} as the dependent variable and two alternative measures of firm life cycle proxies, Dickinson's (2011) measure and RE/TA, as the key independent variables along with control variables. As reported in the table, my inferences on the role of the firm life cycle on the cost of equity remain unaltered when the new empirical proxy for the cost of equity is used as the dependent variable. For example, in Table 7, Model 1, Dickinson's (2011) life cycle proxies show that the cost of equity is positively associated with the decline stages and negatively associated with the growth and mature stages. Model 2 shows that the cost of equity is negatively associated (significant at $p<.05$) with RE/TA.

Table 4.7: Sensitivity Analysis

Alternative Estimation of Cost of Equity

Variables	**Pred. Sign**	**(Model 1)**	**(Model 2)**
		R_{PE}	**R_{PE}**
Intercept	?	0.223	0.010
		(0.87)	(0.05)
Introduction	+	0.017	
		(0.54)	
Growth	-	-0.026**	
		(-2.18)	
Mature	-	-0.024**	
		(-2.23)	
Decline	+	0.219***	
		(3.01)	
RE/TA	-		-0.114**
			(-1.97)
SIZE	-	-0.008	0.003
		(-0.55)	(0.28)
BM	+	0.100***	0.100***
		(5.79)	(5.42)
BETA	+	0.016	0.011
		(1.32)	(0.89)
$LOSS_{t-1}$	+	-0.019	-0.030*
		(-0.97)	(-1.51)
LEV	+	0.053**	0.045**
		(2.41)	(2.05)
ZSCORE	-	-0.000*	-0.000
		(-1.68)	(-.77)
Year Dummy		Yes	Yes
Firm Fixed Effect		Yes	Yes
Adj. R-squared		0.849	0.848
Observations (N)		4,498	4,498
Number of Firms		798	798

Robust *t*-statistics in brackets

*** p<0.01, ** p<0.05, * p<0.10

Variable definitions are provided in appendix 4.1.

4.4.6.2 Alternative Measure of Firm Life Cycle

To mitigate the concerns over whether the main results are sensitive to life cycle proxy, I use firm age as an alternative measure[49]. Firm age is a simple and natural choice as life cycle stages are naturally linked to firm age. I define AGE as the difference between the current year and the year of incorporation of the firm[50]. Results tabulated in Appendix 4.3 reveal that the association between all the estimates of the cost of equity and AGE are negative and statistically significant (p<.01). Moreover, considering that firm age can be a proxy for various time-varying arguments, I also use a dummy variable to distinguish between firms in old and young groups. I use AGE equals 1 if the firm age is greater than the median in any given year, and 0 otherwise. The untabulated results remain qualitatively the same. In summary, these findings corroborate the results reported earlier in the main analysis.

4.4.6.3 Estimates Excluding Regulated Industries

I repeat estimations in the main analysis by excluding utilities, telecommunications, and energy industries from the sample as the investment behavior of firms in these industries is more likely to be affected by regulations and by the nature of their activities (Aivazian, Ge, & Qiu, 2005). In appendix 4.4, estimates of this restricted sample are very similar to the estimates with the main analysis, signifying the robustness of the results.

4.5 Concluding Remarks

In this study I test whether the dynamic resource-based view and life cycle theory can explain the variation in the cost of equity across different phases of a firm's life cycle. I posit that firms in different life cycle stages have different levels of resource base, competitive advantages, information asymmetry, and riskiness and, hence, the

[49] Pástor and Veronesi (2003) also used firm age as a "natural proxy" for investors' uncertainty about the profitability of the firm.
[50] I have collected data on the firm's year of incorporation from company history and listing details of DatAnalysis Morningstar.

cost of equity of the firm should vary systematically across the firm's life cycle. Using a sample of Australian listed firms from 1990–2012, I find that the cost of equity of the firm significantly differs across the life cycle stages. In particular, I find that the cost of equity is higher in the introduction and decline stages of the firm, while it is lower in the growth and mature stage. Moreover, cost of equity decreases as the retained earnings as a proportion of total asset (RE/TA) increase. These results are unaffected by different estimations of the cost of equity and the firm life cycle.

Overall, my empirical evidence contributes to the growing body of literature that focuses on the financial implications of the firm life cycle. Particularly, this study contributes to the literature by showing evidence of the role that firm life cycle plays in determining cost of equity capital.

My findings strongly support the resource-based view of competitive advantage and firm life cycle theory. According to the resource-based view, the financial capital, physical resources, human resources, intangible know-how, and skills and capabilities of large and mature firms are rich, diverse, and strong, while those of small and young firms are small, concentrated and limited. These resource bases and expertise help mature firms to achieve a competitive advantage, to reduce the risk and information asymmetry problem, and to gain easy access to finance, which contribute to a reduction in the cost of equity capital. The findings are also consistent with the life cycle theory of the firm in that different stages of the life cycle exhibit different levels of disclosure, analysts and investors following, liquidity of stock, credibility, and reputation in the market. Hence, as a consequence of the transition from one stage to another, the cost of equity changes accordingly. Finally, from a practitioner's perspective, my results have direct implications for the financial management and strategic direction of the firm. An implication of my study is that firms should reach and maintain maturity, the prime stage of the firm life cycle, to benefit from the lower cost of equity.

Appendix 4.1: Variable Definition and Measurement

Variables	Definition and Measurement
Dependent Variable	
R_{PEG}	Implied cost of equity, estimated by the PEG model of Easton (2004).
R_{MPEG}	Implied cost of equity, estimated by the MPEG model of Easton (2004).
R_{OJ}	Implied cost of equity, estimated by the modified Ohlson and Juettner-Nauroth (2005) model (modified by Gode and Mohanram (2003)).
$R_{Average}$	Implied cost of equity, estimated as the average of the above three models.
Firm Life Cycle Proxies	
CLC	A vector of dummy variables that capture firms' different stages in the life cycle following the Dickinson (2011) model.
RE/TA	Retained earnings as a proportion of total assets, measured as retained earnings/total assets.
AGE	The difference between the current year and the year of incorporation of the firm.
Control Variables	
SIZE	Natural log of total assets of the firm at the end of the fiscal year.
BM	Ratio of book value of equity to market value of equity at the end of the fiscal year.
BETA	A measure of systematic risk, extracted from Datastream. Datastream uses a five-year period and regresses the share price against the respective Datastream total market index using log changes of the closing price on the first day of each month.
$LOSS_{t-1}$	An indicator variable that equals 1 if the net income before abnormal is negative in the previous years and 0 otherwise.
LEV	(Short term debt + long term debt)/Shareholders' equity.
ZSCORE	A model, developed by Edward I. Altman in 1968, used to predict publicly traded manufacturing companies' likelihood of bankruptcy. Altman's Z score = 1.2(Working Capital/Total Assets) + 1.4(Retained Earnings/Total Assets) + 3.3(Earnings Before Interest & Tax/Total Assets) + 0.6(Market Value of Equity/Total Liabilities) + 0.999(Sales/Total Assets).
Year	Dummy variables to control for fiscal year.
a_i	Firm-specific unobserved fixed effects.

Appendix 4.2: Association between Cost of Equity and RE/TE (Life Cycle Proxy of DeAngelo (2006))

Variables	Pred. Sign	(Model 1) Easton 2004 R_{PEG}	(Model 2) Easton 2004 R_{MPEG}	(Model 3) OJ 2005 R_{OJ}	(Model 4) $R_{Average}$
Intercept	?	0.455*** (5.77)	0.382*** (4.96)	0.378*** (5.28)	0.424*** (5.28)
RE/TA	-	-0.017*** (-3.15)	-0.019*** (-3.43)	-0.015*** (-2.96)	-0.017*** (-3.16)
SIZE	-	-0.014*** (-3.72)	-0.012*** (-2.93)	-0.011*** (-2.91)	-0.012*** (-3.21)
BM	+	0.033*** (7.22)	0.042*** (7.70)	0.040*** (7.94)	0.038*** (7.45)
BETA	+	0.005 (1.37)	0.010*** (2.58)	0.010*** (2.61)	0.005 (1.54)
$LOSS_{t-1}$	+	0.031*** (3.66)	0.014 (1.63)	0.012 (1.44)	0.024** (2.78)
LEV	+	0.010** (2.10)	0.012** (1.97)	0.011** (2.27)	0.013** (2.43)
ZSCORE	-	-0.004*** (-5.65)	-0.004*** (-5.33)	-0.004*** (-5.11)	-0.004*** (-5.94)
Year Dummy		Yes	Yes	Yes	Yes
Firm Fixed Effect		Yes	Yes	Yes	Yes
Adj. R-squared		0.757	0.780	0.767	0.754
Observations (N)		3,888	3,563	3,482	3,888
Number of Firms		704	679	656	704

Robust *t*-statistics in brackets
*** p<0.01, ** p<0.05, * p<0.10
Variable definitions are provided in appendix 4.1.

Appendix 4.3: Association between Cost of Equity and Age (Life Cycle Proxy)

Variables	Pred. Sign	(Model 1) Easton 2004 R_{PEG}	(Model 2) Easton 2004 R_{MPEG}	(Model 3) OJ 2005 R_{OJ}	(Model 4) $R_{Average}$
Intercept	?	0.585***	0.547***	0.519***	0.564***
		(7.46)	(7.06)	(7.15)	(7.02)
AGE	-	-0.003***	-0.004***	-0.004***	-0.004***
		(-3.22)	(-3.47)	(-3.49)	(-3.25)
SIZE	-	-0.018***	-0.017***	-0.014***	-0.017***
		(-4.87)	(-3.96)	(-3.69)	(-4.32)
BM	+	0.034***	0.042***	0.041***	0.039***
		(7.49)	(7.90)	(8.12)	(7.69)
BETA	+	0.006*	0.012***	0.011***	0.007*
		(1.70)	(2.97)	(2.94)	(1.87)
$LOSS_{t-1}$	+	0.037***	0.019**	0.016*	0.029***
		(4.14)	(2.26)	(1.96)	(3.34)
LEV	+	0.017***	0.019***	0.017***	0.021***
		(3.47)	(3.28)	(3.68)	(3.74)
ZSCORE	-	-0.005***	-0.005***	-0.004***	-0.005***
		(-6.20)	(-5.81)	(-5.49)	(-6.45)
Year Dummy		Yes	Yes	Yes	Yes
Firm Fixed Effect		Yes	Yes	Yes	Yes
Adj. R-squared		0.754	0.778	0.765	0.751
Observations (N)		3,886	3,561	3,481	3,886
Number of Firms		702	677	655	702

Robust *t*-statistics in brackets
*** p<0.01, ** p<0.05, * p<0.10
Variable definitions are provided in appendix 4.1

Appendix 4.4: Association Between Cost of Equity and Life Cycle Proxies Using Dickinson's (2011) Model - Excluding Regulated Industries

Variables	Pred. Sign	(Model 1) Easton 2004 R_{PEG}	(Model 2) Easton 2004 R_{MPEG}	(Model 3) OJ 2005 R_{OJ}	(Model 4) $R_{Average}$
Intercept	?	0.469***	0.438***	0.440***	0.433***
		(6.33	(5.36)	(5.69)	(5.63)
Introduction	+	0.014	0.028**	0.019**	0.016
		(1.23)	(2.17)	(1.77)	(1.38)
Growth	-	-0.013**	-0.014***	-0.014***	-0.015***
		(-2.37)	(-2.69)	(-2.82)	(-2.57)
Mature	-	-0.016***	-0.016***	-0.016***	-0.017***
		(-3.18)	(-3.22)	(-3.31	(-3.32)
Decline	+	0.064**	0.054*	0.045**	0.054**
		(2.41)	(1.78)	(1.62)	(2.04)
SIZE	-	-0.015***	-0.014***	-0.014***	-0.013***
		(-4.34)	(-3.38)	(-3.41)	(-3.60)
BM	+	0.032***	0.042***	0.041***	0.037***
		(6.90)	(7.55)	(7.88)	(7.11)
BETA	+	0.004	0.009**	0.009**	0.005
		(1.12)	(2.26)	(2.51)	(1.38)
$LOSS_{t-1}$	+	0.033***	0.015*	0.015*	0.026***
		(3.68)	(1.76)	(1.77)	(2.86)
LEV	+	0.015***	0.017***	0.017***	0.019***
		(3.11)	(2.79)	(3.40)	(3.31)
ZSCORE	-	-0.004***	-0.004***	-0.004***	-0.005***
		(-5.70)	(-4.87)	(-4.60)	(-5.71)
Year Dummy		Yes	Yes	Yes	Yes
Firm Fixed Effect		Yes	Yes	Yes	Yes
Adj. R-squared		0.763	0.791	0.776	0.762
Observations (N)		3,456	3,179	3,119	3,456
Number of Firms		600	582	560	600

Robust *t*-statistics in brackets
*** p<0.01, ** p<0.05, * p<0.10
Variable definitions are provided in appendix 4.1.

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CHAPTER 5

CONCLUSION

5.1 Introduction

This thesis empirically investigates a number of important and interesting questions related to corporate life cycle and organization capital. The impact of corporate life cycle and organization capital on corporate outcomes are important issues in the corporate finance literature. Each of these chapters is self-contained. Chapter two focuses on the role of organization capital in determining the corporate life cycle and provides evidence that organization capital has a notable effect in influencing the life cycle progression of the firm. The third chapter disentangles organization capital into two components: firm-specific organization capital and management-specific organization capital, and provides evidence that the impact of both forms of organization capital on corporate outcome (e.g., firm risks) vary substantially. The fourth chapter provides evidence that the corporate life cycle has important implications for the cost of equity capital.

5.2 Summary of Major Findings

The **second chapter** sheds light on the association between organization capital and the firm life cycle. The findings of this chapter suggest that firms with higher organization capital are likely to be in the introduction or decline stage. However, firms with a lower level of organization capital are more likely to be in the growth or mature stages. Empirical evidence in this paper also shows that firms with higher organization capital in the introduction and decline stages are more likely to progress to the growth and mature stages in the subsequent five years. Collectively, these results suggest that organization capital is a channel through which managers can lead the firm to attain and maintain the prime stages (i.e., growth and mature) in their life cycle.

This chapter makes important contributions to the literature. First, this paper contributes to the corporate finance literature by directly examining the role of organization capital in influencing corporate life cycle stages. While prior research has investigated the association between organization capital and cross-sectional stock returns (Eisfeldt & Papanikolaou, 2013), and future operating and stock return performance (Lev et al., 2009), little attention has been paid to the role of organization capital in driving firm life cycle stages. This paper attempts to fill this gap in the literature. Second, this paper contributes to the area of research that stresses the importance of organization capital as a major driver of firms' (and national) growth and competitiveness (e.g., Eisfeldt & Papanikolaou, 2014; Lev & Radhakrishnan, 2005; Youndt et al., 2004). While prior research shows that organization capital has a valuable impact on the growth, productivity and competitiveness of the firm, this chapter provides evidence that earlier literature on organization capital overlooked the important role of organization capital in influencing firm life cycle stages. Taken together, this paper makes an important contribution to the literature by demonstrating that organization capital is a indeed a determinant of firm life cycle stages.

The **third chapter** in this thesis focuses on the adhesiveness of organization capital and outlines the importance of isolating firm-specific organization capital from management-specific organization capital in determining the role of organization capital in relation to the firm level outcomes (e.g., idiosyncratic risk, systematic risk, and total risk). The findings of this chapter suggest that management-specific organization capital reduces (increases) idiosyncratic and total (systematic) risk, whereas firm-specific organization capital reduces (increases) systematic (idiosyncratic and total) risk. Moreover, management-specific organization capital, when interacted with firm-specific organization capital, negatively affects idiosyncratic, systematic, and total risk, suggesting the dominant role of management-specific organization capital in reducing wide range of firm risks. Finally, additional analysis shows that management-specific organization capital can improve stock returns and firm performance in the presence of firm-specific organization capital. Overall, this chapter shows that the impact of organization capital on firm outcomes (e.g., risks and return) depends on whether the organization capital is firm-specific or management-specific.

This chapter contributes to the corporate finance literature by directly examining the role of management-specific and firm-specific organization capital in influencing idiosyncratic, systematic, and total risk. Despite considerable evidence that organization capital improves the productivity, efficiency, and performance of the firm (Corrado et al., 2009; Fredrickson, 1986; Lev et al., 2009;), there remains a clear divergence of opinion regarding the adhesiveness of such organization capital. This study provides evidence that disentangling firm-specific organization capital from management-specific organization capital is important in examining the impact of organization capital on firm-level outcomes (e.g., idiosyncratic, systematic, and total risk). A further contribution of this chapter is that, to the best of my knowledge, it is the first to isolate firm-specific organization capital systematically from management-specific organization capital and examine whether both forms of organization capital affect firm-level outcomes identically. It shows empirically that the effect of organization capital on idiosyncratic, systematic, and total risk differ considerably, depending on whether the organizational capital is management-specific or firm-specific. Thus, this study makes an important contribution in resolving the competing views of the embodiments and effects of different forms of organization capital. Finally, this chapter contributes to the corporate finance literature on the determinants of firm risks by incorporating a human dimension into the equation.

The **fourth chapter** investigates the effect of the corporate life cycle on the cost of equity capital. The findings of this chapter show that the cost of equity capital varies over the life cycle of the firm. In particular, compared to the shake-out stage of the firm life cycle, the cost of equity is higher in the introduction and decline stages, but lower in the growth and mature stages, resembling a U-shaped pattern. Furthermore, the cost of equity decreases as retained earnings as a proportion of total assets increase after controlling for other firm characteristics and unobserved heterogeneity. This chapter extends the corporate finance literature by providing empirical evidence that the firm life cycle has significant implications for the cost of equity of the firm. While prior research has investigated the role of the firm life cycle in decision making regarding dividends (DeAngelo et al., 2006; Fama & French, 2001) and capital structure (Berger & Udell 1998), little attention has hitherto been paid to the role of the firm life cycle in determining the cost of equity capital. This chapter aims to fill this gap in the literature. It thus augments our understanding of the role of the corporate life cycle in major financial policies.

5.3 Directions for Future Research

The findings of the thesis add to our understanding of the implications of the corporate life cycle and organization capital for the cost of equity and firm-level risks. It also provides a good framework for future research. More research is needed to gain a better understanding of the implications of the firm life cycle for the informational environment (analyst following, voluntary disclosure, etc.), the cost of debt and firm-specific crash risk. Future research in the area of the corporate life cycle may also focus on the association between the firm life cycle and idiosyncratic return volatility.

This thesis also provides a good framework for future research in the area of organization capital. It provides evidence that the impact of organization capital on corporate outcome (e.g., risks and return) depends on whether organization capital is firm-specific or management-specific. Further research may be done to ascertain whether similar findings can be found for other corporate outcomes. Future research in the area of organization capital may also concentrate on the implications of organization capital for the agency problem and the information environment of the firm.

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Notes