INSTITUTIONAL OWNERSHIP AND LONG-TERM INVESTMENTS ACROSS THE CORPORATE LIFE CYCLE

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ABSTRACT

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Motivated by concerns about managerial myopia, I examine how the effects of institutional ownership on firms' long-term investments vary across life cycle stages. I find that the effects of institutional ownership on long-term investments in both capital and research and development (R&D) are more positive in transitory life cycle stages relative to sustainable life cycle stages. These results indicate that life cycle patterns explain important variation in the relation between institutional ownership and long-term investments and highlight the importance of firms' life cycles in measuring governance effects. I also find that having a large number of institutional owners with relatively small ownership stakes has a more positive effect than having a smaller number of institutional owners with relatively large ownership stakes. Using the discontinuity between the Russell 1000 and 2000 indexes as an identification strategy, I also provide evidence in support of a causal effect of institutional ownership on firms' long-term investments. Additional tests indicate my results are not driven by firms that are more likely to over-invest.

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CHAPTER 1: INTRODUCTION

I examine how the effects of institutional ownership on firms' long-term investments vary across the corporate life cycle. Prior literature provides mixed evidence on the extent to which governance mechanisms mitigate managerial myopia (i.e., a sacrifice of long-term value to achieve short-term goals), and finds some instances in which governance mechanisms may actually induce myopia (e.g., He and Tian 2013). Managerial myopia can lead to under-investment as long-term investments increase current expenses, which reduces earnings and potentially affects stock prices. Reducing long-term investments can have serious implications for future profitability and growth, however, and governance mechanisms should help to alleviate this problem by promoting appropriate long-term investments and long-term value creation.

As owners are a fundamental driver of governance, I focus on large, sophisticated investors (i.e., institutional investors). Given their large ownership stakes, institutional investors have incentives to engage in governance activities to promote long-term value. Through voting and activism activities, as well as through their threat of exit, institutional investors can exert influence on managers' decisions, including long-term investment decisions (Edmans 2014). Further, given their greater sophistication, institutional investors can better identify the long-term value associated with firms' long-term investments. These advantages allow institutional investors to shelter managers from short-term earnings and stock price effects resulting from long-term investments (Bushee 1998), and thus promote long-term value creation. I examine this relation in the context of the corporate life cycle.

As firms change throughout their life cycle, they face different internal and external operating environments, investment opportunities, agency costs, and governance challenges. In particular, certain stages in the corporate life cycle are transitory, and are characterized by negative operating cash flows and low profitability. These life cycle stages represent critical "make or break" points in which firms either move to a more sustainable stage, or face failure (Dickinson 2011; Greiner 1972). Given the additional short-term pressure stemming from negative operating results, managers may be hesitant to make appropriate long-term investments. Failure to make necessary investments can impair a firm's ability to move into a more sustainable life cycle stage, thus inhibiting long-term value and growth. I argue that institutional investors are well positioned to address this challenge by providing managers the flexibility they need to pursue long-term value creation even if the short-term implications appear negative. I also show that institutional ownership tends to be lowest during transitory life cycle stages, which implies that the marginal benefit of institutional ownership should be greater in these stages. Thus, I predict that institutional investors encourage greater long-term investments, and this effect is most pronounced among firms in transitory life cycle stages.

To conduct my analyses, I create institutional ownership scores using data reduction techniques that allow me to differentiate between different types of institutional investors from the firm's perspective. These scores capture two distinct types of institutional ownership: broad ownership (a large number of institutional owners with relatively small ownership stakes) and concentrated ownership (a smaller number of institutional owners with relatively large ownership stakes). Using these scores, I examine how the effects of institutional ownership on long-term investments vary across the corporate life cycle, and I focus on two types of long-term investments: research and development (R&D) and capital (i.e., plant, property, and equipment).

Consistent with my prediction, I find that the effects of institutional ownership on firms' capital and R&D investments are more positive in transitory life cycle stages relative to sustainable life cycle stages. These results indicate that life cycle patterns explain important variation in the relation between institutional ownership and firms' long-term investments. On average (i.e., aggregating across life cycle stages), I also show that concentrated institutional ownership is negatively associated with capital investments, while broad institutional ownership is positively associated with both capital and R&D investments. Thus, I also show that the effect of institutional ownership on firms' investment behavior differs substantially depending on the type of institutional ownership.

To rule out the possibility that the effects I document are driven by institutional investors focusing on firms with particular investment profiles, I identify a setting to provide evidence suggestive of a causal relation between institutional ownership and firms' long-term investments. I use the annual reconstitution of the Russell indexes as an identification strategy to examine firms near the cutoff between the Russell 1000 and the Russell 2000 indexes. Index weights are assigned to firms within these indexes based on their relative market capitalizations, so firms at the bottom of the Russell 1000 index have substantially smaller index weights than firms at the top of the Russell 2000 index. As both index funds and actively managed funds often benchmark against these indexes, firms at the top of the Russell 2000 index have discontinuously higher institutional ownership relative to firms at the bottom of the Russell 1000 index (Crane et al. 2016; Chang et al. 2015). For a number of reasons, it is difficult for firms to manage their market capitalization and float to achieve classification in one index versus the other. When the indexes are reconstituted annually, firms that are re-classified from one index to the other experience an exogenous shock to institutional ownership that is unrelated to firm characteristics, including investments in capital and R&D. Using an instrumental variable approach with index inclusion as an instrument for institutional ownership, I test for a causal link between institutional ownership and firms' long-term investments (Crane et al. 2016; Appel et al. 2016; Boone and White 2015). The results of this approach show, across life cycle stages, that broad institutional ownership is positively related to R&D investments, providing evidence in support of a causal relation between broad institutional ownership and long-term investments.

An additional concern is that a positive effect of institutional ownership on long-term investments might reflect institutional owners promoting value-decreasing investment, or investment above an optimal level (i.e., over-investment). I address this concern by examining firms which are more likely to over-invest, and find that my results are not driven by these firms. Thus, based on my primary findings, I show that broad institutional ownership promotes efficient long-term investment, while concentrated ownership may actually lead to inefficient reductions in firms' long-term investment activity. Finally, within each life cycle stage, I also find that the effects of institutional ownership on firms' long-term investment are most pronounced for firms with lower levels of investment.

My study contributes to literature examining the effects of governance on firm outcomes, particularly long-term investments (Aghion et al. 2013; Wahal and McConnell 2000; Bushee 1998), by documenting that the effects of governance on firms' investment behavior vary across the corporate life cycle. Given that firms in transitory life cycle stages face greater short-term pressure, and generally have lower investment levels and lower institutional ownership levels, I show that institutional ownership has a more positive effect on firms' long-term investment behavior in these stages. Further, I show that the effects of institutional ownership may actually be negative in more sustainable stages, and thus considering a firm's life cycle stage is important in identifying the effects of institutional ownership.

I also contribute to the literature examining the governance role of institutional investors, by developing innovative new measures that capture multiple dimensions of institutional ownership. Previous approaches classify institutional investors based on characteristics of the investor's portfolio (i.e., from the *investor's* perspective) (Bushee 1998). In contrast, I measure and classify institutional ownership from the *firm's* perspective. Specifically, I use data reduction techniques and incorporate multiple dimensions of institutional ownership to identify two general types of institutional ownership that firms face: broad and concentrated ownership. My results indicate that different concentrations of institutional ownership have very different implications for firms' long-term investment behavior. In particular, after addressing concerns of over-investment, I find that broad institutional ownership fulfils a positive governance role by promoting efficient investment. In contrast, concentrated institutional ownership may actually lead to inefficient reductions in firms' long-term investments. Thus, I show that different concentrations of ownership lead to differences in firms' investment behavior.

Finally, I contribute to a growing literature that finds the corporate life cycle provides additional explanatory power for a variety of phenomena of interest to accounting academics, including accrual-based earnings management (Chang and Li 2016), relative performance evaluation (Drake and Martin 2016), executive compensation (Drake and Martin 2015), and the pricing of cash flows and accruals (Hribar and Yehuda 2015). My findings add to these studies by enhancing our understanding of how a firm's life cycle stage can yield valuable insights into governance effects and firms' investment behavior.

The paper proceeds as follows. In Chapter 2, I provide background on managerial myopia and long-term investments, institutional ownership, and the corporate life cycle, and I develop my hypothesis. In Chapter 3, I describe the data, the measurement of institutional ownership and life cycle stages, and present descriptive statistics. In Chapter 4, I describe my research design and present the results of my baseline models and hypothesis tests. In Chapter 5, I use the discontinuity between the Russell 1000 and 2000 indexes as an identification strategy to address endogeneity concerns. In Chapter 6, I examine the potential for over-investment within my setting. In Chapter 7, I present additional sensitivity tests. In Section 8, I conclude with a discussion of my results and their implications.

CHAPTER 2: THEORY AND HYPOTHESIS DEVELOPMENT

2.1. Managerial myopia

Managerial myopia has been defined as an "underinvestment in long-term intangible projects […] for the purposes of meeting short-term goals" (Bushee 1998, 306), or as a "desire to achieve a high stock price by inflating current earnings at the expense of long-term growth" (Chen et al. 2015, 44). Thus, managerial myopia is the sacrifice of long-term value to achieve short-term earnings or stock price goals, and can be triggered by a variety of pressures (e.g., stock options, analyst forecasts, and investor expectations) (Stein 1988, 1989). There are also many ways that myopic action can be exhibited, including excess production to meet short-term performance goals or to improve accounting performance (Bruggen et al. 2011; Young et al. 2014), reductions in R&D (Bushee 1998), and other forms of real earnings management (Graham et al. 2005; Roychowdhury 2006; Cohen et al. 2008; Dichev et al. 2013; Vorst 2016). Edmans et al. (2016) and Ladika and Sautner (2016) also provide evidence that incentive horizons affect executives' investment decisions, and show that shortening managers' incentives horizons can substantially reduce long-term investment. Given the prevalence of stock-based compensation, this suggests that stock price concerns cause managers to reduce valuable investments, consistent with the view of managerial myopia models (e.g., Stein 1988, 1989).

In this study, I examine investments in research and development (R&D) and capital (i.e., property, plant, and equipment), both of which are long-term in nature. These investments are largely discretionary and can be delayed to meet short-term performance targets. When under increased pressure, managers may be less inclined to invest in R&D and capital assets, as R&D investments are expensed and capital investments may result in higher depreciation charges, increases in interest costs, and reductions in cash balances. Delaying or foregoing such investments to meet short-term performance targets, however, can inhibit the ability of the firm to generate value in the future.

2.2. Governance and institutional ownership

Given the value-decreasing effects of myopic action and the empirical evidence regarding managerial myopia, it is important to consider the role of governance in mitigating myopia. There are many mechanisms that can be used to promote efficient investment and a variety of groups and individuals that may play a role in governance. The choices between these various mechanisms often depend on the type of firm, particularly with respect to the ownership structure of the firm (Bebchuk and Weisbach 2010; Hart 1995). As the owners of the firm are a fundamental driver of governance, I focus on the role of ownership in mitigating managerial myopia, and specifically on the role of institutional investors.[1]

Institutional investors (owners) play an important governance role due to their large ownership stakes and ability to influence managers through their voting and activism activities, as well as through their threat of exit. In publicly traded companies, financing often occurs through equity securities which are owned by a large number of investors, each of which may have a relatively small stake in the firm. While this provides the benefit of risk diversification to the investors, it creates a problem of free-riding with respect to governance (Bebchuk and Weisbach 2010). Since no single investor or group of investors has a sufficiently large stake in the company, incentives to be actively involved in governance are very low, particularly when the investors may have ownership stakes in other companies as well. The free-riding problem

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[1] Tirole (2005) outlines a broad set of governance mechanisms, including incentives (e.g., compensation), the board of directors, ownership and investor activism, takeovers and leveraged buyouts, and debt. I restrict my analysis to governance arising through ownership, as many other governance mechanisms are driven by owners. For instance, the owners of the firm elect the board of directors, who then design incentives for executives. Thus, while other governance mechanisms could also affect long-term investment activity, I focus on the influence of institutional ownership as a fundamental driver of governance.

arises because the benefit accruing to any investment in becoming informed about the company and exercising governance is shared among all investors, not only by those making the investment in governance, which substantially reduces the incentives for any individual investor to be actively involved in governance activities (Shleifer and Vishny 1997).

In the presence of governance free-riding, only larger shareholders will have sufficient incentives to become more informed and to monitor managers. Prior research has focused on institutional investors as they have the resources to hold larger stakes in a given firm and thus have greater incentives to be involved in governance activities compared to smaller investors (Edmans 2014; Bebchuk and Weisbach 2010). Institutional investors may also become involved in proxy contests and other activist actions in an attempt to change corporate policies, replace directors and managers, and increase dividend payments (Edmans 2014). As defined by the SEC (Rule 13f), institutional investors are entities which manage at least $100 million in equity and which must file quarterly reports with the SEC (Bushee 1998). Collectively, institutional investors hold a substantial portion of outstanding stock in the U.S., and prior research has established the importance of institutional investors in the economy and their influence on managers (Aggarwal et al. 2011; Bebchuk and Hamdani 2009; Chen et al. 2007).

There are many means by which institutional investors can encourage long-term investments and thus reduce managerial myopia and promote long-term value. First, institutional investors are sophisticated investors and much better informed than the average investor (Bushee and Goodman 2007; Parrino et al. 2003). As pointed out by Edmans (2009), small shareholders suffer not so much from the “separation of ownership from control” as from the “separation of ownership from information” (p. 2485). By nature of their informational advantage and greater sophistication, institutional investors have the ability to better identify the long-term value associated with firms' investments, which then gives managers the freedom to focus on maximizing long-run value, without being penalized for temporary reductions in earnings or stock prices (Bushee 1998). Second, in addition to active governance, institutional investors with large holdings can exert influence simply through the option of selling their ownership stake (Parrino et al. 2003). Thus, institutional investors can cause stock prices to better reflect fundamental value simply due to their threat of exit (Edmans 2009). These advantages allow institutional investors to exercise restraint and to provide managers with greater freedom to pursue value creation over a longer horizon.[2]

Prior empirical research provides evidence that higher levels of institutional ownership reduce managerial myopia. For instance, studies have shown that institutional ownership is positively related to firm-level governance (Aggarwal et al. 2011), industry-adjusted expenditures for property, plant, and equipment (PPE) and R&D (Wahal and McConnell 2000), as well as innovation, R&D, and the productivity of R&D (Aghion et al. 2013). Institutional ownership has also been shown to decrease the likelihood of cutting R&D to reverse an earnings decline (Bushee 1998) and to limit the influence of venture capitalists on annual, short-horizon incentives (Cadman and Sunder 2014).

2.3. Institutional ownership and long-term investments across life cycle stages

While the importance of institutional ownership has been previously examined, the effects of institutional ownership should be more pronounced for certain firms and in specific settings. Prior studies have shown that the effectiveness of governance depends on contextual

[2] As an example of how institutional investors may exercise restraint (and encourage restraint from their own investors), Peter A. Harbeck, President & CEO of SunAmerica Asset Management, LLC wrote the following in a letter to shareholders in the SunAmerica Series, Inc. 2016 Annual Report: "Maintaining a long-term perspective is a basic tenet of effective investing for both managers and investors. We believe that investors should resist the urge to act upon short-term market movements and should instead maintain investments in assets that are allocated based on their long-term individual goals" (Harbeck 2016, 3).

factors and firm-specific circumstances (O'Conner and Byrne 2015; Bhagat et al. 2008; Dey 2008; Cremers and Nair 2005). For instance, the effects of institutional ownership vary based on important characteristics of institutional investors, such as portfolio weights (Fich et al. 2015), holding size (Chen et al. 2007), and investment strategies (Bushee and Goodman 2007; Abarbanell et al. 2003; Bushee 1998). The effects of institutional ownership also vary based on characteristics of the firms in which they invest, such as the level of agency costs (Crane et al. 2016) and the presence of other governance channels (Atanassov 2013). To add to this line of research and to better understand the circumstances in which institutional ownership matters most, I leverage a growing literature on the corporate life cycle to examine how a firm's life cycle stage influences the effectiveness of institutional ownership.

As firms evolve and face different operating environments, they move through various life cycle stages (e.g., Phelps et al. 2007; van de Ven and Poole 1995). Firms do not necessarily follow a linear, sequential progression through life cycle stages and may skip stages or revert to previous life cycle stages due to differences in internal (e.g., strategy, innovation, investments) and external factors (e.g., industry shocks, competition) (Phelps et al. 2007; van de Ven and Poole 1995; Dickinson 2011; Miller and Friesen 1984). As a result, firms in the same life cycle stage may have arrived in that stage through many different paths. I use an adaptation of Dickinson's (2011) classification, in which she classifies firms into life cycle stages based on the pattern of their cash inflows and outflows from operating, investing, and financing activities (see Figure 1). Her classification scheme provides five stages, which she labels *Introduction*, *Growth*, *Mature*, *Shake-Out*, and *Decline*.

While any classification scheme is necessarily imprecise and there may be ambiguity in classifying certain firms, a typology of classifying firms based on their life cycle stage can yield valuable insights to better understand predictable patterns of firm characteristics and actions. Further, while there are not bright-line distinctions between the stages, there are important differences in firm characteristics between stages, and many similarities among firms classified in the same stage. For instance, firms differ in predictable ways across life cycle stages in terms of innovation, growth, and the competition they face. Other important differences include ownership concentration, business structure, centralization, and risk-taking. For instance, prior studies have found that firms' investment, financing, and cash policies (Faff et al. 2016), board structure and composition (Balogh 2016), sales growth and capital investments (Anthony and Ramesh 1992), dividend policies (DeAngelo et al. 2006), and profitability (Dickinson 2011) vary across life cycle stages. More recent studies have also considered how a firm's life cycle provides additional explanatory power for accrual-based earnings management (Chang and Li 2016), relative performance evaluation (Drake and Martin 2016), executive compensation (Drake and Martin 2015), and the pricing of cash flows and accruals (Hribar and Yehuda 2015). As of yet, however, little research has considered how governance mechanisms may function differently depending on a firm's life cycle stage.[3]

Dedman and Filatotchev (2008) suggest that "the role of corporate governance is likely to differ in ways contingent on both the firm's internal and external factors" with the result that "internal and external contingencies are likely to influence the effectiveness of particular governance practices" (p. 250). As firms change over the course of their life cycle, they face different internal and external operating environments, competition, investment opportunities, and agency costs. For instance, free cash problems generally only arise in later life cycle stages

[3] While most prior studies have examined cross-sectional variation in control use among mature, stable firms (Filatotchev et al. 2006), some studies have examined the evolution of organizational control for firms at specific transitions between life cycle stages (Shah et al. 2013; Phelps et al. 2007; Cardinal et al. 2004).

(Saravia 2014; Filatotchev et al. 2006; DeAngelo et al. 2006; Grullon et al. 2002), so mechanisms designed to address free cash flow problems might actually be detrimental in other life cycle stages. Thus, what is effective in one life cycle stage may be less effective or even detrimental in another stage, since firms face different governance challenges in different life cycle stages (Koh et al. 2015; Filatotchev et al. 2006; Miller and Friesen 1984; Anthony and Ramesh 1972).

Given different governance challenges across life cycle stages, I predict that the effectiveness of governance in mitigating investment myopia will vary across firms' life cycle stages. Dickinson (2011) suggests that the ideal point is somewhere between the *Growth* and *Mature* stages, as this is where the risk-reward structure is optimized. While the *Growth* and *Mature* stages are characterized by stability, the *Introduction* and *Decline* stages are transitory.[4] Firms in the *Introduction* and *Decline* stages are characterized by negative operating cash flows, and these firms also tend to have the lowest profitability levels. As these are not sustainable long-term states, firms need to generate positive operating cash flows or face exit. Thus, the *Introduction* and *Decline* stages are transitory stages which represent critical "make-or-break" points in the corporate life cycle.[5] In a similar vein, Greiner (1972) suggests that a number of firms fail during these "periods of crisis". In particular, "[firms] unable to abandon past practices and effect major organization changes are likely either to fold or to level off in their growth rates. The critical task for management in each revolutionary period is to find a new set of organization practices that will become the basis for managing the next period of evolutionary growth" (p.

[4] The *Shake-Out* stage is essentially an "Other" category for unusual cash flow patterns. It is difficult to predict what the effect of institutional owners will be in this stage, since there are three highly distinct cash flow patterns which result in classification in this stage.

[5] The *Decline* stage does not necessarily represent a stage in which the firm is itself facing exit. Gort and Klepper (1982) define the *Decline* stage as a situation in which there are essentially no new producers entering the market. Firms classified in the *Decline* stage may be experiencing adverse circumstances or otherwise attempting to revive the firm. Thus, the *Decline* stage does not necessarily represent a period of winding down operations.

40). As long-term investments (in capital and R&D) are critical in generating positive future operating cash flows., firms in these “periods of crisis” that make appropriate investments face more promising future prospects, while firms that fail to make adequate investments face greater likelihood of exit. Further, when firms are operating in unsustainable situations, they face greater uncertainty, which is likely to further reduce long-term investments. To move to a sustainable stage, disruptive change may be necessary, thus requiring greater long-term investment.

During these critical transitory periods, managers face greater short-term pressure which can lead to reductions in long-term investments. Institutional owners can insulate managers from other external pressures for short-term results, allowing managers to make the long-term investments necessary to generate positive future operating cash flows. Institutional investors can also provide stability to stock prices through greater insights regarding long-term value, further mitigating managerial concerns about short-term price effects related to long-term investment decisions. Finally, institutional ownership tends to be lower in less established firms (i.e., in transitory life cycle stages), so the marginal effect of each institutional owner on managerial decisions should be stronger. Thus, I predict that the effect of institutional ownership on firms’ long-term investment will be more pronounced among firms in transitory life cycle stages. This leads to my hypothesis:

H1: The effect of institutional ownership on firms’ long-term investments is *more positive* in transitory life cycle stages.

CHAPTER 3: RESEARCH DESIGN

3.1. Data and sample

Institutional ownership data come from the Thomson Reuters Institutional (13f) Holdings s34 Master File. Long-term investment values and other financial statement data come from Compustat Annual. Stock price and trading data come from CRSP. I start with all firms incorporated in the U.S., and then exclude financial firms (NAICS 52) and utilities (NAICS 22) due to differences in their physical capital requirements and regulatory environments (Faff et al. 2016; DeAngelo et al. 2006). I then drop any observations with assets less than $1 million, and any observations with abnormal (e.g., negative) values for long-term investments or other control variables. After merging the datasets, the main sample for empirical analysis includes 6,141 unique firms (42,112 firm-year observations) for the period 1997–2014.

3.2. Institutional ownership

To examine how institutional ownership influences firms' investment levels, I create composite measures of institutional ownership (i.e., institutional ownership scores). Using institutional ownership scores allows me to incorporate multiple dimensions of institutional ownership. Many of the specific measures are closely related, and thus may be usefully summarized, providing a more informative overall picture and simplifying subsequent analysis.[6] Importantly, I measure institutional ownership from the firm's perspective, rather than from the institutional investor's perspective. I use factor analysis to develop the institutional ownership scores, which allows the weights to vary across different measures.

I include nine measures which capture different aspects of institutional ownership. The

[6] Using a summary measure also provides a stronger test, as including multiple correlated measures in a single model would lead to substantial multicollinearity.

data on institutional ownership are quarterly, so I average across quarters to calculate each measure by firm and year, unless indicated otherwise. I start by including the number of institutional owners (*nii*) for each firm. I include the number of blockholders that own at least five percent of a firm's outstanding stock (*block*). I identify activist institutions based on the classifications of Cremers and Nair (2005) and Larcker et al. (2007), and calculate the number of activist institutions with holdings in each firm (*active*). I also measure the percentage of each firm's outstanding stock that is held by activist institutions (*actpct*) and blockholders (*blockpct*). The Herfindahl-Hirschman Index is the sum of the squared ownership stakes of all institutions owning stock in a given firm (*ownhh*). Institutions are classified as long-term investors if they held stock for at least eight continuous quarters, consistent with Bushee (1998), and I include the percentage of each firm's outstanding stock held by long-term investors (*lterpct*). The average ownership stake of an institutional owner in each firm is measured as a percentage (*avgown*). Finally, I include the largest institutional ownership stake (in any quarter) in each firm (*maxhold*). To mitigate the effect of outliers and to reduce skewness, I winsorize each of the nine institutional ownership measures at the 1st and 99th percentiles.

As shown in Table 1, Panel A, the mean (median) firm has 106 (59) institutional owners. The mean (median) firm has 2 (2) blockholders that hold 15% (12%) of outstanding stock, and 5 (4) that are activist owners that hold 1% (1%) of outstanding stock. The largest holding is 9% on average, and only 19% of outstanding shares are held by institutional investors for two years or more. In the last column of Panel A, I show that these variables exhibit substantial variation over time as institutions change their holdings in a given firm (range of 61%–83% annual change, depending on the variable). These ownership characteristics also vary across life cycle stages, as shown in Table 1, Panel B. Each of the specific institutional ownership measures is generally highest for *Mature* firms and lowest for *Introduction* and *Decline* firms, except for average ownership percentage, which would be expected to have the opposite pattern given the potential for more diversified ownership for *Mature* firms. These patterns are presented graphically in Figure 2, Panel A, while Table 2, Panel A provides Pearson correlations for the institutional ownership measures. I find that all of the institutional ownership measures are significantly correlated, and all in a positive direction, with the exception of average ownership (*avgown*).

I include the nine specific institutional ownership measures in a factor analysis to create composite institutional ownership scores for each firm-year in my sample. Based on a review of eigenvalues, scree plots, and the proportion of variance explained, I determined that there was a clear two-factor solution (Tabachnick and Fidell 2013). To maintain the orthogonality of the factors for subsequent analysis and to more easily interpret the factors, I used varimax rotation. The results of the factor analyses, including the (rotated) factor loadings, eigenvalues, uniquenesses, and proportion of variance explained are reported in Table 3.

Based on the factor loadings, I identified which institutional ownership measures were most strongly associated with each factor. I identified these measures based on whether the absolute value of the factor loading was above 0.40. For institutional ownership, the first factor appears to represent concentrated institutional ownership, as the factor is positively related to the number of blockholders (*block*), the percentage of shares held by blockholders (*blockpct*), the Herfindahl-Hirschman Index (*ownhh*), the largest institutional holding (*maxhold*), and the average institutional ownership stake (*avgown*). In contrast, the second factor appears to represent more dispersed, yet more active institutional ownership, as the factor is positively related to the total number of institutional investors (*nii*), the number of active institutional owners (*active*), the proportion of active (*actpct*) and long-term institutional owners (*lterpct*), and negatively related to the average institutional ownership stake (*avgown*). Given the factor loading structure, these factors seem to clearly represent different aspects of institutional ownership, where the first institutional ownership factor represents concentrated institutional ownership (*Concentrated*) and the second factor represents broad institutional ownership (*Broad*).

Pearson correlations between the institutional ownership scores, investment measures, and controls are provided in Table 2, Panel B, which indicate that both capital investments (*CAPX*) and R&D investments (*R&D*) are positively correlated with the institutional ownership scores (*Concentrated* and *Broad*), although the correlations are quite low for *Concentrated*. The average factor scores for *Concentrated* and *Broad* are plotted against life cycle stages in Figure 2, Panel B. The figure shows substantial differences in the institutional ownership scores across life cycle stages. In particular, both *Concentrated* and *Broad* ownership are higher in the *Growth* and *Mature* stages relative to the *Introduction* and *Decline* stages.

3.3. Life cycle

To measure each firm's life cycle stage, I start with Dickinson's (2011) classification. She classifies firms into one of five stages based on the pattern of their operating, investing, and financing cash flows. Figure 1 shows the classification scheme based on the direction of cash flows (whether the cash flow in each category is an inflow (+) or an outflow (–)). Thus, the pattern of a firm's cash flows provides a mapping into a life cycle stage each year. Her classification results in five stages, which are labeled as *Introduction*, *Growth*, *Mature*, *Shake-Out*, and *Decline*.

Dickinson's (2011) classification scheme is a parsimonious and robust approach, and relative to prior life cycle measures (e.g., Anthony and Ramesh 1992), is free from distributional assumptions (i.e., uniformity) and has better explanatory power for future profitability. She also validated her classification scheme using a number of approaches.[7] Subsequent studies have further validated Dickinson's (2011) life cycle classification, and have shown that this classification provides additional explanatory power for accrual-based earnings management (Chang and Li 2016), relative performance evaluation (Drake and Martin 2016), executive compensation (Drake and Martin 2015), and the pricing of cash flows and accruals (Hribar and Yehuda 2015).

One of the drawbacks of using an annual re-classification, however, is that random fluctuations and volatility in cash flows could result in frequent re-classifications. Panel A of Table 4 shows the year-to-year classification of firms and indicates that a large proportion of firms are classified in a different life cycle stage relative to the prior year. Firms should generally follow a long-term trajectory through life cycle stages and it seems reasonable that firms would not move from one life cycle stage to another on a frequent basis.

Thus, I use average three-year cash flows to smooth these fluctuations and to provide a more consistent and stable proxy for firms' life cycle stages. In particular, a smoothed three-year average measure reduces variation due to unusual events and random fluctuations, and increases the stability of the life cycle measure across years. As can be seen in Table 4, Panel B, the life cycle measure using three-year average cash flows produces more consistent classifications, and fewer observations which move to a different life cycle stage in a given year. Based on these comparisons, I use this classification in all empirical tests.[8]

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[7] First, Dickinson (2011) analyzed the relation between cash flows, future performance, and life cycle fundamentals. Her findings indicate that her classification scheme provides a superior alignment of the functional form of firm's profitability than earlier classification schemes. Second, patterns of growth, leverage, size, and age across life cycle stages using this classification scheme are consistent with economic theory.

[8] I find that my results are robust to using one-year cash flows to classify firms into life cycle stages (see Chapter 7.4).

As discussed in my hypothesis development, the *Introduction* and *Decline* stages represent critical transitory periods that are unsustainable in the long-run. Thus, I further examine what happens to firms in these stages, and whether they drop out of my sample or move to another life cycle stage. As shown in Table 4, Panel C, the proportion of firms remaining in the *Introduction* and *Decline* stages is lower than in the *Growth* and *Mature* stages. While 55.2% of *Introduction* firms remain in the same stage in the subsequent year, of the remaining *Introduction* firms, there is a roughly equal number moving out of the *Introduction* stage to the *Growth* stage (12.7%), the *Decline* stage (12.8%), and dropping from the sample (13.3%). For firms in the *Decline* stage, 54.4% remain in the same stage in the subsequent year, and there are slightly more firms moving to the *Introduction* stage (17.7%) than those dropping from the sample (14.9%). In both the *Introduction* and *Decline* stages, there are relatively few firms that move directly into the *Mature* stage (3.4% and 2.0%, respectively).

To further examine survivorship, I look at the reasons why firms drop from the sample. I use delisting data from the CRSP Event database and separately analyze firms that were delisted due to mergers and acquisitions (delisting codes 200–299) and firms that were delisted for cause, either through liquidation (delisting codes 400–499) or an inability to meet listing requirements (e.g., bankruptcy, stock price below an acceptable level, insufficient capital) (delisting codes 500–599) (Chen 2011; Yung et al. 2008; Beaver et al. 2007).[9]

In a similar analysis, Dickinson (2011) found that only 78% of firms in her sample remained in the sample five years in the future. She also found substantially higher (lower) survival rates for *Mature* (*Decline*) firms relative to the pooled sample. Consistent with

[9] Other reasons for delisting include issue exchanges, expirations, or a change in ownership from domestic to foreign. Details on delisting categories are available at http://www.crsp.com/products/documentation/delisting-codes.

Dickinson's (2011) findings, I find that firms in the *Introduction* and *Decline* stages experience the greatest rates of delisting. As shown in Table 4, Panel D, on average, 6.4–6.6% of firms in the *Introduction* and *Decline* stages delist every year for cause, compared to 0.7–1.0% of firms in the *Growth* and *Mature* stages. Thus, the *Growth* and *Mature* stages are the most stable and sustainable, while firms in the *Introduction* and *Decline* stages experience much higher rates of attrition and movements into other life cycle stage. This is consistent with earlier arguments that the *Introduction* and *Decline* stages are the most transitory and represent critical "make-or-break" points in the corporate life cycle.

3.4. Long-term investments and controls

I use two measures of long-term investment: capital investments (i.e., in PPE) and research and development (R&D) investments. The first measure of long-term investment is capital expenditures, which includes items related to property, plant, and equipment, expenditures for capital leases, increases in funds for construction, and other long-term capital expenditures, but excludes expenditures related to acquisitions and discontinued operations (Compustat: *capx*).[10] The second measure of long-term investment is R&D expense (Compustat: *xrd*).[11] While the effectiveness of any given investment is uncertain, firms with greater investments can be expected to yield greater long-term value over time, on average. For my

[10] A challenge with examining capital investments is that it is very difficult to specify *ex ante* an appropriate level of capital investment. Greater investment can be seen as a positive action, in the sense that it enables growth and future performance. On the other hand, greater investment could also be representative of inefficient spending, such as empire building or other forms of over-investment. Even attempting to control for size, industry characteristics, growth opportunities, and profitability is unlikely to provide a measure of the optimal level of capital investment for a given firm. Further, measuring managerial myopia is challenging since researchers are unable to empirically measure the optimal level of investment and the extent to which managers make their investment decisions in light of pressures for short-term results (Stein 1988). As such, similar to R&D investments, I focus instead on the size of investments (inputs) rather than the quality of the investments. In supplemental analyses (see Chapter 6), I attempt to further examine whether the results are driven by firms with a propensity toward over-investment.

[11] While patenting activity may be a better indicator of innovation as it represents an output measure (Fang et al. 2014), I am interested in the extent to which firms are investing in long-term value creation (i.e., an input measure).

empirical analyses, I set all missing values to zero and take the natural log of one plus the investment value.[12] The patterns of long-term investments across life cycle stages are presented graphically in Figure 2, Panel C. As shown in this figure, capital investments are lowest in the *Introduction* and *Decline* stages, while R&D investments do not vary substantially across life cycle stages.

Consistent with prior studies, I include controls related to size, financing, performance, and market-based characteristics which are likely to influence long-term investments. Specifically, I include lagged firm size (natural log of total assets), lagged asset tangibility (ratio of net property, plant, and equipment to total assets), the lagged cash ratio (ratio of cash to total assets), lagged leverage (ratio of long-term debt and debt in current liabilities to average total assets), annual growth in revenue, return on assets (ratio of operating income before depreciation to average total assets), the market-to-book ratio, annual stock returns, annual price volatility (the standard deviation of closing prices over each firm's fiscal year), and annual trading volatility (the average trading volume divided by average shares outstanding). Finally, I include industry fixed effects at the two-digit NAICS level and year fixed effects, and use robust standard errors clustered by firm (Chen et al. 2015; Fang et al. 2014). After calculating the dependent variables and control variables, I winsorize each at the 1st and 99th percentiles to mitigate the effect of outliers. To further address skewness in the distributions of the dependent variables, I use a log transformation for both capital and R&D investments.

[12] I use the natural log of one plus long-term investments as my dependent variable, rather than scaling by total assets or some other measure of firm size. Instead, I control for lagged firm size (natural log of total assets) as an additional predictor in my models. This approach is strictly more general, as it allows the model to determine the appropriate coefficient, rather than imposing a pre-specified relationship between long-term investments and firm size.

CHAPTER 4: EMPIRICAL TESTS AND RESULTS

4.1. Baseline models

To provide baseline results of the association between institutional ownership and long-term investments, I regress a measure of long-term investment (where *LTI* is either *CAPX* or *R&D*) on the institutional ownership scores (*Concentrated* and *Broad*) and a set of controls, including life cycle stage indicators. If institutional ownership affects managerial myopia, then I expect a short-term reaction, which would be reflected in a contemporaneous annual relation between institutional ownership and long-term investments. Thus, the baseline model for the effect of institutional ownership on long-term investments (*LTI*) for firm *i* at time *t* is:

$$LTI_{it} = \beta_0 + \beta_1 Concentrated_{it} + \beta_2 Broad_{it} + Controls_{it} + e_{it}, \quad (1)$$

where the controls are as described above. I also include year, industry, and life cycle fixed effects, and use robust standard errors clustered by firm. As pointed out by Larcker et al. (2007), this empirical specification assumes that governance does not have an indirect effect on the dependent variables through the other control variables, and thus provides conservative estimates for the effect of governance. I also examine this model using changes in institutional ownership scores and changes in long-term investments from *t*–1 to *t*.

Table 5 presents baseline results for the effects of institutional ownership on long-term investments with life cycle indicators. The first two columns use institutional ownership scores, with *CAPX* and *R&D* as the dependent variables, respectively. The second two columns use *changes* in the institutional ownership scores, with *changes* in *CAPX* and *R&D* as the dependent variables, respectively. The results indicate that both *Concentrated* and *changes* in *Concentrated* ownership are negatively associated with *CAPX*, but are not significantly related to *R&D*. In contrast, the results consistently indicate that *Broad* (and *changes* in *Broad*) ownership are positively associated with both *CAPX* and *R&D* (and *changes* in *CAPX* and *R&D*). I also find in all specifications that the absolute magnitude of the effect of *Broad* is several times larger than the effect of *Concentrated* (both *Concentrated* and *Broad* are in the same metric), and the difference is significant in all specifications ($p < 0.01$).

With respect to the control variables, the effects are generally consistent with expectations. Larger firms, firms with a greater proportion of PPE, firms with higher growth in revenues, greater profitability, and higher market-to-book ratios generally have greater capital investments, while firms with higher leverage have lower capital investments. I also find that firms with more cash have lower capital investments, which may be related to the free cash flow problem described earlier. Larger firms, and firms with more cash and higher market-to-book ratios generally have greater R&D investments, while firms with a greater proportion of PPE and higher leverage generally have lower R&D investments.

4.2. Hypothesis tests

To test my hypothesis, I analyze Model (1) separately for each life cycle stage, which allows the effects of institutional ownership on long-term investments to vary by life cycle stage. This specification allows the effects of the controls to vary with each life cycle stage. I also analyze Model (1) by life cycle stage using *changes* in institutional ownership scores and *changes* in long-term investments from t–1 to t. These specifications allow for formal tests of my hypothesis, in which the effects of institutional ownership on long-term investments can be compared across life cycle stages. Table 6 presents the results of the hypothesis tests, where the values presented in the table represent the coefficients for each institutional ownership score. Control variables, industry fixed effects, and year fixed effects are included in these specifications, but are excluded from the table for ease of presentation.

The results indicate that the effects of institutional ownership (both *Concentrated* and *Broad*) on long-term investments (both *CAPX* and *R&D*) are generally more positive in the *Introduction* and *Decline* (transitory) stages relative to the *Growth* and *Mature* (sustainable) stages. Panel B looks at the effects of *changes* in the institutional ownership scores on *changes* in long-term investments. The same pattern emerges in which the effects of *changes* in institutional ownership are more positive in the transitory stages relative to the sustainable stages (although some of the effects of changes in *Concentrated* ownership are not statistically significant). I also find in all life cycle stages in which the effects are significant, that the magnitude of the effect of *Broad* institutional ownership is significantly more positive than that of *Concentrated* institutional ownership for both *CAPX* and *R&D*.

Table 6, Panels C and D present comparisons of effects between life cycle stages. The values in this panel represent the *differences* in the effects for each institutional ownership score across life cycle stages, and the statistical significance of the differences. The tests are one-sided, with a predicted positive difference between transitory (*Introduction* and *Decline*) stages and sustainable (*Growth* and *Mature*) stages (representing stronger effects in more transitory stages). For both *Concentrated* and *Broad* ownership, I find that the effects on *CAPX* (and changes in *CAPX*) are significantly more positive in transitory stages relative to sustainable stages. I also find that the effects of *Concentrated* ownership on *R&D*, and changes in *Broad* ownership on changes in *R&D*, are significantly more positive in transitory stages relative to sustainable stages. I do not find significant results in the other comparisons for *R&D*, but all the differences are positive. Thus, I find strong support for H1 with respect to capital investments, and moderate support with respect to R&D investments. That is, I find that the effect of institutional ownership on long-term investment is more positive for firms in transitory life cycle stages.

4.3. Changes in life cycle stage

To further examine how the effects of institutional ownership vary with the corporate life cycle, I partition the sample based on whether a firm is in the same life cycle stage as in the prior year. This provides one set of firm-years in which the firm's life cycle stage classification did not change between years (*Stable*) and another set of firm-years in which the firm shifted into a different life cycle stage (*Transition*) (Drake and Martin 2016; Chang and Li 2016). I then test Model (1) separately for *Stable* and *Transition* firm-years to determine whether the effects of institutional ownership are more pronounced for firms when they transition to a new life cycle stage. I also analyze Model (1) by changes in life cycle stage using *changes* in institutional ownership scores from t–1 to t and *changes* in long-term investments from t–1 to t.

Table 7 presents the results of these tests where control variables and life cycle, industry, and year fixed effects are included in the estimation, but are excluded from the table for ease of presentation. The results are generally consistent with those presented in Table 5. I find that *Concentrated* (*Broad*) institutional ownership is negatively (positively) related to *CAPX* for both *Stable* and *Transition* firms. *Concentrated* ownership is positively related to *R&D* for *Stable* firms, while *Broad* ownership is positively related to *R&D* for both *Stable* and *Transition* firms. The results are similar for the effect of changes in institutional ownership on changes in long-term investments (Panel B).

CHAPTER 5: INDEX THRESHOLD TESTS

While the previous tests show the relation between institutional ownership and long-term investments, the direction of causality is more difficult to establish due to the potentially endogenous nature of the relation. In particular, while institutional investors may either intentionally or unintentionally influence firms' investment activity, it is also possible that institutional investors invest in firms with particular investment profiles.

To address this concern, I use the annual reconstitution of the Russell indexes as an identification strategy, in which I examine firms near the cutoff between the Russell 1000 and the Russell 2000 indexes.[13] Firms are weighted within these indexes based on their relative market capitalizations, so firms at the bottom of the Russell 1000 index have substantially smaller index weights than firms at the top of the Russell 2000 index. As both index funds and actively managed funds often benchmark against these indexes, firms at the top of the Russell 2000 index have discontinuously higher institutional ownership relative to firms at the bottom of the Russell 1000 index (Crane et al. 2016; Chang et al. 2015). When the indexes are reconstituted annually (i.e., firms are re-classified to the indexes), firms that are re-classified from one index to the other experience an exogenous shock to institutional ownership that is unrelated to firm characteristics, including investment levels. Firms are reclassified each year at the end of June, based on their market capitalizations at the end of May, where Russell uses a proprietary calculation for firms' market capitalizations which accounts for float adjustments and

[13] The Russell indexes offer a better research setting than the S&P 500 index for important reasons. First, the Russell indexes are based only on float-adjusted market capitalization values, while the S&P 500 index is determined by the S&P Index Committee, and inclusion is based on a firm's liquidity, ownership, profitability, and importance within its industry. Second, changes are more frequent in the Russell indexes relative to the S&P 500, offering greater power for analysis. Third, the Russell indexes are reconstituted on an annual basis, while changes to the S&P 500 index are made irregularly (Chen et al. 2006; Biktimirov et al. 2004).

multiple share classes (FTSE Russell 2016).

Firms on either side of the cutoff between the two indexes should be fundamentally similar, and it would be difficult for a firm to manage its market capitalization and float to achieve classification in one index versus the other. Further, since the classifications are based on relative rankings, re-classifications also depend on the market capitalization of other firms, making it even more implausible that firms would be able to influence their classification. Given firms' inability to precisely control their classification, changes in index classification represent an exogenous shock to institutional ownership, and such changes should be unrelated to firm characteristics, including investment levels. However, this identification strategy only holds within a relatively narrow region around the cutoff between the two indexes. Thus, similar to prior studies, I focus on relatively narrow bins of firms on either side of the threshold that could plausibly move between the indexes (Appel et al. 2016; Crane et al. 2016; Edmans 2014).

I obtained the annual listing of firms included in the Russell 1000 and Russell 2000 indexes from FTSE Russell, along with the index weights and the float-adjusted market capitalization values for each firm. I used the lists from 1997–2006, since Russell instituted a banding policy in 2007 to make the composition of the indexes more stable across years. Under the banding policy, firms are only reclassified if their change in market capitalization is large enough to move outside of a "band" around the cutoff, rather than a simple change in rank ordering.

Consistent with prior literature (Crane et al. 2016; Appel et al. 2016; Boone and White 2015), I use an instrumental variable approach using index inclusion as an instrument for institutional ownership. Within a narrow range of firms, this approach allows me to test for a causal link between institutional ownership and firms' long-term investments. In the first-stage estimation, I use a sharp regression discontinuity design in which I examine institutional ownership as a function of index inclusion. To measure the effect of inclusion in the Russell 2000 index, I include an indicator variable equal to one for firms included in the Russell 2000 index (*R2000*). Since institutional ownership should be higher for firms at the top of the Russell 2000 index relative to firms at the bottom of the Russell 1000 index, I expect a positive coefficient for *R2000*. I also calculate the rank distance of each firm from the Russell 1000/2000 inclusion threshold (*Distance*) as $rank_{it}$–1,000. I control for *Distance* and for the interaction between *R2000* and *Distance*. These controls address the mechanical relation between market capitalization and index inclusion. Finally, I include year fixed effects to control for any differences across years. I run this model separately for each institutional ownership score (*Concentrated* and *Broad*), and for three different bin widths around the index threshold: 150, 200, and 250 firms on either side of the threshold. Thus, the first-stage model for firm *i* at time *t* is:

$$Score_{it} = \beta_0 + \beta_1 R2000_{it} + \beta_2 Distance_{it} + \beta_3 R2000_{it} \times Distance_{it} + Year_t + e_{it}, \qquad (2)$$

where *Score* is either the *Concentrated* or *Broad* institutional ownership score. I then calculate the predicted scores to be used as instrumented institutional ownership in the second-stage estimation.

Table 8, Panel A reports descriptive statistics by Russell index (1000 or 2000) and by bin width (150, 200, or 250 firms). Across all three bin widths, *CAPX* is significantly higher in firms in the Russell 1000 index, consistent with these firms being larger, but *R&D* is significantly higher in firms in the Russell 2000 index. There are some differences in the control variables for firms on either side of the threshold (e.g., size, cash ratio, revenue growth, and trading volatility), supporting the inclusion of these variables in the second-stage model. Table 8, Panel B reports the number of firms classified in each life cycle stage. Similar to the overall sample, the majority of firms are classified in the *Growth* and *Mature* stages, but all life cycle stages are represented in each of the bin widths.

The results from estimating the first-stage model [Model (2)] are presented in Table 8, Panel C. I find that the effect of being included in the Russell 2000 index (the coefficient on *R2000*) is positive and significant for *Broad* under all three bin widths, but is not significant for *Concentrated* under any of the bin widths. Thus, Russell index inclusion appears to be a relevant instrument for *Broad* ownership, but not for *Concentrated* ownership, so I do not estimate the second-stage model for *Concentrated* ownership. Since owners with larger ownership stakes (i.e., *Concentrated* ownership) are less likely to change their holdings in response to index reconstitutions, this is not surprising.

Turning to the second-stage model, I use the instrumented *Broad* ownership scores to estimate the effect on firms' long-term investments. As shown in Table 8, Panel B, while all life cycle stages are represented in each bin width, there are relatively few observations for some life cycle stages. Thus, rather than estimate the effects of institutional ownership separately for each life cycle stage, I use life cycle indicators and interact these indicators with the instrumented institutional ownership scores to identify whether the effects vary across life cycle stages. Specifically, I regress long-term investments (where *LTI* is either *CAPX* or *R&D*) on the instrumented institutional ownership scores, life cycle indicators, and interactions between the scores and life cycle indicators. I include the same set of controls as used in the main analyses above. I continue to use year fixed effects, but drop the industry fixed effects due to reduced sample size. Thus, the second-stage model for firm *i* at time *t* is:

$$LTI_{it} = \beta_0 + \beta_1 Broad_{it} + \sum_{j=2}^{5} \beta_j LC_{it} + \sum_{l=6}^{9} \beta_l Broad_{it} \times LC_{it} + Controls_{it} + e_{it}, \qquad (3)$$

where *LC* are the life cycle stage indicators (one indicator is dropped as the base level, so there are only four indicators in the equation above).

The results from estimating the second-stage model [Model (3)] are presented in Table 8, Panel D. For ease of interpretation, the values presented in Panel D are the marginal effects of institutional ownership (*Concentrated* or *Broad*) by life cycle stage. Control variables, life cycle fixed effects, and year fixed effects are included in the second-stage model, but are excluded from the table for ease of presentation. I find that *Broad* ownership is generally not significantly related to *CAPX*. In contrast, *Broad* ownership is positively and significantly related to *R&D* in the *Introduction*, *Growth*, and *Mature* stages under all bin widths, and for all life cycle stages in the 250 firm bin width. As shown in Panel B, there are very few firms in the *Decline* stage, so it is not surprising that I do not find an effect except in the 250 firm bin width. Thus, while I do not find an effect with respect to *CAPX*, I find evidence in support of a causal relation between *Broad* institutional ownership and long-term investments. I also continue to find that the effects are more positive for firms in the *Introduction* and *Decline* stages, but the differences in effect sizes between life cycle stages are generally not significant.

CHAPTER 6: INVESTMENT EFFICIENCY TESTS

One of the fundamental issues in corporate finance is the efficiency of capital allocation across firms and within firms. In the absence of financing frictions, information asymmetry, agency conflicts, and private managerial objectives, firms should be able to achieve first-best investment levels. Since these impediments are likely to be present, however, most firms deviate from the first-best level by either under-investing or over-investing. Managers' private objectives can involve over-investment (e.g., empire-building), but can also involve under-investment, particularly related to reputational and career concerns (e.g., short-termism). Other private objectives or tendencies provide ambiguous predictions regarding over- vs. under-investment. Herding behavior, in which managers follow others' actions, can lead to deviations from optimal investment levels in either direction. Preferences for "the quiet life" (Bertrand and Mullainathan 2003) can also lead to either under- or over-investment. In some cases, a "quiet life" preference may lead to inertia and the continuation of existing investments or an unwillingness to terminate investments. In other cases, such inertia may inhibit managers from making additional investments to pursue new business or growth. Thus, the existence of private objectives and other agency problems can lead to either under- or over-investment (Stein 2003), which makes it difficult to empirically identify firms' investment opportunities and optimal investment levels (Erickson and Whited 2006). Distortions in investment efficiency can also arise from contracting. For instance, Laux (2012) models how managerial myopia can arise endogenously from boards attempting to balance the provision of incentives for effort and incentives to induce efficient investment. Given these limitations, measuring the level of a firm's under- or over-investment is very challenging.

Thus, finding a positive effect of institutional ownership on long-term investments could either provide evidence of a reduction in managerial myopia and an increase in investment efficiency (the *myopia* hypothesis), or could represent over-investment (the *efficiency* hypothesis) (Edmans et al. 2016). Given the differences in implications, it is important to attempt to distinguish between these competing hypotheses. I examine the issue of investment efficiency to identify whether institutional investors fulfill a positive governance role or actually increase pressure on managers, resulting in inefficient investment. In general, I find that my results are not indicative of over-investment.

First, R&D investments are less likely to reflect over-investment relative to capital investments (Ramalingeogowda et al. 2013). Hall and Lerner (2010) further show that firms tend to under-invest in R&D. R&D investments are also generally value-increasing, while capital investments can be value-decreasing. For instance, Eberhart et al. (2004) show that firms experience significantly positive long-term abnormal operating performance subsequent to increases in R&D. Thus, my finding of a positive effect of institutional ownership on firms' R&D investments is unlikely to be driven by over-investment. As described by Ramalingeogowda et al. (2013), such results are consistent with an under-investment explanation (governance promoting a more efficient investment level) but inconsistent with an over-investment explanation.

Second, I test investment efficiency using firms' cash and debt levels, as one of the strongest empirical regularities with respect to investments is that firms with more cash and lower debt tend to invest more, and are potentially more likely to over-invest. While prior studies have not provided strong evidence on why this is the case, researchers have attempted to use these findings to measure firms' under- and over-investment. Biddle et al. (2009) create a measure which attempts to assess firms' propensity toward over-investment (under-investment) based on high (low) cash balances and low (high) leverage.[14]

To consider the potential for under- and over-investment, I calculate each firm's propensity toward over-investment using Biddle et al.'s (2009) approach. For each year and industry (using the Fama-French 12-industry classification), I rank firms into deciles based on (1) their cash balances (or cash ratio) and (2) their leverage. Prior to creating the deciles, I multiply leverage by –1 so that both sets of deciles are increasing in the propensity toward over-investment. I then scale both sets of deciles to range between 0 and 1, and take the average of the two scaled measures (*OverFirm*). Based on theory and prior empirical findings, firms with higher values on this measure should be more likely to over-invest.[15]

I then analyze Model (1) including *OverFirm* as a proxy for a firm's propensity toward over-investment, and interactions between *OverFirm* and both *Concentrated* and *Broad*. The first (last) two columns in Table 9 use a firm's cash balance (cash ratio) in calculating *OverFirm*. When using a firm's cash balance, the results continue to provide evidence of a negative (positive) main effect of *Concentrated* (*Broad*) on *CAPX*, and a positive effect of both *Concentrated* and *Broad* on *R&D*. The main effect on *OverFirm* is positive and significant for both *CAPX* and *R&D*, consistent with this measure capturing higher levels of investment (and

[14] Biddle et al. (2009) use this measure to examine whether moral hazard and adverse selection hamper efficient investment, and whether financial reporting quality affects this relation. In particular, they measure the relation between financial reporting quality and investment by regressing investment on a financial reporting quality measure, an over-investment measure, and their interaction. They find a conditional negative (positive) relation between financial reporting quality and investment for firms more disposed to over-investment (under-investment). This approach has also been used by Cheng et al. (2013) to examine the investment behavior of firms before and after the disclosure of an internal control weakness, and by Lara et al. (2016) to examine the effect of conservatism on investment efficiency. Biddle et al.'s (2009) findings with respect to governance suggest that institutional ownership is positively (negatively) related to investment regardless of a firm's propensity toward over-investment. They also find that institutional ownership is negatively related to under-investment and positively related to over-investment, where they measure institutional ownership as the percentage of institutional investors in the firm.
[15] Using the Fama-French 12-industry classification provides between 47 and 715 firms for calculating deciles for each industry-year, after excluding the Utilities and Finance industries.

potentially capturing over-investment). The interaction between *OverFirm* and *Concentrated* (*Broad*) is significant and negative (positive) for *CAPX*, but is not statistically different from zero for *R&D*. Thus, this provides some evidence that *Concentrated* (*Broad*) institutional ownership may decrease (increase) over-investment in *CAPX*, but this relation does not hold with respect to *R&D*. When the cash ratio is used instead of the cash balance, however, the interaction between *OverFirm* and *Concentrated* is only significantly positive for *R&D*, and the interaction between *OverFirm* and *Broad* is actually negative for *CAPX*. Further, the main effect of *OverFirm* is only positive for *R&D*. Given these conflicting results, there does not appear to be strong evidence that the effects I document are indicative of over-investment.

Third, I also consider firms' changes in dividends. Brav et al. (2005) provide survey evidence that managers are willing to forgo valuable investment opportunities to avoid reducing dividends, and Daniel et al. (2010) provide archival evidence consistent with these findings. However, there is an asymmetry in managers' behavior regarding dividend changes. While managers are willing to forgo valuable investments to avoid reducing dividends, they are not as willing to forgo valuable investments to increase dividends. As a result, firms that decrease (increase) dividends are more (less) likely to be facing financial constraints and thus less susceptible to over-investment (Brav et al. 2005; Ramalingeogowda et al. 2013). As expected, I find firms that decrease dividends have lower levels of long-term investments, on average. Interestingly, the effect of *Broad* ownership on capital investments is actually more positive for firms that decrease dividends, and this is most pronounced for firms in the *Introduction* and *Decline* stages. I do find that, on average, the effect of *Concentrated* ownership on R&D investments is lower for firms that decrease dividends, and similarly for *Broad* ownership in the *Decline* stage. Thus, while there is some limited evidence from this test in support of the efficiency hypothesis, the results appear to be more in line with the myopia hypothesis. Based on the evidence from these tests, my results do not appear to be driven by over-investment.

CHAPTER 7: SENSITIVITY TESTS

7.1. Quantile regression

I also consider how the level of long-term investment may influence my findings. In particular, it is possible that the observed relation between institutional ownership and long-term investments at the mean is driven by large effects in one part of the distribution. As such, there may not be an effect in certain parts of the distribution, or there may even be opposing effects at different ends of the distribution. Thus, rather than focus solely on the conditional mean of the dependent variables, I consider how the effects of institutional ownership vary across the distribution of long-term investments. To address this, I use quantile regression[16], which allows for an examination of the relation between institutional ownership and long-term investments across the investment distribution. I run quantile regressions by life cycle stage at each decile of *CAPX* and *R&D*. The results are presented in Table 10, and the patterns of the institutional ownership effects by long-term investment decile and life cycle stage are presented in Figure 4.

I find that the effect of *Concentrated* institutional ownership on *CAPX* generally decreases with the size of *CAPX*, except in the *Mature* stage. Further, the effect size is positive or not significantly different from zero in the *Introduction* and *Decline* stages, but negative or not significantly different from zero in the *Growth* and *Mature* stages. However, there is not a consistent pattern for the effects of *Broad* ownership on *CAPX* across deciles of *CAPX*. For both *Concentrated* and *Broad* ownership, the effects on *CAPX* are larger in the *Introduction* and *Decline* stages relative to the *Growth* and *Mature* stages.

[16] Quantile regression estimates conditional quantiles of the dependent variable as linear functions of the independent variables. I use robust standard errors with kernel density estimation using the Epanechnikov kernel function for all quantile regression models.

For *R&D*, there is a large density of firms with zero *R&D*, thus the lower deciles are generally not significant (the 40th percentile of the *R&D* distribution is still zero). The effect of *Concentrated* institutional ownership on *R&D* generally decreases with the size of *R&D* beyond the 40th percentile. The effect of *Broad* institutional ownership on *R&D* follows a concave pattern across all life cycle stages, and generally starts to decline between the 50th and 70th percentiles. Thus, across life cycle stages, I find that the effect of institutional ownership in promoting long-term investments is generally higher at lower levels of investment. This may be particularly important as firms with lower levels of investment may benefit the most from increasing their investment levels to expand and grow their operations.

7.2. Long-term effects

For my hypothesis tests (Chapter 4), I examine the relation between the institutional ownership scores (*changes* in institutional ownership scores) and contemporaneous long-term investments (*changes* in long-term investments), under the assumption that there should be an effect in the short-run. To the extent that there are long-term effects of institutional ownership on investment activity, I re-run the models using one-year ahead investments in the relevant specifications. The results are similar and continue to support earlier inferences. I do find that some of the significance levels decrease, and the effect of changes in *Concentrated* ownership on changes in one-year ahead *CAPX* for *Introduction* firms is negative rather than positive.

7.3. Institutional ownership classification using Bushee's (2001) measures

I also consider Bushee's (1998, 2001) classification of institutional investors (Bushee 2001; Bushee and Noe 2000). Based on each institution's past investment behavior (portfolio turnover, diversification, and investment horizon), Bushee uses a two-stage process involving factor analysis and cluster analysis to classify each institution as either a dedicated, quasi-indexer, or transient investor. In general, quasi-indexers are diversified with low turnover and a longer-term horizon, transient investors are diversified with high turnover and a shorter-term horizon, and dedicated investors are less diversified, with low turnover and a long-term horizon (Bushee 1998, 2001; Boone and White 2015). This approach results in classification based on characteristics of the *investor's* portfolio. Importantly, I measure institutional ownership from the *firm's* perspective, rather than from the institutional investor's perspective. Given that managers are influenced by the set of owners in their specific firm, my approach should provide a more direct measure with respect to myopia and investment behavior.

The institutional ownership scores I develop also differ from Bushee's (1998, 2001) measures in terms of how the measures are constructed. In particular, the measures I develop (*Concentrated* and *Broad*) are orthogonal by construction. In contrast, *Dedicated*, *Quasi-Indexer*, and *Transient* are all positively correlated (ρ from 0.27 to 0.60 in my sample). In terms of the association between the sets of institutional ownership measures, *Concentrated* (*Broad*) is correlated 0.58, 0.52, and 0.35 (0.21, 0.58, and 0.39) with *Dedicated*, *Quasi-Indexer*, and *Transient*, respectively (all $p < 0.01$).

I re-run the relevant analyses above using Bushee's institutional investor measures instead of the *Concentrated* and *Broad* measures I develop.[17] I find that *Quasi-Indexer* ownership is negatively related to *CAPX*, but none of the other effects are significant for either the levels or changes specifications. I find that changes in both *Quasi-Indexer* and *Dedicated*

[17] I run these analyses over the same period (1997–2014) for comparative purposes. For each of the three institutional classifications I compute the total fraction of shares held in each firm, and then take the average across quarters to obtain a mean annual fraction. I use Bushee's permanent classifications (rather than the annual classifications), which assign the same classification to a fund manager across years based on the modal classification for each fund manager. Using the permanent classification provides a more consistent classification across time. Further, due to the requirement of at least two years of data for a fund, the permanent classification provides a larger sample size by providing a classification for the first two years. The institutional investor classifications and additional details are provided by Brian Bushee on his website (http://acct.wharton.upenn.edu/faculty/bushee/IIclass.html).

ownership are positively related to both changes in *CAPX* and *R&D*. I also find that all three types of investors are positively related to both *CAPX* and *R&D* in the *Introduction* stage, but the effects are generally not significant in the other life cycle stages. As described above, the differences in the construction of these measures are likely the primary drivers for the observed differences in results. However, I continue to find a strong effect of institutional ownership on long-term investments for *Introduction* firms, consistent with my primary results.

7.4. Life cycle classification using one-year cash flow measures

In my main analyses, I use average three-year cash flows to classify firms into life cycle stages. To examine the sensitivity of my results to this design choice, I also re-run my analyses using life cycle stage classifications based on one-year cash flows. I find that the effect of *Concentrated* ownership on *CAPX* is not significant in the *Introduction* and *Decline* stages, but otherwise, the results are qualitatively unchanged.

7.5. Life cycle classification using the DeAngelo et al. (2006) measure

DeAngelo et al. (2006) use an alternative approach to measuring a firm's life cycle. They compute the ratio of retained earnings to total assets (or total equity). This measure attempts to capture the extent to which the firm is self-financing or using external capital, and thus provides an alternate measure of a firm's maturity. DeAngelo et al. (2006) point out that this measure captures the source of a firm's cash balances, whether through internal or external capital. Lower values of the ratio represent a greater need for external capital, whereas higher values represent greater internal financing availability.[18]

While there is not a clear mapping between the DeAngelo et al. (2006) and Dickinson (2011) measures, firms with low values of the *RE ratio* likely represent *Introduction* firms, while

[18] DeAngelo et al. (2006) use this measure to examine firms' dividend policies across the corporate life cycle. This measure has also been used in other studies (e.g., Faff et al. 2016; O'Conner and Byrne 2015).

firms with high values likely represent *Mature* firms.[19] Thus, I would expect to find that the effects of institutional ownership decreases as the *RE ratio* increases. My results indicate that as the *RE ratio* increases, the effects of both *Concentrated* and *Broad* ownership increase (decrease) for *CAPX* (changes in *CAPX*). For *R&D*, the effects of both *Concentrated* and *Broad* ownership decrease with the *RE ratio*, and the effects of *Broad* ownership on changes in *R&D* also decrease. The results are similar when using the ratio of earned equity to total equity. Thus, I find mixed evidence with respect to *CAPX*, but the results for *R&D* are consistent with my earlier findings.

7.6. Life cycle classification using the Anthony and Ramesh (1992) measure

Anthony and Ramesh (1992) also use an alternative approach to measuring a firm's life cycle. To calculate a firm's life cycle stage, they use three inputs: annual dividend as a percentage of income, percent sales growth, and firm age. They rank firms each year on these three measures and create terciles, which results in a score of 1, 2, or 3 (higher values represent later life cycle stages). They then sum the scores and use the summed values to create approximately equal life cycle groups, which they label as *Growth*, *Growth/Mature*, *Mature*, *Mature/Stagnant*, and *Stagnant*.

Using this alternative life cycle measure for the baseline model (Model (1)), I find that the effect of life cycle stage on long-term investments decreases monotonically from the *Growth* stage to the *Stagnant* stage. Interestingly, the effect of *Concentrated* ownership on capital expenditures is negative and significant in all life cycle stages, while the effect of *Broad* ownership is positive and significant (except in the *Stagnant* stage). For R&D investments, the effect of *Concentrated* ownership is not significant for any life cycle stages, while the effect of

[19] It is not clear what the value of a firm's *RE ratio* would be in the *Decline* stage.

Broad ownership is positive and significant for all stages. For both types of long-term investments, the results do not indicate that the effects are more positive in the *Growth* (earliest) and *Stagnant* (latest) stages, but I continue to find that the effect of *Broad* ownership is more positive than *Concentrated* ownership in each life cycle stage.

As noted above, due to clear differences in the construction of the different life cycle measures, it is not surprising that the results differ in this case. First, while age may be related to a firm's life cycle stages, there are many exceptions which prevent firm age from being a strong predictor of a firm's life cycle stage. Second, using an approximately uniform distribution to assign firms to life cycle stages results in a distribution which is not consistent with economic theory. Finally, this classification approach is based purely on a ranking of firms, which fails to capture underlying fundamentals relating to life cycle classification, and may result in highly unusual distributions of life cycle stages by industry.

7.7. Additional governance controls

I also examine whether my results are robust to the inclusion of controls for CEO and board characteristics. I obtain data on CEO characteristics from Execucomp and data on board characteristics from ISS Directors. Data is available from both datasets for the full sample period 1997–2014, but data on stock and option awards (from Execucomp) is only fully available after 2006. This results in a sub-sample of firm-years with available Execucomp data from 2007–2014 (n = 9,060) and another sub-sample of firm-years with available ISS Directors data from 1997–2014 (n = 16,542). It is important to note, however, that due to data availability, the two sub-samples (matched Execucomp data and matched ISS Directors data) are smaller and very different than the full sample. In fact, all variables from the original models are significantly different between the original sample and the two sub-samples ($p < 0.01$), except for *Stock return* in the Execucomp sub-sample. For both sub-samples, the firms with data on CEO and board characteristics are significantly larger, with significantly higher capital and R&D investments and *Concentrated* and *Broad* ownership relative to the unmatched samples. Further, there are substantially fewer firms in the *Introduction* and *Decline* stages in the sub-samples, thus reducing the power of these sensitivity tests.

Given the differences in the sub-samples due to data restrictions, I first re-run the original models on the reduced samples and then add the additional controls. For CEO-related controls, I include total compensation, stock awards, and option awards. For board-related controls, I include the percentage of independent board members and an indicator variable for whether the CEO is also the chair of the board. Similar to the Russell indexing tests, given the low density of firms in the *Introduction* and *Decline* stages, I use life cycle indicators and interact these indicators with the institutional ownership scores to identify whether the effects vary across life cycle stages. For (1) the reduced sample with CEO data, (2) the reduced sample with board data, and (3) the reduced sample with both CEO and board data, the results are unchanged when adding the additional governance controls.

When comparing my full sample results (i.e., the sample which is not restricted to having available CEO and board data) to the results for the sub-samples with CEO and board data, I find differences in results. In particular, the effects of institutional ownership are no longer more positive in transitory life cycle stages in the sub-samples. When running the models on the remaining sample (i.e., the sample without available CEO and board data), I find the effect of institutional ownership on R&D investments is more positive in transitory life cycle stages. The results are opposite, however, for capital investments, as the effect of institutional ownership is more positive in the sustainable stages. Thus, my results appear to be sensitive to the sample of firms included in the analyses.

CHAPTER 8: CONCLUSION

Motivated by concerns about managerial myopia and the long-term implications of reductions in long-term investments, I consider how governance can reduce myopia and encourage long-term investment, and how this varies across the corporate life cycle. I focus on governance provided by institutional investors, as owners are fundamental drivers of governance in firms. Given their large ownership stakes, their voting and activism activities, and their threat of exit, institutional investors can exert influence on managers' decisions, including long-term investment decisions. Further, as sophisticated investors capable of identifying long-term value, institutional investors can promote long-term value creation by insulating managers from negative short-term earnings and stock price effects arising from long-term investments.

Specifically, I examine how the effect of institutional ownership on firms' long-term investments varies across the corporate life cycle. At different stages of their life cycle, firms face different investment opportunities, agency costs, and governance challenges. In particular, certain stages in the corporate life cycle are transitory, representing critical "make or break" points. Firms in these stages may be hesitant to make appropriate long-term investments, but failure to make necessary investments can impair a firm's ability to move into a more sustainable life cycle stage, thus inhibiting long-term value and growth. Institutional investors are well positioned to address this challenge by providing managers the flexibility they need to pursue long-term value creation in these transitory stages. Thus, I predict that institutional investors encourage greater long-term investments, and this effect is most pronounced among firms in transitory life cycle stages.

To conduct my analyses, I create institutional ownership scores using data reduction techniques that allow me to differentiate between different types of institutional investors from the firm's perspective. Using these scores, I examine how the effect of institutional ownership on long-term investments varies across the corporate life cycle. My results indicate that having a smaller number of institutional investors with relatively large ownership stakes (i.e., concentrated institutional ownership) is negatively associated with capital investments, while having a larger number of institutional investors with relatively small ownership stakes (i.e., broad institutional ownership) is positively associated with both capital and R&D investments. Consistent with my prediction, I find that the effects of both concentrated and broad institutional ownership on capital and R&D investments are more positive in transitory life cycle stages relative to sustainable life cycle stages. These results indicate that life cycle patterns explain important variation in the relation between institutional ownership and firms' long-term investments.

Additional tests using the Russell index thresholds provide evidence suggestive of a causal relation between broad institutional ownership and R&D investments, and the pattern of results across life cycle stages continues to support my prediction. I also find that my results are not driven by over-investment. My results are also robust to using one-year ahead investments, alternative institutional investor measures, and alternative life cycle classification schemes.

This study provides a deeper understanding of the nature of governance and the effects that governance has on firm outcomes. In particular, I show how the effects of institutional ownership vary across the corporate life cycle, reflecting differences in firms' characteristics and needs at different stages of their life cycles. Using innovative measure of institutional ownership, I also show that the concentration of institutional ownership matters and leads to differences in firms' investment behavior across life cycle stages. Specifically, I find that broad institutional ownership fulfils a positive governance role by promoting efficient investment while concentrated institutional ownership may actually lead to inefficient reductions in firms' long-term investments. Finally, I contribute to the emerging corporate life cycle literature by enhancing our understanding of how a firm's life cycle stage can yield valuable insights into patterns of governance effects and firms' investment behavior.

APPENDICES

APPENDIX A

FIGURES

Figure 1: Life Cycle Stage Classifications

	Introduction	Growth	Mature	Shake-Out			Decline	
Operating	–	+	+	–	+	+	–	–
Investing	–	–	–	–	+	+	+	+
Financing	+	+	–	–	+	–	+	–

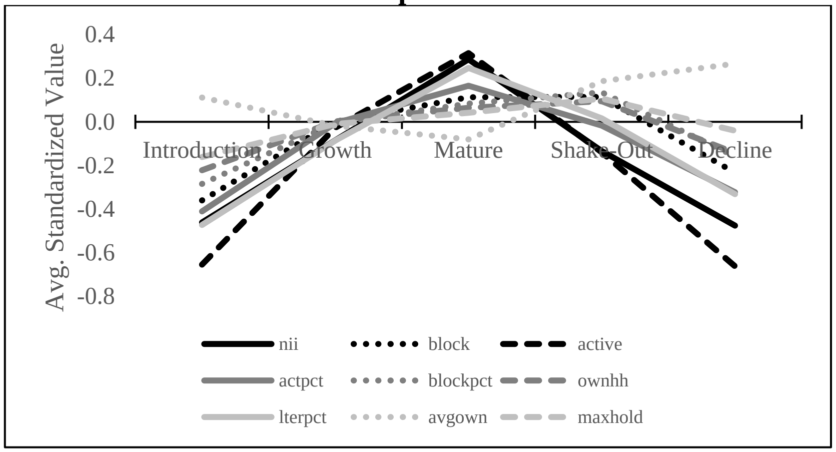
	Introduction	Growth	Mature	Shake-Out			Decline	
Count	4,827	14,997	17,292	282	201	2,243	1,520	750
Percent	11.5%	35.6%	41.1%	0.7%	0.5%	5.3%	3.6%	1.8%

	Introduction	Growth	Mature	Shake-Out	Decline
Count	4,827	14,997	17,292	2,726	2,270
Percent	11.5%	35.6%	41.1%	6.5%	5.4%

Dickinson's (2011) classification is based on the direction of cash flows, whether the cash flow in each category is an inflow (+) or an outflow (–). The values in the lower part of the figure represent the number and percentage of firm-years by life cycle stage in my sample.

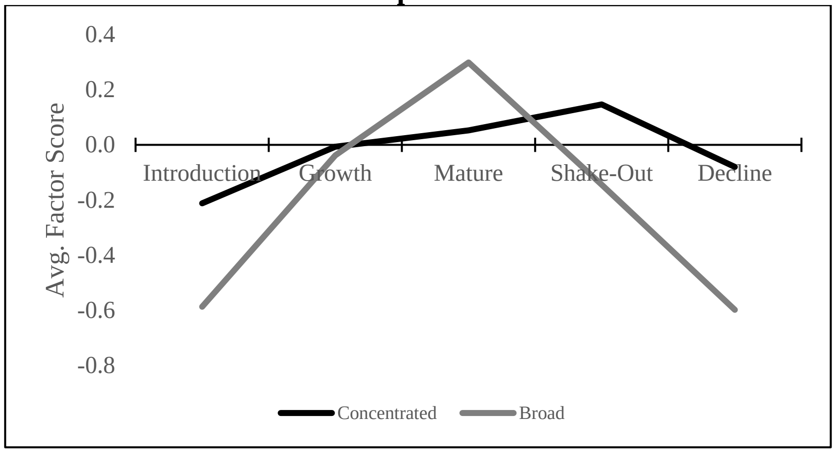
Figure 2: Institutional Ownership and Long-Term Investments across Life Cycle Stages

Panel A: Institutional Ownership Measures



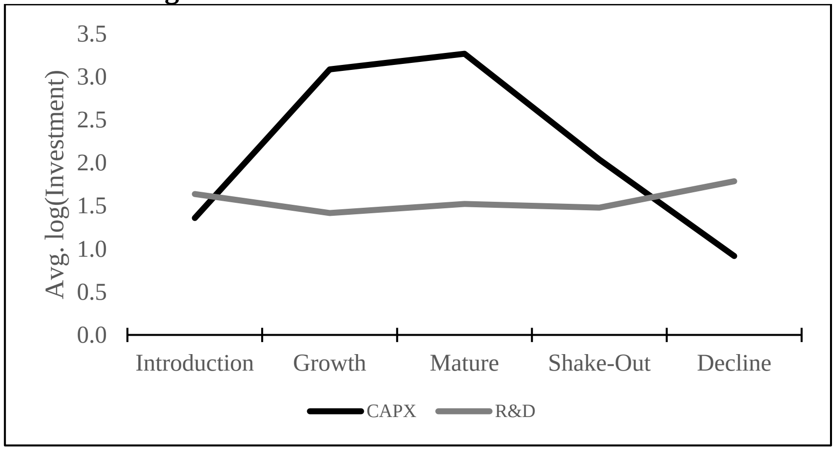
The values represent the means of the standardized measures for each life cycle stage.

Panel B: Institutional Ownership Scores



The values represent the means of the factor scores by life cycle stage for the two institutional ownership scores.

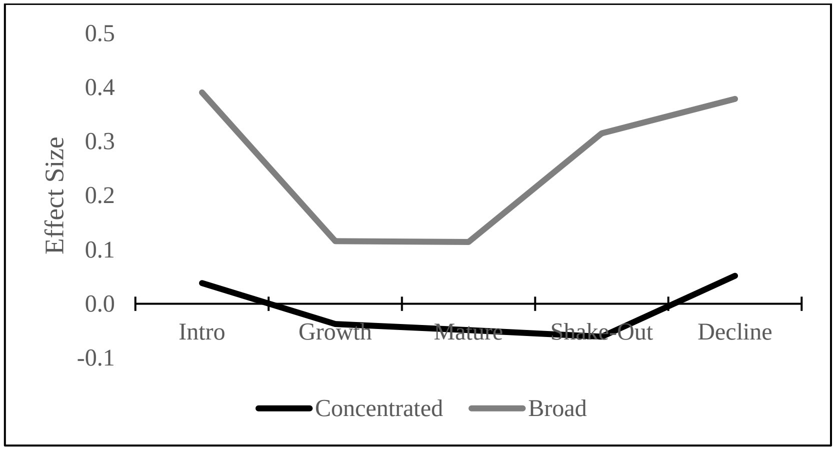
Panel C: Long-Term Investments



The values represent the average long-term investments by life cycle stage for *CAPX* and *R&D*.

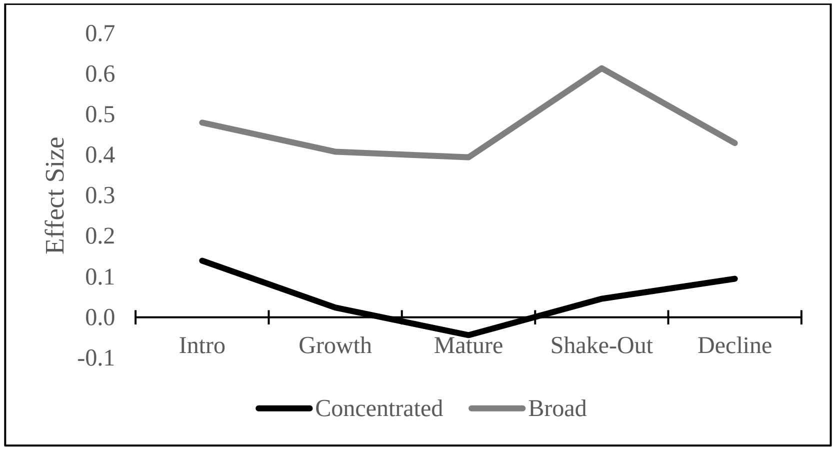
Figure 3: Effects of Institutional Ownership on Long-Term Investments by Life Cycle Stage

Panel A: Effects of Institutional Ownership on Capital Investments



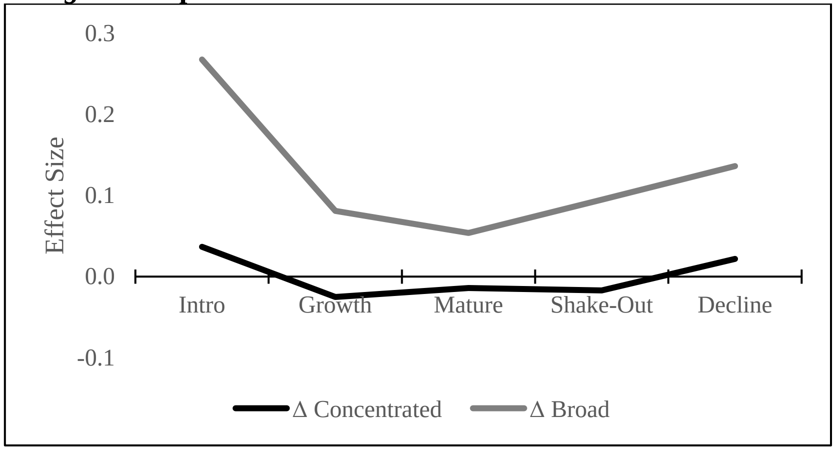
The values represent the effects of institutional ownership on capital investments by life cycle stage.

Panel B: Effects of Institutional Ownership on R&D Investments



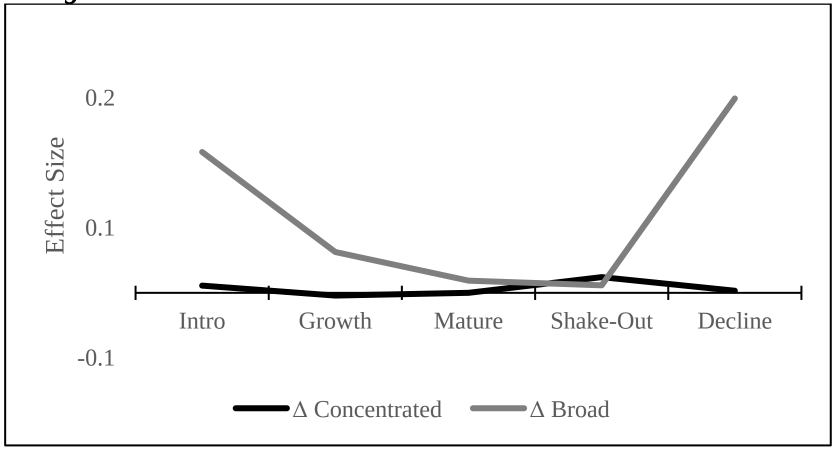
The values represent the effects of institutional ownership on R&D investments by life cycle stage.

Panel C: Effects of *Changes* in Institutional Ownership on *Changes* in Capital Investments



The values represent the effects of *changes* in institutional ownership on *changes* in capital investments by life cycle stage.

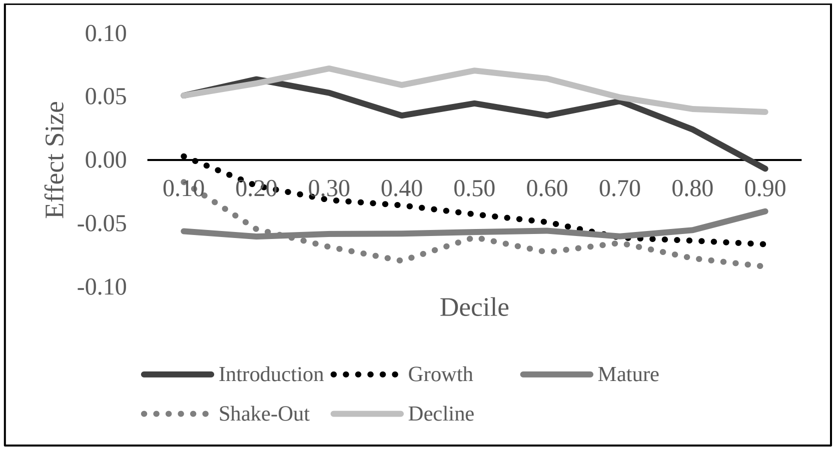
Panel D: Effects of *Changes* in Institutional Ownership on *Changes* in R&D Investments



The values represent the effects of *changes* in institutional ownership on *changes* in R&D investments by life cycle stage.

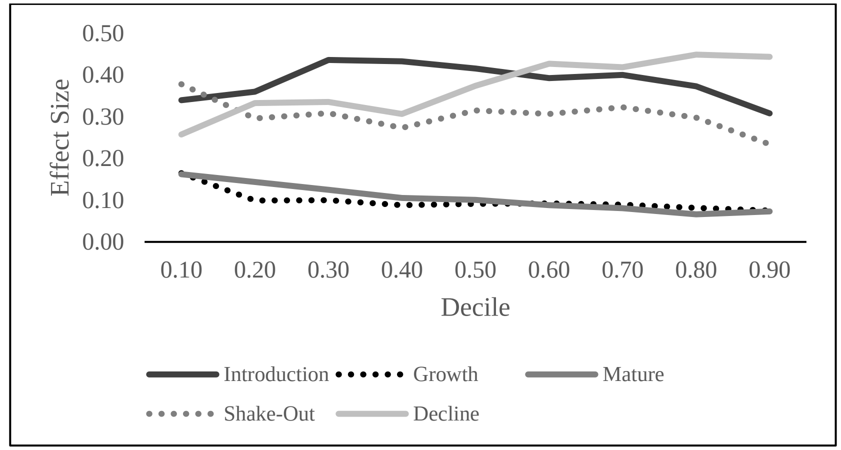
Figure 4: Effects of Institutional Ownership on Deciles of Long-Term Investments by Life Cycle Stage

Panel A: Effects of *Concentrated* Ownership on Capital Investments



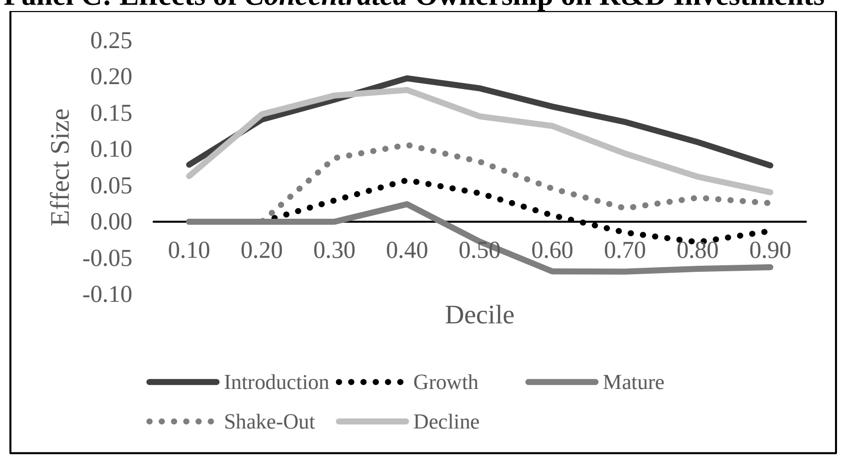
The values represent the effects of *Concentrated* institutional ownership on deciles of capital investments by life cycle stage.

Panel B: Effects of *Broad* Ownership on Capital Investments



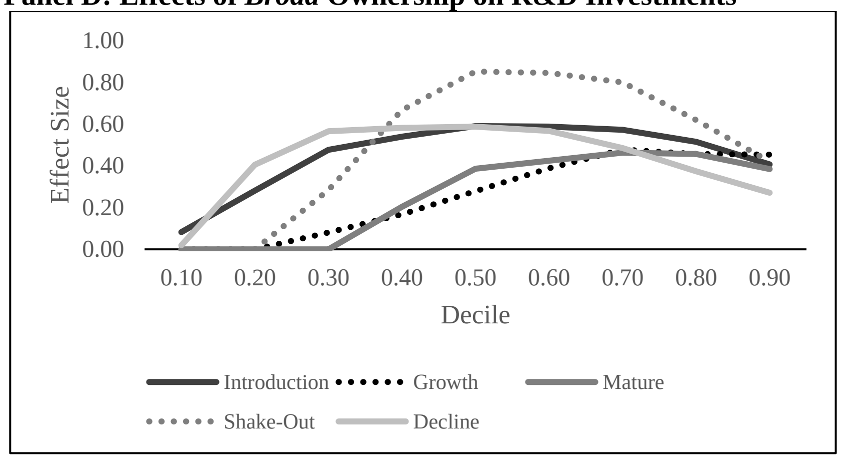
The values represent the effects of *Broad* institutional ownership on deciles of capital investments by life cycle stage.

Panel C: Effects of *Concentrated* Ownership on R&D Investments



The values represent the effects of *Concentrated* institutional ownership on deciles of R&D investments by life cycle stage.

Panel D: Effects of *Broad* Ownership on R&D Investments



The values represent the effects of *Broad* institutional ownership on deciles of R&D investments by life cycle stage.

APPENDIX B

TABLES

Table 1: Descriptive Statistics

Panel A: Institutional Ownership Measures and Scores, Investments, and Controls

Variable	Obs	Mean	Std. Dev.	Min	Median	Max	Annual Change
Institutional Ownership Measures							
nii	42,189	105.73	148.06	0.25	58.50	1,070.50	81.3%
block	42,189	1.72	1.51	0.00	1.50	6.00	61.1%
active	42,189	4.76	4.33	0.00	3.75	15.00	63.3%
actpct	42,189	0.01	0.01	0.00	0.01	0.10	73.0%
blockpct	42,189	0.15	0.14	0.00	0.12	0.71	70.5%
ownhh	42,189	0.02	0.02	0.00	0.02	0.39	83.0%
lterpct	42,189	0.19	0.20	0.00	0.12	0.71	72.2%
avgown	42,189	0.01	0.01	0.00	0.01	0.12	83.0%
maxhold	42,189	0.09	0.07	0.00	0.09	0.76	82.1%
Dependent Variables							
CAPX	42,189	2.78	1.92	0.00	2.55	8.11	
R&D	42,189	1.51	1.84	0.00	0.48	6.58	
Institutional Ownership Scores							
Concentrated	42,189	0.00	0.99	-1.31	-0.15	6.90	
Broad	42,189	0.00	0.94	-2.71	-0.23	3.21	
Controls							
Size	42,189	5.88	1.97	0.26	5.78	11.69	
Tangibility	42,189	0.25	0.22	0.00	0.18	0.94	
Cash ratio	42,189	0.20	0.22	0.00	0.11	0.98	
Leverage	42,189	0.19	0.19	0.00	0.16	0.94	
Revenue growth	42,189	0.15	0.56	-0.95	0.07	12.36	
ROA	42,189	0.09	0.19	-2.20	0.12	0.53	
MTB ratio	42,189	2.46	2.59	0.26	1.69	44.08	
Stock return	42,189	1.18	0.79	0.02	1.06	11.00	
Price volatility	42,189	4.94	5.23	0.18	3.35	54.45	
Trading volatility	42,189	7.55	7.13	0.21	5.38	44.64	

This panel provides descriptive statistics for the institutional ownership measures, long-term investments, institutional ownership scores, and control variables. Variable definitions are provided in Appendix C.

Table 1 (cont'd)

Panel B: Descriptive Statistics by Life Cycle Stage

	Life Cycle Stage				
Variable	**Introduction**	**Growth**	**Mature**	**Shake-Out**	**Decline**
Institutional Ownership Measures					
nii	37.408	93.144	148.154	85.944	35.306
block	1.178	1.720	1.890	1.892	1.369
active	1.929	4.649	6.127	4.158	1.895
actpct	0.006	0.011	0.013	0.011	0.007
blockpct	0.108	0.146	0.158	0.165	0.125
ownhh	0.016	0.021	0.022	0.023	0.017
lterpct	0.095	0.174	0.241	0.194	0.124
avgown	0.009	0.008	0.008	0.010	0.010
maxhold	0.080	0.090	0.094	0.098	0.088
Dependent Variables					
CAPX	1.358	3.085	3.267	2.039	0.917
R&D	1.636	1.416	1.521	1.479	1.785
Institutional Ownership Scores					
Concentrated	-0.212	-0.007	0.052	0.147	-0.080
Broad	-0.587	-0.038	0.299	-0.145	-0.598
Controls					
Size	4.393	6.095	6.416	5.504	4.057
Tangibility	0.160	0.288	0.272	0.181	0.132
Cash ratio	0.330	0.166	0.148	0.261	0.411
Leverage	0.193	0.237	0.171	0.146	0.123
Revenue growth	0.374	0.194	0.057	0.032	0.219
ROA	-0.151	0.126	0.156	0.077	-0.195
MTB ratio	3.503	2.233	2.322	2.046	3.231
Stock return	1.145	1.175	1.192	1.230	1.205
Price volatility	3.958	5.565	5.153	3.857	2.511
Trading volatility	8.640	8.490	6.698	6.379	6.852

This panel provides the mean of the institutional ownership measures, long-term investments, institutional ownership scores, and control variables, by life cycle stage. Variable definitions are provided in Appendix C

Table 2: Correlations

Panel A: Correlations between Institutional Ownership Measures

	1	2	3	4	5	6	7	8	9
1 *nii*	**1.00**								
2 *block*	**0.14**	**1.00**							
3 *active*	**0.78**	**0.30**	**1.00**						
4 *actpct*	**0.46**	**0.35**	**0.65**	**1.00**					
5 *blockpct*	**0.09**	**0.92**	**0.23**	**0.31**	**1.00**				
6 *ownhh*	**0.10**	**0.60**	**0.20**	**0.24**	**0.83**	**1.00**			
7 *lterpct*	**0.47**	**0.43**	**0.49**	**0.42**	**0.42**	**0.35**	**1.00**		
8 *avgown*	**-0.35**	**0.23**	**-0.44**	**-0.17**	**0.34**	**0.32**	**-0.02**	**1.00**	
9 *maxhold*	**0.10**	**0.55**	**0.16**	**0.24**	**0.76**	**0.89**	**0.35**	**0.41**	**1.00**

This panel provides correlations for the institutional ownership measures. **Bolded** Pearson correlations are significant at the 5% level (two-tailed). Variable definitions are provided in Appendix C.

Panel B: Correlations between Institutional Ownership Scores, Investments, and Controls

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1 *Concentrated*	**1.00**													
2 *Broad*	**0.01**	**1.00**												
3 *CAPX*	**0.03**	**0.73**	**1.00**											
4 *R&D*	**0.01**	**0.40**	**0.19**	**1.00**										
5 *Size*	**0.10**	**0.80**	**0.89**	**0.30**	**1.00**									
6 *Cash ratio*	**-0.03**	**0.05**	**0.44**	**-0.31**	**0.19**	**1.00**								
7 *Tangibility*	**0.02**	**-0.09**	**-0.34**	**0.31**	**-0.28**	**-0.41**	**1.00**							
8 *Leverage*	0.00	**0.04**	**0.29**	**-0.15**	**0.29**	**-0.45**	**0.34**	**1.00**						
9 *Revenue growth*	**-0.06**	**-0.04**	**-0.01**	**0.03**	**-0.03**	**0.10**	**-0.02**	0.01	**1.00**					
10 *ROA*	0.01	**0.28**	**0.37**	**-0.08**	**0.37**	**-0.38**	**0.20**	**0.07**	**-0.04**	**1.00**				
11 *Stock return*	**-0.04**	**-0.02**	**-0.03**	0.01	**-0.01**	**0.08**	**-0.03**	**-0.06**	**0.10**	**0.11**	**1.00**			
12 *MTB ratio*	**-0.08**	**0.10**	**-0.04**	**0.21**	**-0.07**	**0.34**	**-0.16**	**-0.22**	**0.17**	**-0.11**	**0.33**	**1.00**		
13 *Price volatility*	**-0.03**	**0.22**	**0.27**	**0.14**	**0.26**	0.00	**0.04**	**-0.01**	**0.02**	**0.18**	**0.06**	**0.15**	**1.00**	
14 *Trading volatility*	**0.04**	**0.29**	**0.22**	**0.23**	**0.24**	**0.21**	**-0.07**	**-0.06**	**0.07**	**-0.01**	0.01	**0.13**	**0.24**	**1.00**

This panel provides correlations for the institutional ownership scores, investments, and controls. **Bolded** Pearson correlations are significant at the 5% level (two-tailed). Variable definitions are provided in Appendix C.

Table 3: Institutional Ownership Scores and Factor Loadings

Score/*Measure*	**Factor 1**	**Factor 2**	**Uniqueness**
Concentrated			
block	**0.822**	0.220	0.276
blockpct	**0.965**	0.106	0.058
ownhh	**0.895**	0.062	0.196
maxhold	**0.864**	0.025	0.254
avgown	**0.433**	**-0.490**	0.572
Broad			
avgown	**0.433**	**-0.490**	0.572
nii	0.037	**0.805**	0.351
active	0.140	**0.917**	0.139
actpct	0.257	**0.623**	0.546
lterpct	0.386	**0.498**	0.602
Eigenvalue	3.876	2.130	
Proportion	0.606	0.333	
N			42,189

This table presents the results of a factor analysis of institutional ownership measures. The reported factor loadings are based on varimax rotation. Variable definitions are provided in Appendix C.

Table 4: Changes in Life Cycle Stages

Panel A: 1-Year Cash Flows

	Subsequent Year Life Cycle Stage						
Current Stage	**Intro**	**Growth**	**Mature**	**Shake-Out**	**Decline**	**Attrition**	**% Unchanged**
Introduction	**1,193**	708	737	347	772	551	**27.7%**
Growth	725	**4,204**	4,317	881	309	856	**37.2%**
Mature	623	3,998	**8,882**	1,472	289	1,240	**53.8%**
Shake-Out	316	724	1,546	**445**	304	409	**11.9%**
Decline	708	271	262	318	**567**	421	**22.3%**

This panel provides the classification of firms by life cycle stage based on annual cash flows. The % Unchanged column indicates the proportion of firms in each life cycle stage that were classified in the same life cycle stage in the subsequent year (the bolded value in the main diagonal divided by the total for each row).

Panel B: 3-Year Cash Flows

	Subsequent Year Life Cycle Stage						
Current Stage	**Intro**	**Growth**	**Mature**	**Shake-Out**	**Decline**	**Attrition**	**% Unchanged**
Introduction	**2,664**	613	166	128	616	640	**55.2%**
Growth	532	**9,928**	3,023	305	97	1,112	**66.2%**
Mature	113	2,310	**12,884**	761	74	1,150	**74.5%**
Shake-Out	67	212	752	**1,243**	215	237	**45.6%**
Decline	402	78	46	171	**1,235**	338	**54.4%**

This panel provides the classification of firms by life cycle stage based on average annual cash flows over three years. The % Unchanged column indicates the proportion of firms in each life cycle stage that were classified in the same life cycle stage in the subsequent year (the bolded value in the main diagonal divided by the total for each row).

Panel C: Changes between Stages (3-Year Cash Flows)

	Subsequent Year Life Cycle Stage					
Current Stage	**Intro**	**Growth**	**Mature**	**Shake-Out**	**Decline**	**Attrition**
Introduction	**55.2%**	12.7%	3.4%	2.7%	12.8%	13.3%
Growth	3.5%	**66.2%**	20.2%	2.0%	0.6%	7.4%
Mature	0.7%	13.4%	**74.5%**	4.4%	0.4%	6.7%
Shake-Out	2.5%	7.8%	27.6%	**45.6%**	7.9%	8.7%
Decline	17.7%	3.4%	2.0%	7.5%	**54.4%**	14.9%

This panel provides the year-to-year classification of firms by life cycle stage changes in life cycle stage based on average annual cash flows over three years. The rows sum to 100%.

Table 4 (cont'd)

Panel D: Delistings by Life Cycle Stage

	Delisting due to Mergers and Acquisitions					Delistings due to Liquidation or Drops				
Year	Intro	Growth	Mature	Shake-Out	Decline	Intro	Growth	Mature	Shake-Out	Decline
1997	0.3%	0.0%	0.0%	0.0%	1.0%	6.5%	0.6%	0.5%	3.9%	9.0%
1998	9.6%	8.3%	9.4%	3.1%	15.9%	3.2%	0.7%	1.0%	0.0%	4.8%
1999	8.4%	8.2%	8.0%	10.4%	8.1%	6.8%	2.0%	1.6%	3.0%	6.8%
2000	5.6%	4.8%	6.7%	6.3%	8.4%	12.1%	2.5%	1.3%	3.9%	10.3%
2001	4.3%	2.6%	3.1%	3.3%	5.5%	11.0%	1.4%	1.5%	5.3%	11.0%
2002	8.3%	3.2%	3.5%	5.0%	2.6%	8.6%	1.2%	1.3%	5.0%	9.2%
2003	3.9%	3.7%	3.6%	2.7%	8.5%	2.3%	0.4%	1.1%	3.8%	2.7%
2004	6.4%	5.4%	4.0%	6.7%	6.6%	2.6%	0.8%	1.0%	3.3%	7.2%
2005	5.5%	6.6%	4.8%	6.4%	4.9%	4.6%	0.7%	0.1%	1.2%	2.1%
2006	2.3%	7.4%	8.3%	9.0%	4.0%	7.7%	0.4%	0.2%	1.4%	2.4%
2007	4.5%	4.4%	2.8%	6.2%	9.7%	7.7%	1.1%	0.7%	0.0%	6.9%
2008	3.4%	2.6%	2.4%	4.8%	8.3%	7.9%	0.9%	0.9%	1.1%	10.0%
2009	6.1%	5.5%	3.9%	6.1%	4.5%	6.8%	0.2%	0.3%	1.5%	9.0%
2010	4.7%	5.5%	4.4%	2.2%	6.3%	3.1%	1.0%	0.3%	1.6%	0.9%
2011	5.6%	4.9%	4.4%	4.2%	6.7%	2.1%	1.0%	0.4%	2.8%	4.5%
2012	4.9%	3.2%	4.1%	5.5%	5.4%	4.3%	0.7%	0.1%	1.6%	7.6%
2013	3.1%	2.7%	2.8%	2.6%	5.2%	2.6%	0.5%	0.1%	0.9%	2.1%
Average	**5.3%**	**4.7%**	**4.4%**	**5.1%**	**6.5%**	**6.6%**	**1.0%**	**0.7%**	**2.4%**	**6.4%**

This panel provides the percentage of firms in each life cycle stage and year that were delisted.

Table 5: Effects of Institutional Ownership on Long-Term Investments

	CAPX	R&D	Δ CAPX	Δ R&D
Ownership Scores				
Concentrated	-0.042 ***	0.012		
Broad	0.236 ***	0.402 ***		
Δ *Concentrated*			-0.017 ***	-0.001
Δ *Broad*			0.104 ***	0.037 ***
Life Cycle Stage				
Introduction				
Growth	0.098 ***	-0.052	0.024 **	0.045 ***
Mature	-0.032	-0.160 ***	0.006	0.020 ***
Shake-Out	-0.276 ***	-0.183 ***	-0.027 *	-0.013
Decline	-0.179 ***	-0.029	-0.051 ***	-0.081 ***
Controls				
Size	0.725 ***	0.291 ***	-0.003 **	0.001
Tangibility	2.198 ***	-1.255 ***	-0.268 ***	-0.058 ***
Cash ratio	-0.084 **	1.553 ***	0.079 ***	0.051 ***
Leverage	-0.309 ***	-0.335 ***	-0.037 **	-0.012
Revenue growth	0.128 ***	-0.009	0.160 ***	0.043 ***
ROA	0.248 ***	-0.375 ***	0.331 ***	0.018
MTB ratio	0.036 ***	0.053 ***	0.006 ***	0.005 ***
Stock return	-0.021 ***	0.000	0.012 ***	-0.007 ***
Price volatility	0.007 ***	0.000	0.002 ***	0.001 ***
Trading volatility	0.005 ***	0.009 ***	-0.001	0.001 ***
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Intercept	-1.930 ***	0.031	0.129 ***	0.009
N	42,112	42,112	35,999	35,999
R^2	0.8766	0.5513	0.0986	0.0445

This table presents the results of estimating the effects of institutional ownership on long-term investments with life cycle fixed effects. Column 1 (2) uses the institutional ownership scores (*Concentrated* and *Broad*), with *CAPX* (*R&D*) as the dependent variable. Column 3 (4) uses *changes* in the institutional ownership scores (*Concentrated* and *Broad*), with *changes* in *CAPX* (*R&D*) as the dependent variable. ***, **, and * represent statistical significance at the p<0.01, p<0.05, and p<0.10 levels (two-tailed), respectively. Variable definitions are provided in Appendix C.

Table 6: Effects of Institutional Ownership on Long-Term Investments by Life Cycle Stage

Panel A: Capital and R&D Investments

DV:	CAPX					R&D				
Life Cycle Stage:	**Intro**	**Growth**	**Mature**	**Shake-Out**	**Decline**	**Intro**	**Growth**	**Mature**	**Shake-Out**	**Decline**
Ownership Scores										
Concentrated	0.038 **	-0.038 ***	-0.049 ***	-0.061 ***	0.052 **	0.140 ***	0.024	-0.044 *	0.046	0.095 **
Broad	0.391 ***	0.116 ***	0.114 ***	0.315 ***	0.379 ***	0.480 ***	0.408 ***	0.394 ***	0.614 ***	0.430 ***
N	4,827	14,997	17,292	2,726	2,270	4,827	14,997	17,292	2,726	2,270
R^2	0.6905	0.8502	0.9067	0.8507	0.6621	0.6397	0.5606	0.5598	0.5765	0.5783

Panel B: Changes in Capital and R&D Investments

DV:	Δ CAPX					Δ R&D				
Life Cycle Stage:	**Intro**	**Growth**	**Mature**	**Shake-Out**	**Decline**	**Intro**	**Growth**	**Mature**	**Shake-Out**	**Decline**
Changes in Scores										
Δ *Concentrated*	0.037 **	-0.025 ***	-0.014 *	-0.017	0.022	0.006	-0.002	0.000	0.012	0.002
Δ *Broad*	0.268 ***	0.081 ***	0.054 ***	0.095 **	0.136 **	0.109 ***	0.031 ***	0.009	0.006	0.150 ***
N	3,354	12,390	15,870	2,460	1,925	3,354	12,390	15,870	2,460	1,925
R^2	0.1001	0.1372	0.1259	0.0911	0.0958	0.0563	0.0715	0.0356	0.0436	0.0591

These panels present the results of estimating the effects of institutional ownership on long-term investments separately for each life cycle stage. The values presented in Panels A and B represent the coefficients for each institutional ownership score, where estimates were made separately for each life cycle stage. Control variables, industry fixed effects, and year fixed effects are included in the estimation, but are excluded from the table for ease of presentation. Panel A (B) uses capital and R&D investments (*changes* in capital and R&D investments) as the dependent variables. ***, **, and * represent statistical significance at the p<0.01, p<0.05, and p<0.10 levels (two-tailed in Panels A and B), respectively. Variable definitions are provided in Appendix C.

Table 6 (cont'd)

Panel C: Capital and R&D Investments (Hypothesis Tests)

DV:	CAPX				R&D			
Life Cycle Stage:	Intro vs. Growth	Intro vs. Mature	Decline vs. Growth	Decline vs. Mature	Intro vs. Growth	Intro vs. Mature	Decline vs. Growth	Decline vs. Mature
Ownership Scores								
Concentrated	0.076 ***	0.087 ***	0.089 ***	0.100 ***	0.116 ***	0.184 ***	0.071 *	0.139 ***
Broad	0.275 ***	0.276 ***	0.264 ***	0.264 ***	0.072	0.086	0.021	0.035

Panel D: Changes in Capital and R&D Investments (Hypothesis Tests)

DV:	Δ CAPX				Δ R&D			
Life Cycle Stage:	Intro vs. Growth	Intro vs. Mature	Decline vs. Growth	Decline vs. Mature	Intro vs. Growth	Intro vs. Mature	Decline vs. Growth	Decline vs. Mature
Changes in Scores								
Δ *Concentrated*	0.062 ***	0.051 ***	0.047 **	0.036 *	0.008	0.006	0.004	0.002
Δ *Broad*	0.187 ***	0.214 ***	0.082 *	0.082 *	0.077 ***	0.099 ***	0.118 ***	0.140 ***

These panels present the results of estimating the effects of institutional ownership on long-term investments separately for each life cycle stage. The values presented in Panels C and D represent the *differences* in the effects for each institutional ownership score and long-term investment across life cycle stages, and the statistical significance of the differences. The tests are one-sided, with a predicted positive difference between transitory (*Introduction* and *Decline*) stages and sustainable (*Growth* and *Mature*) stages (representing stronger effects in more transitory stages). Control variables, industry fixed effects, and year fixed effects are included in the estimation, but are excluded from the table for ease of presentation. ***, **, and * represent statistical significance at the p<0.01, p<0.05, and p<0.10 levels (one-tailed in Panels C and D), respectively. Variable definitions are provided in Appendix C.

Table 7: Effects of Institutional Ownership on Long-Term Investments by Changes in Life Cycle Stage

Panel A: Capital and R&D Investments

DV:	CAPX		R&D	
	Transition	**Stable**	**Transition**	**Stable**
Ownership Scores				
Concentrated	-0.036 ***	-0.043 ***	0.033 *	0.005
Broad	0.264 ***	0.220 ***	0.443 ***	0.392 ***
N	11,498	30,363	11,498	30,363
R^2	0.8644	0.8797	0.5490	0.5547

Panel B: Changes in Capital and R&D Investments

DV:	Δ CAPX		Δ R&D	
	Transition	**Stable**	**Transition**	**Stable**
Changes in Scores				
Δ *Concentrated*	-0.018 *	-0.016 ***	0.001	-0.002
Δ *Broad*	0.102 ***	0.105 ***	0.054 ***	0.031 ***
N	10,002	25,981	10,002	25,981
R^2	0.1111	0.0983	0.0513	0.0445

These panels present the results of estimating the effects of institutional ownership on long-term investments using separate samples for firms that either remain in the same life cycle stage (*Stable*) or move to a new life cycle stage in a given year (*Transition*). Control variables, life cycle indicators, industry fixed effects, and year fixed effects are included in the estimation, but are excluded from the table for ease of presentation. Panel A presents the results using capital and R&D investments as the dependent variables, and Panel B presents the results using *changes* in capital and R&D investments as the dependent variables. ***, **, and * represent statistical significance at the $p<0.01$, $p<0.05$, and $p<0.10$ levels (two-tailed), respectively. Variable definitions are provided in Appendix C.

Table 8: Stock Indexing Tests using Russell Index Thresholds

Panel A: Descriptive Statistics

Bin Width:	150				200				250			
Russell Index:	**1000**	**2000**	**Diff**		**1000**	**2000**	**Diff**		**1000**	**2000**	**Diff**	
Long-Term Investment												
CAPX	4.090	3.787	0.303	***	4.112	3.776	0.336	***	4.164	3.719	0.444	***
R&D	1.590	2.056	-0.466	***	1.691	2.004	-0.313	***	1.790	2.001	-0.211	***
Ownership Scores												
Concentrated	-0.091	-0.044	-0.048		-0.079	-0.045	-0.034		-0.090	-0.039	-0.051	
Broad	0.480	0.554	-0.074	**	0.563	0.526	0.037		0.615	0.514	0.101	***
Controls												
Size	7.190	6.791	0.399	***	7.210	6.772	0.438	***	7.237	6.732	0.505	***
Tangibility	0.294	0.276	0.018	*	0.291	0.281	0.010		0.292	0.275	0.017	**
Cash ratio	0.155	0.183	-0.029	**	0.147	0.179	-0.032	***	0.144	0.178	-0.035	***
Leverage	0.208	0.209	-0.002		0.211	0.209	0.002		0.218	0.207	0.011	
Revenue growth	0.137	0.196	-0.058	**	0.132	0.180	-0.048	**	0.134	0.173	-0.040	**
ROA	0.150	0.147	0.004		0.151	0.147	0.004		0.154	0.146	0.008	*
MTB ratio	2.580	2.901	-0.321	**	2.579	2.752	-0.173		2.594	2.698	-0.104	
Stock return	1.126	1.157	-0.031		1.120	1.143	-0.023		1.129	1.132	-0.004	
Price volatility	6.574	7.047	-0.473		6.519	6.801	-0.282		6.509	6.796	-0.287	
Trading volatility	8.263	11.007	-2.743	***	8.372	10.469	-2.098	***	8.606	10.401	-1.795	***

Panel B: Effects by Life Cycle Stage (2nd Stage Estimation)

Bin Width:	150		200		250	
Russell Index:	**1000**	**2000**	**1000**	**2000**	**1000**	**2000**
Life Cycle Stage						
Introduction	33	53	43	67	52	85
Growth	304	297	410	417	529	536
Mature	345	274	458	385	571	484
Shake-Out	36	21	47	35	59	42
Decline	6	9	12	10	14	13

These panels present the results of estimating the effects of institutional ownership on long-term investments using instrumental variable estimation based on the Russell index thresholds. Panel A provides descriptive statistics for key variables of firms above and below the Russell index threshold at three different bin widths (150, 200, and 250 firms on either side of the threshold). The significance of the differences in values between the Russell indexes is evaluated based on assumed unequal variances. Panel B provides the number of sample firms used in these tests by life cycle stage. ***, **, and * represent statistical significance at the $p<0.01$, $p<0.05$, and $p<0.10$ levels (two-tailed), respectively. Variable definitions are provided in Appendix C.

Table 8 (cont'd)

Panel C: Sharp Regression Discontinuity Design (1st Stage Estimation)

Bin Width:	150		200		250	
	Conc.	Broad	Conc.	Broad	Conc.	Broad
R2000	0.096	0.670 ***	0.084	0.545 ***	0.035	0.424 ***
Distance	-0.001	-0.007 ***	-0.001	-0.005 ***	0.000	-0.003 ***
R2000 × Distance	0.001	0.006 ***	0.001	0.004 ***	0.000	0.003 ***
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	-1.255 ***	-0.769 ***	-1.251 ***	-0.654 ***	-1.208 ***	-0.566 ***
N	1,378	1,378	1,884	1,884	2,385	2,385
R^2	0.275	0.364	0.300	0.360	0.312	0.360

Panel D: Effects by Life Cycle Stage (2nd Stage Estimation)

DV:	CAPX			R&D		
Bin Width:	150	200	250	150	200	250
Broad						
Introduction	-0.423 *	-0.321	-0.129	1.397 ***	1.591 ***	1.924 ***
Growth	-0.208	-0.101	0.022	0.900 **	1.050 ***	1.231 ***
Mature	-0.083	0.065	0.202	1.159 ***	1.116 ***	1.343 ***
Shake-Out	0.867 *	0.808 *	0.553	0.609	0.709	1.537 **
Decline	0.524	1.305	1.419	2.225	1.170	2.228 *
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
N	1,378	1,884	2,385	1,378	1,884	2,385
R^2	0.668	0.675	0.675	0.267	0.249	0.246

These panels present the results of estimating the effects of institutional ownership on long-term investments using instrumental variable estimation based on the Russell index thresholds. The values presented in Panel C represent the coefficients from the 1st stage estimation. The values presented in Panel D represent the marginal effects of *Broad* institutional ownership by life cycle stage. Control variables, life cycle indicators, and year fixed effects are included in the 2nd stage estimation, but are excluded from the table for ease of presentation. ***, **, and * represent statistical significance at the $p<0.01$, $p<0.05$, and $p<0.10$ levels (two-tailed), respectively. Variable definitions are provided in Appendix C.

Table 9: Investment Efficiency Tests

	Cash Balance				Cash Ratio			
	CAPX		R&D		CAPX		R&D	
IO Scores								
Concentrated	-0.025	*	0.062	**	-0.033	***	-0.040	
Broad	0.206	***	0.346	***	0.339	***	0.534	***
Over-Investment								
OverFirm	0.145	***	0.479	***	-0.014		0.146	*
OverFirm × Conc.	-0.043	*	-0.070		-0.024		0.145	***
OverFirm × Broad	0.067	**	0.190		-0.200	***	-0.152	
Life Cycle Stage								
Introduction	0.000		0.000		0.000		0.000	
Growth	0.098	***	-0.080	**	0.093	***	-0.079	**
Mature	-0.028		-0.221	***	-0.022		-0.197	***
Shake-Out	-0.281	***	-0.174	***	-0.276	***	-0.156	***
Decline	-0.171	***	0.060		-0.173	***	0.063	*
Controls								
Size	0.709	***	0.221	***	0.711	***	0.238	***
Tangibility	2.186	***	-1.798	***	2.168	***	-1.845	***
Revenue growth	0.125	***	0.021	*	0.125	***	0.023	*
ROA	0.253	***	-0.754	***	0.296	***	-0.706	***
MTB ratio	0.035	***	0.070	***	0.038	***	0.075	***
Stock return	-0.025	***	-0.019	*	-0.028	***	-0.020	**
Price volatility	0.008	***	0.002		0.008	***	0.002	
Trading volatility	0.004	***	0.016	***	0.005	***	0.017	***
Industry FE	Yes		Yes		Yes		Yes	
Year FE	Yes		Yes		Yes		Yes	
Intercept	-2.005	***	0.522		-1.920	***	0.611	
N	41,409		41,409		41,409		41,409	
R^2	0.8796		0.5344		0.8800		0.5332	

This table presents the results of the investment efficiency tests using the Biddle et al. (2009) measure of over-investment (*OverFirm*). Columns 1–2 (3–4) use firms' cash balances (cash ratios) in computing *OverFirm*. ***, **, and * represent statistical significance at the $p<0.01$, $p<0.05$, and $p<0.10$ levels (two-tailed), respectively. Variable definitions are provided in Appendix C.

Table 10: Effects of Institutional Ownership on Deciles of Long-Term Investments by Life Cycle Stage

Panel A: Capital Investments

	Introduction		Growth		Mature		Shake-Out		Decline	
Decile	Conc.	Broad	Conc.	Broad	Conc.	Broad	Conc.	Broad	Conc.	Broad
0.10	0.051 ***	0.340 ***	0.003	0.165 ***	-0.056 ***	0.162 ***	-0.017	0.378 ***	0.051 ***	0.257 ***
0.20	0.064 ***	0.360 ***	-0.020 **	0.099 ***	-0.060 ***	0.144 ***	-0.055 ***	0.296 ***	0.061 ***	0.333 ***
0.30	0.053 ***	0.436 ***	-0.032 ***	0.100 ***	-0.058 ***	0.125 ***	-0.069 ***	0.308 ***	0.072 ***	0.335 ***
0.40	0.035 **	0.433 ***	-0.036 ***	0.088 ***	-0.058 ***	0.105 ***	-0.080 ***	0.273 ***	0.059 ***	0.307 ***
0.50	0.045 ***	0.416 ***	-0.043 ***	0.091 ***	-0.057 ***	0.101 ***	-0.061 ***	0.315 ***	0.071 ***	0.374 ***
0.60	0.035 **	0.393 ***	-0.049 ***	0.092 ***	-0.056 ***	0.088 ***	-0.073 ***	0.307 ***	0.064 ***	0.427 ***
0.70	0.046 ***	0.400 ***	-0.061 ***	0.089 ***	-0.060 ***	0.081 ***	-0.065 ***	0.323 ***	0.050 **	0.419 ***
0.80	0.024	0.373 ***	-0.064 ***	0.082 ***	-0.055 ***	0.066 ***	-0.078 ***	0.298 ***	0.040 *	0.449 ***
0.90	-0.007	0.308 ***	-0.067 ***	0.075 ***	-0.041 ***	0.073 ***	-0.084 ***	0.234 ***	0.038	0.443 ***

Panel B: R&D Investments

	Introduction		Growth		Mature		Shake-Out		Decline	
Decile	Conc.	Broad	Conc.	Broad	Conc.	Broad	Conc.	Broad	Conc.	Broad
0.10	0.079 ***	0.082 *	0.000	0.000	0.000	0.000	0.000	0.000	0.063	0.019
0.20	0.141 ***	0.281 ***	0.000	0.000	0.000	0.000	0.000	0.000	0.148 ***	0.405 **
0.30	0.168 ***	0.477 ***	0.029 ***	0.081 ***	0.000	0.000	0.088 ***	0.284 ***	0.174 ***	0.565 ***
0.40	0.198 ***	0.539 ***	0.057 ***	0.167 ***	0.024 **	0.203 ***	0.106 ***	0.666 ***	0.182 ***	0.582 ***
0.50	0.184 ***	0.590 ***	0.039 ***	0.278 ***	-0.027 *	0.386 ***	0.083 ***	0.851 ***	0.145 ***	0.587 ***
0.60	0.159 ***	0.587 ***	0.009	0.388 ***	-0.069 ***	0.424 ***	0.046	0.844 ***	0.132 ***	0.567 ***
0.70	0.138 ***	0.572 ***	-0.015	0.477 ***	-0.069 ***	0.463 ***	0.019	0.800 ***	0.094 ***	0.485 ***
0.80	0.110 ***	0.515 ***	-0.028 **	0.457 ***	-0.065 ***	0.457 ***	0.033	0.619 ***	0.062 **	0.374 ***
0.90	0.078 ***	0.407 ***	-0.013	0.454 ***	-0.063 ***	0.385 ***	0.026	0.421 ***	0.041	0.271 ***

These panels present the results of estimating the effect of institutional ownership on long-term investments by life cycle stage using quantile regression. Results are reported for each decile of the capital investments (Panel A) and R&D investments (Panel B). ***, **, and * represent statistical significance at the $p<0.01$, $p<0.05$, and $p<0.10$ levels (two-tailed), respectively.

APPENDIX C

VARIABLE DEFINITIONS

Table 11: Variable Definitions

Institutional Ownership Measures		
nii	=	the number of institutional investors in each firm (averaged across quarters). (Thomson Reuters)
block	=	the number of blockholders in each firm that own more than 5% of the firm's outstanding stock (averaged across quarters). (Thomson Reuters)
active	=	the number of activist investors, as identified by Cremers and Nair (2005) and Larcker et al. (2007), in each firm (averaged across quarters). (Thomson Reuters)
actpct	=	the percentage of each firm's outstanding stock held by activist investors (averaged across quarters). (Thomson Reuters)
blockpct	=	the percentage of each firm's outstanding stock held by blockholders (averaged across quarters). (Thomson Reuters)
ownhh	=	the sum of the squared ownership stakes of all institutions owning stock in each firm (averaged across quarters). (Thomson Reuters)
lterpct	=	the percentage of each firm's outstanding stock held by long-term institutional investors, where long-term holdings are defined as at least eight continuous quarters (averaged across quarters). (Thomson Reuters)
avgown	=	the average ownership stake of an institutional investor in each firm, measured as a percentage (averaged across quarters). (Thomson Reuters)
maxhold	=	the largest institutional holding in each firm, measured as a percentage. (Thomson Reuters)
Institutional Ownership Scores		
Concentrated	=	the standardized factor score for the first factor from a factor analysis of 9 institutional ownership measures, with positive loadings on *block*, *blockpct*, *ownhh*, *maxhold*, and *avgown*. (Thomson Reuters)
Broad	=	the standardized factor score for the second factor from a factor analysis of 9 institutional ownership measures, with positive loadings on *nii*, *active*, *actpct*, and *lterpct*, and a negative loading on *avgown*. (Thomson Reuters)
Long-Term Investments		
CAPX	=	the log of 1 plus capital expenditures, where all missing values are coded as 0 [log(1 + *capx*)]. (Compustat)
R&D	=	the log of 1 plus R&D expense, where all missing values are coded as 0 [log(1 + *xrd*)]. (Compustat)
Life Cycle Stage		
Introduction	=	an indicator variable equal to 1 if a firm is classified in the *Introduction* stage in a given year, and 0 otherwise. (Compustat)
Growth	=	an indicator variable equal to 1 if a firm is classified in the *Growth* stage in a given year, and 0 otherwise. (Compustat)
Mature	=	an indicator variable equal to 1 if a firm is classified in the *Mature* stage in a given year, and 0 otherwise. (Compustat)
Shake-Out	=	an indicator variable equal to 1 if a firm is classified in the *Shake-Out* stage in a given year, and 0 otherwise. (Compustat)
Decline	=	an indicator variable equal to 1 if a firm is classified in the *Decline* stage in a given year, and 0 otherwise. (Compustat)

Table 11 (cont'd)

Controls		
Size	=	the natural log of total assets in *t*–1. (Compustat)
Tangibility	=	the ratio of net property, plant, and equipment to total assets in *t*–1. (Compustat)
Cash ratio	=	the ratio of cash to total assets in *t*–1. (Compustat)
Leverage	=	the ratio of long-term debt and debt in current liabilities to total assets in *t*–1. (Compustat)
Revenue growth	=	the change in revenue divided by revenue in *t*–1. (Compustat)
ROA	=	the ratio of operating income before depreciation to average (*t* to *t*–1) total assets. (Compustat)
MTB ratio	=	the ratio of the market value to book value. (Compustat)
Stock return	=	the annual stock return. (Compustat)
Price volatility	=	the standard deviation of daily stock prices in a given year. (CRSP)
Trading volatility	=	the ratio of average trading volume to average shares outstanding in a given year. (CRSP)
Russell Indexing Variables		
R2000	=	an indicator variable equal to 1 if a firm is classified in the Russell 2000 index in a given year, and 0 otherwise. (FTSE Russell)
Distance	=	the rank distance from the Russell 1000/2000 threshold in a given year. (FTSE Russell)
Investment Efficiency Variables		
OverFirm	=	the average of the scaled cash balances (or cash ratios) and leverage, where each measure is scaled to range between 0 and 1 after creating ranked deciles by year and Fama-French 12-industry (leverage is multiplied by –1 so that both sets of deciles are increasing in the propensity toward over-investment). (Compustat)

Data sources are provided in parentheses after the variable description.

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