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THREE ESSAYS IN CORPORATE FINANCE

BY

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ABSTRACT

In the first chapter, using new patent-based industry-level measures of the horizons and values of corporate investment, I find that in response to an increase in long-term institutional ownership firms reallocate their capital toward divisions with long product life-cycle *and* high innovation value, which leads to longer corporate investment horizons and higher investment values at firm level. To disentangle investors' effects from spurious correlations, I employ a widely-adopted identification strategy based on the discontinuity in long-term ownerships around Russell 1000/2000 index thresholds. The effects are strongest among firms with more undervaluation. I also document a possible channel through which investors affect corporate investment horizon - the managerial incentive channel. These results are consistent with the horizon alignment hypothesis that long-term investors could mitigate inefficient corporate short-termisms in real investment decisions among undervalued firms.

In the second chapter, we show that Korean business groups, *chaebol*, reduced (increased) investment in risky (safe) member firms in the aftermath of the 1997 Asian financial crisis. Risk reduction was accompanied by capital reallocation from risky member firms to safe member firms through equity investments. Consequently, *chaebol* reduced investment to a lesser extent than otherwise similar stand-alone firms did while reducing risk to a greater extent. Risk reduction was stronger among *chaebol* with greater variability in risk across member firms and with greater dependence on external financing. Our results suggest that within-group risk variability along with internal capital markets enabled *chaebol* to effectively reduce risk in response to the increased cost of external financing.

The final chapter documents a new cost of insider ownership; we call this the *minority-alignment* cost. This cost arises when a higher share of insider ownership incentivizes the insider to act in the best interest of a minority of shareholders. These actions thus hurt the interests of the majority of shareholders and therefore reduce firm value. We document

evidence consistent with this cost of insider ownership using a natural experiment created by the 2012 presidential election and the impending fiscal cliff. In this setting, insiders (who are subject to dividend taxes) had a personal incentive to pay out large special dividends, and this incentive was stronger for insiders who owned larger shares of their firms. We show that when insider ownership was high, firms were less responsive to tax incentives of their investor base (i.e., the fraction of taxable vs. non-taxable shareholders). Moreover, when there was greater misalignment (high insider ownership combined with high ownership by non-taxable investors), these decisions had higher negative valuation implications and often reduced firm value.

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CHAPTER 1

THE EFFECT OF INVESTOR HORIZONS ON CORPORATE INVESTMENT HORIZONS

1.1 Introduction

What determines firms' choices of investment project horizons? This has long been a central question in the world of corporations.¹ While it is controversial whether short-termism is socially bad or not, corporate short-termism could be inefficient for the firms in certain circumstances, especially when managers choose short-term investment projects over more valuable long-term ones. In the real world, firms manage several projects at the same time and a corporation can be thought of as a portfolio with multiple investment projects with different horizons and values. Therefore, the more specific question would be as following: what affects within-firm capital reallocations across investment projects (or divisions) with different horizons and intrinsic values, thereby the overall horizon and value of corporate investments as well?

This study focuses on investor horizon as the main determinant of corporate investment horizons. Short-term trading behaviors by investors have been suspected to be one of the main causes of short-termisms among firms, if any. For example, the literature has shown that short-term investors pressure firms to temporarily cut R&D expenditures to meet short-term earnings goals (Bushee (1998) and Cremers, Pareek, and Sautner (2016)). Froot, Perold, and Stein (1992) also attempt in their cross-country study to prove this belief on short-term trading practices as a driving force that shortens corporate investment horizons. In this context, it has been proposed that lengthening investor horizons could mitigate such short-term preferences by corporations on investment decisions.²

¹For example, the National Academy of Sciences, Engineering, and Medicine published a book in 1992 where discussed are the potential causes of short-term preferences by U.S. firms in deciding among many technological innovation opportunities and possible solutions to such short-termism problems (National Academy of Engineering (1992))

²For instance, Hillary Clinton proposed U.S. corporate tax reforms in July 2015 that include doubling

Empirically testing this proposition is challenging mainly because researchers do not observe investment projects within a company, thereby being unable to measure corporate investment horizons. I detour this difficulty using a patent-citation-based product life-cycle length index by industry for the sample of U.S. diversified firms with multiple segments. To measure the product life-cycle length for each industry, I follow Bilir (2014) and pick the median average forward citation lags across all patents in the industry, where the average forward citation lag for each patent is defined as the average of time lapse between the cited patent’s grant date and a subsequent citation across all citing patents. This industry-level product life-cycle length measures the life-span of a new technology and is used as the proxy for investment horizon for each division based on the division’s industry. As a firm’s overall investment horizon, I use the asset-weighted average of product life-cycle length across all divisions. This firm-level corporate investment horizon varies across time by firms reallocating their capitals across divisions within firm. For the measure of investor horizon, I follow the literature (e.g., Derrien, Kecskes, and Thesmar (2013)) and use the widely-used turnover-based long-term institutional ownership.

Using these investment horizon measures of firms and investors for a panel of firm-year observations of the U.S. conglomerates over a period of 20 years, I find that long-term institutional ownership is positively associated with corporate investment horizon: a one-standard-deviation increase in long-term ownership is associated with eight months and two weeks increase in the average product life-cycle length, which is approximately 49.8% of its standard deviation. I also document a positive relationship between long-term ownership and the value of corporate investment: a one-standard-deviation increase in long-term ownership is associated with an increase in corporate investment value by 4.7%.³

I next examine a channel through which investors can influence managers’ decisions on investment horizons. If corporate managers’ compensations are associated more with short-term performance of their firms, the managers would care more about divisions with short-term investment projects. Therefore, long-term investors could mitigate this short-termism by affecting the managers’ compensation structures. To test this implication, I explore grant-level data on CEO compensation. More specifically, I develop a firm-year-

the short-term holding period from one year to two years, which could eventually have resulted in a sharp increase in the U.S. capital gains tax rates for investments held for fewer than two years.

³I proxy the value of corporate investment by the asset-weighted average of industry-level economic value of innovation across all divisions of the firm, where the industry-level innovation value is the average of Kogan, Papanikolaou, Seru, and Stoffman’s (2017) announcement-return-based measure of patent’s economic values across all patents in each industry.

level (CEO-year-level) measure of incentive horizon based on the vesting periods of each performance-based grant and repeat the baseline tests replacing the dependent variable with this incentive horizon measure. The results support the aforementioned implication. For example, a one-standard-deviation increase in long-term ownership is associated with a lengthened CEO incentive horizon by four months and two weeks, which is approximately 53% of the standard deviation of the incentive horizon.

The evidence from these panel regressions is, however, subject to endogeneity issues: either may there be omitted factors that affect both long-term ownership and corporate investment horizon, or it may be the reverse causality that drives the documented horizon alignment effects between investors and firms, that is, long-term investors may actively choose their portfolio stocks of which corporate investment horizons are expected to be long.

To address this endogeneity concern and establish a causal inference on the effect of long-term ownership, I employ an identification strategy based on the sharp discontinuity in long-term institutional ownership around the Russell 1000/2000 indexes threshold. Every year, the largest 3000 stocks are ranked by the Russell based on market capitalization, and the first 1000 and the following 2000 stocks are assigned to the Russell 1000 and 2000 indexes, respectively. Then within each index, the stocks are assigned their index weights based on the market capitalization ranking. Hence, the firms of their stocks on the top of the Russell 2000 index have sharply larger index weights than those of their stocks on the bottom of the Russell 1000 index. On the other hand, there is no significant difference in all other metrics including market capitalization among those firms in a narrow bandwidth around the Russell 1000/2000 threshold. Finally, since the Russell indexes are the most widely-adopted indexes by quasi-indexing institutional investors who are long-term investors at the same time, long-term institutional ownership is sharply higher for the firms slightly below the threshold than those slightly above it. This discontinuity around the index threshold existing only in long-term institutional ownership enables the Russell 2000 index membership to satisfy the exclusion restriction and hence makes it possible to identify the causal effect of long-term institutional ownership.

With this strategy, the results from two-stage least square (2SLS) regressions, by instrumenting the long-term institutional ownership by the Russell 2000 index membership and confining the sample to a narrow bandwidth (± 100) around the Russell 1000/2000 threshold, support the causal effects of long-term ownership on both corporate investment horizon and the value of corporate investment: a one-standard-deviation increase in

long-term ownership not only leads to six months and three weeks increase in the average product life-cycle lengths, but also results in an increase in the firm's average economic value of innovative projects by 4.1%, which are approximately 54% and 20% of the standard deviations of the average product life-cycle lengths and the corporate investment value, respectively, for the sample used in these 2SLS specifications. Therefore, long-term institutional investors indeed have positive and (both statistically and economically) significant influence on corporate investment horizons and values. I also document the causal effect of investor horizon on CEO's incentive horizon, which confirms the possible workings of incentive horizon channel: a one-standard-deviation increase in long-term ownership is followed by an increase in the average vesting period of the CEO's performance-based grants by three months and two weeks.

A cross-sectional analysis using several proxies for undervaluation based on residual book-to-markets or future excess returns shows that all these effects become much stronger or even only exist for highly undervalued firms. Moreover, test results from segment-level specifications provide further evidence that firms increase their overall horizons and values of corporate investments in response to an increase in long-term ownerships by raising capital expenditures of divisions with long product life-cycles *and* high innovation values, while reducing those of divisions with short product life-cycles *and* low innovation values, which suggests an internal capital market channel through which managers of multi-segment firms dynamically adjust the horizons and values of investment projects. Finally, I repeat the same 2SLS regressions, but this time decomposing long-term ownership into block and non-block ownerships and instrumenting long-term block ownership by the Russell 2000 index membership, and find that the same positive causal effects hold, which reinforces the plausibility of long-term investors' real effects on managers' incentive plans and their choices of investment projects.

Combined altogether, these results provide empirical evidence that is loosely consistent with implications from a theoretical model developed by Shleifer and Vishny (1990) (SV hereafter). The efficient market hypothesis suggests that horizons should not matter because a firm's stock price is always equal to its fundamental value regardless of the horizons of investments. Therefore, SV's model assumes *misvaluation*: an underpricing of long-term projects takes longer to be eliminated and hence long-term projects are exposed to more noise trader risk than short-term projects. Then, the main prediction from the model is that, to eliminate underpricing and realize their returns as soon as possible, short-term investors funded by liabilities with short maturities prefer short-term investment projects

even if long-term projects have higher fundamental values, which in turn, in equilibrium, leads to larger mispricing for long-term projects funded mostly by short-term investors for the costs of arbitrage for short-term and long-term projects to be equal. Then corporate managers whose compensations are partly associated with short-run (stock) performance would choose short-term projects because the stock price being underpriced for a long period of time would hurt their payoffs or even threaten their jobs. This equilibrium short-termism by investors and firms can be mitigated by long-term investors because long-term projects funded by long-term investors would be less mispriced and hence corporate managers would be able to keep pursuing long-term profitable projects without being distracted by pressure for short-term performance.⁴

Furthermore, recent studies have shown that institutional investors influence corporate policies such as governance choices (Appel, Gormley, and Keim (2016)) and payout policies (Crane, Michenaud, and Weston (2016)). Also, Derrien, Kecskes, and Thesmar (2013) and Harford, Kecskes, and Mansi (2016) find that long-term institutional investors affect corporate governance and managerial misbehaviors as well as corporate policies such as investment and financing decisions. These studies all provide consistent evidence that investors influence management through active monitoring and governance mechanisms. Therefore, my empirical findings are consistent with a new hypothesis combining the aforementioned prediction from SV's model on investors' horizon preferences and managerial short-termism behaviors, and the recent empirical evidences on institutional investors as active owners: in the presence of underpricing corporate managers would increase the horizons of their firms' real investments by reallocating capitals across divisions with different investment horizons in response to an increase of long-term institutional ownership in their firms, because institutional investors with long investment horizons would prefer long-term more valuable investment projects and hence try to mitigate the effect of speculative components in stock prices on managers' biased investment decisions toward short-term projects, subsequently resulting in greater overall economic values of corporate investments. Throughout the paper, I call this hypothesis the *horizon alignment hypothesis*.

⁴The model implication by Shleifer and Vishny (1990) is consistent with a popular belief among practitioners that long-term investment could be a good way to make profits even though it requires more commitment with higher opportunity costs and takes longer to realize the returns, for example, “*Numerous market players concur with this view. For instance, CalPERS (California Public Employees’ Retirement System pension fund) published its 10 investment beliefs; among them is the belief that “a long term investment horizon is a responsibility and an advantage” that leads them to “favor investment strategies that create long-term, sustainable value.”*” (Roberge, Flaherty, Jr., Almeida, Jr., and Boyd (2016))

While some related studies examine the effects of pressures by short-term investors on managerial choices between short-term earnings management and investments in R&D or tangible assets (e.g., Bushee (1998), Bolton, Scheinkman, and Xiong (2006), and Cremers, Pareek, and Sautner (2016)), the effects of CEO contractual protection on those managerial choices (e.g., Chen, Cheng, Lo, and Wang (2015)), the differential responsiveness to changes in investment opportunities between publicly listed firms and privately held firms due to short-termist pressures by stock markets (Asker, Farre-Mensa, and Ljungqvist (2015)), or the effects of long-term investors on corporate investments and innovations (e.g. Harford, Keckes, and Mansi (2016)), yet has been attempted to measure the horizons of firms' real investments and sort investments or innovations into short-term or long-term ones. For the following reasons, it is critical to measure the horizons of real corporate investments, which have not been successful in the existing body of literature. First, the existing amount-based measures of long-term investments such as capital expenditures or R&D expenditures cannot tell anything about the actual horizons of the investment projects: it is not always the case that longer-term projects require larger investments than shorter-term projects. Therefore, an increase (decrease) in the amount of such investments cannot be deemed as a lengthened (shortened) corporate investment horizon. Second, the short-term earnings management, often used as a proxy for short-term investment projects, may be a consequence of managers' endogenous intentions to create mispricing. Therefore, comparing short-term earnings management with R&D or capital expenditures cannot correctly test the predictions from SV's model that assumes the presence of mispricing.

This paper is related to the growing literature on managerial short-termism. Bebchuk and Stole (1993) propose theoretical predictions that in the presence of imperfect information managerial short-term objectives could lead to either underinvestment or overinvestment depending on the characteristics of the imperfect information. Milbradt and Oehmke (2015) develop a model predicting that higher cost of external financing for long-term projects could induce managers to make inefficient investment decisions toward short-term projects, thereby generating an equilibrium inefficient short-termism. On the other hand, Thakor (2016) shows that short-termism could be an efficient decision in that it could limit managerial rent-seeking behavior and reveal managerial ability faster. A recent empirical study by Budish, Roin, and Williams (2015) documents an evidence of short-termism by showing that private investments in cancer research are distorted away from long-term projects due to the structure of the patent system where firms file patents at the time of invention rather than commercialization. Chen, Cheng, Lo, and Wang (2015) also doc-

ument an empirical evidence on the effect of CEO contractual protection on managerial short-termism. My paper differs from these papers because I examine investor horizon as the determinant of managerial horizon on investment decisions while others investigate either consequences of short-termism or other factors such as financing frictions and CEO contracts as the determinants of managerial investment horizons.

This paper is also closely related to the literature on the role of investor horizons in stock markets and corporate policies. However, the previous studies in this literature investigate the effects of investor horizons on variables other than corporate investment horizons: for example, M&A deals and post-merger performance (Gaspar, Massa, and Matos (2005) and Chen, Harford, and Li (2007)), amplification of negative shocks in the aftermath of the financial crisis (Cella, Ellul, and Giannetti (2013)), catering behaviors by corporate managers (Derrien, Kecskes, and Thesmar (2013)), CEO horizon incentives (Cadman and Sunder (2014)), and investment choices by venture capitals on the life-cycles of innovative firms (Barrot (2016)).

My paper differs from other papers that use quasi-indexed institutions as the source of exogenous variation in institutional ownerships of firms. Unlike Aghion, Van Reenen, and Zingales (2013), Boone and White (2015), Appel, Gormley, and Keim (2016), Crane, Michenaud, and Weston (2016) that use the index membership as an instrumental variable for institutional ownership, it is long-term institutional ownership that I instrument by the index membership. Basically though, what other papers actually instrument by the index membership is also institutional ownership by long-term investors because quasi-indexers are classified into long-term investors (Bushee (1998)).

The rest of the paper is organized as follows. Section 1.2 develops the hypotheses. Section 3.2 describes the data and the variables used in empirical tests. Section 1.4 reports my empirical results from the baseline specifications. Section 1.5 presents the empirical results with causal inference from an identification strategy. Section 1.6 concludes.

1.2 Hypotheses Development

In this section, I develop hypotheses that I test using my data in this study. In short, I extend and combine the implications from the model in Shleifer and Vishny (1990) (SV hereafter again) and the well-documented empirical evidence in the literature.

Consider a conglomerate which consists of two divisions: a division that has a long-term

project and the other division that has a short-term project. This firm dynamically adjust the overall investment horizon at firm level by reallocating its capital across these two divisions. Suppose there are three types of investors in the stock market: short-term smart investors (arbitrageurs), long-term investors, and noise traders, which implicitly assumes that the market is not perfectly efficient at least to some degree. I only consider the case of underpricing here as the other case for overvaluation is symmetric.⁵ The key assumption of SV's model is that for short-term investors the cost of arbitrage is higher for long-term investment projects than for short-term investment projects: both fundamental and noise trader risks for short-term investors are more crucial for long-term projects of which the elimination of underpricing takes longer because there is more time for negative news or pessimism among investors to arrive,⁶ and these risks cannot be completely shared in the market because the existence of information asymmetry between short-term arbitrageurs and outside lenders imposes credit constraints on short-term investors for borrowing rates, amount, and maturities. Furthermore, due to such credit constraints, short-term investors are additionally subject to opportunity costs of their capital being tied up for long-term projects. In a related context, short-term investors might inherently have shorter maturities of their liabilities from the beginning.⁷

Then the main implication on investors' side from SV's model due to this higher cost of arbitrage and the resulting credit and maturity constraints imposed on short-term investors is that, in order to eliminate underpricing sooner and realize their returns from arbitraging as soon as possible, short-term arbitrageurs would prefer short-term projects even if long-term projects have higher fundamental values.

In equilibrium, the returns to arbitrage on the long-term project and the short-term project must be the same. Since the cost of arbitrage is greater for the long-term project, short-term investors require the long-term project to be more underpriced. Then another implication from SV's model on the side of corporate managers is that the managers would

⁵As a matter of fact, the case of overvaluation is irrelevant to consider in this model framework because both short-term and long-term investors would immediately liquidate their shares of undervalued firms, hence they are not differentiated.

⁶'Fundamental risk' means that the fundamental value could actually fall before the completion of the project and the elimination of the undervaluation. 'Noise trader risk' implies that the underpricing could become even larger tomorrow than today, so investors would lose money if they liquidate their positions tomorrow.

⁷"For example, pension funds have long-term liabilities and thus long investment horizons whereas mutual funds are subject to large short-term redemptions and thus their investment horizons are also short-term." (Derrien, Kecskes, and Thesmar (2013))

choose the short-term less valuable- over the long-term more valuable investment project because in practice the compensation of managers is in part linked to short-term equity performance and hence the managers would want to avoid the stock price to be underpriced for a long time. Therefore, long-term investors could mitigate such inefficient corporate short-termisms, either through corporate manager’s observation of longer holding period by equity investors, thereby being less pressured by short-run stock performance, or through a lengthened managerial incentive horizon by activist shareholders with long-term investment horizon affecting executive compensation structures. This leads to the following hypothesis:

- An increase in the long-term ownership of a conglomerate is followed by a lengthened compensation horizon of the firm’s manager.
- Such increase in long-term ownership is subsequently followed by within-firm capital reallocations from short-term less valuable to long-term more valuable investment projects.
- Such capital reallocations result in an increase of the overall investment horizon as well as the overall fundamental value of the firm.
- This horizon alignment effect is stronger for firms with greater undervaluation.

In what follows, I directly test these implications through a battery of empirical specifications. I first construct the measures of corporate investment horizon, the value of corporate investment, managerial incentive horizon, and investor horizon. Then I show that the first three measures are positively correlated with the measure of investor horizon, respectively. I establish the causality of those positive relationships by instrumenting the long-term institutional ownership by its discontinuity around the Russell 1000/2000 index threshold and show that the causal relationship is stronger for firms with greater undervaluation. I also show that those effects are the consequences of within-firm capital reallocations.

1.3 Data and Variables

In this section, I describe how to construct the sample from various data sources, discuss the main variables used in this study, and report summary statistics of them.

1.3.1 Data Sources and Sample Construction

The data for this study are compiled from several sources. Firm-level accounting information is obtained from Compustat and data on stock come from the Center for Research in Security Prices (CRSP). Divisional data for U.S. publicly listed firms are acquired from Compustat Historical Segments Data. Patent data used to measure industry-level product life-cycle lengths are collected from the National Bureau of Economic Research (NBER) Patent Citations Data file. Data on the dollar value of each patent are collected from Noah Stoffman’s website on patent data.⁸ Grant-level data used to calculate the horizons of performance-related CEO compensations are gathered from the Incentive Lab database. Data on institutional common stock holdings are obtained from Thomson Reuters.

The sample construction starts at segment level by excluding all other types of segments except business segments. For the sake of measuring product life-cycle length, I keep only segments where patent data are available for their industries. I also drop segment-years with missing values for capital expenditures or identifiable total assets. Then at firm level, since I concentrate on U.S. conglomerates in this study, among all publicly traded U.S. firms between 1990 and 2010 only those with at least two segments operating in different industries are kept in the sample.⁹ I merge the resulting data file with annual firm characteristics from Compustat. Finally, I merge these data with institutional ownership data from Thomson Reuters and drop firm-year observations with missing values for institutional ownership. The final sample for baseline analyses consists of 6,619 firm-year and 21,170 segment-year observations.

1.3.2 Variables and Summary Statistics

1.3.2.1 Corporate Investment Horizons

One of the most challenging parts in empirically testing the horizon alignment hypotheses is to measure corporate investment horizons. Two most critical features of such measure to be desired are: 1) it should measure the actual time horizon of real investments because

⁸<https://iu.app.box.com/v/patents>

⁹Since companies typically look back three years and review all the information again when reporting segments data, there are occasions that some already recorded entries are updated within three years. To keep any unfinalized data from polluting the test results and to be as conservative as possible by having safety margins, I exclude recent years from the sample.

otherwise there would be no comparative advantage of using it compared to examining managerial choices between short-term earnings management and spending on R&D, and we would be unable to directly test the implications derived from Shleifer and Vishny’s (1990) model; 2) it should measure *ex ante* required or expected time length for an investment to come to fruition at the moment of a managerial investment decision rather than *ex post* actual time taken until the fruition of the investment because the question of interest is whether investor horizons influence corporate investment decisions, not the outcome of corporate investments.

To meet such desired features, I use an industry-level technology-based measure of product life-cycle length as the proxy for investment time horizon of each industry. Following Bilir (2014), I measure an industry’s product life-cycle length using the NBER Patent Citation Data as follows: 1) for each pair of cited and citing patents, I calculate the time lapse between the cited patent’s grant date and the citing patent’s citation date, which is called the *forward citation lag* by Bilir (2014); 2) for each patent, I compute the average of the forward citation lags across all subsequent citing patents; 3) then for each three-digit SIC industry, I collect all patents filed for the industry and pick the median of the average forward citation lags which is the measure of product life-cycle length of that industry.

This product life-cycle length varies from approximately six to thirteen years across industries. Table 1.2 reports the complete list of product life-cycle lengths for SIC three-digit codes where at least 1,000 patents have been granted over the past forty years. For example, the non-electric heating equipment industry is the one with the longest product life-cycle of approximately thirteen years, and the electronic machinery industry is the one with the shortest product life-cycle of approximately six years. What this industry-level product life-cycle length actually measures is the economic lifetime of a patented technology rather than that of a specific version of a product which a product turnover measure based on product level data, if any, would proxy.¹⁰

This measure of industry-level product life-cycle length satisfies the two desired features above of a corporate investment horizon measure. First, it measures the actual time horizon in years rather than just whether a corporate decision is of short-term or long-term view.

¹⁰ “As an illustration of this product definition, consider the example of automobiles. New car models within an automobile product line are introduced annually (termed the “model cycle” in Bils 2009), but the technological overlap across successive models is substantial... Successive versions of the Honda Accord, for example, are so similar that the BLS substitutes new versions for old (e.g., the 2012 Honda Accord LX is substituted for the 2011 Honda Accord LX, with minimal adjustment) to establish price comparisons underlying official US inflation indexes (Bils 2009).”, Bilir (2014)

Second and more importantly, it measures the *ex ante* required or expected time length until an investment starts generating outcomes. Consider an example where there are two industries, that is, one industry with a long product life-cycle of thirteen years and the other industry with a short product life-cycle of six years. Then, on average, the thirteen-year product life-cycle length implies that once a company achieves a patented technology in this industry, it can expect a secured cash-flow-generating time period of thirteen years while the six-year product life-cycle length means such time period of only six years. This equivalently means that the company operating in the long product life-cycle industry can have, on average, longer time for developing a new technology than companies operating in the short product life-cycle industry.

To help better understand how this measure of product life-cycle length based only on cross-sectional variations across industries is used for measuring corporate investment horizons at firm-year level, consider again a diversified firm consisting of two segments as exemplified in Section 1.2: a segment that operates in an industry with long product life-cycle and the other segment that operates in another industry with short product life-cycle.¹¹ The product life-cycle length for each industry is exogenously given and time-invariant. Each segment reports its own total assets which dynamically change every year. Then the overall investment horizon of a conglomerate firm for each year is calculated as the asset-weighted average of product life-cycle lengths across segments, that is, simply

$$Corporate\ Investment\ Horizon_{i,t} = Avg.\ PLC_{i,t} = \frac{\sum_{j=1}^2 ias_{j,t} \cdot PLC_j}{AT_{i,t}}.$$

Avg. PLC stands for average product life-cycle length. PLC_j is the product life-cycle length of the segment j 's industry and $AT_{i,t}$ denotes total assets of firm i for the year t . $ias_{j,t}$ denotes identifiable total assets of segment j for the year t which is the main

¹¹Among many other examples of such a diversified firm is Procter & Gamble Co. (P&G) which is a U.S. multinational conglomerate giant manufacturing mainly cleaning agents and personal care products. P&G largely has three major segments where patent data are available: one is its oldest and biggest home-care segment that produces, for instance, dishwashing liquid and laundry detergent brands such as Dawn, Tide, and Downy, of which industry has approximately eight years of short product life-cycle; another is the health-care and pharmaceutical segment that produces, for example, cough and cold products such as Vicks or medicines for minor digestive system upset such as Pepto-Bismol, whose industry has approximately ten years of long product life-cycle; and the third is its grooming segment which was recently formed from the acquisitions of Gillette and Braun that manufactures razors and blades of which industry has 11.69 years of very-long product life-cycle.

source of cross-sectional and time-series variations in this firm-level corporate investment horizon measure and changes every year as a result of within-firm capital allocations across segments. Another source of time-series variations in the corporate investment horizon is corporate restructuring such as mergers and acquisitions, divestitures, spin-offs, etc. which occur infrequently though, hence is not closely examined in this paper.

1.3.2.2 Economic Value of Corporate Investment

Another challenging part in an empirical study on the horizon alignment hypotheses is measuring the fundamental value of corporate investment. Successful execution on this is critical because the horizon should not matter in the first place unless the long-term investment projects have greater fundamental values than short-term projects. This task is extremely difficult because researchers do not directly observe values of corporate investment projects.

Since my measure of corporate investment horizon is based on the industry-level innovation activities, I also use the patent data to measure the values of corporate investment. More specifically, I use the data on economic value of each patent that Kogan, Papanikolaou, Seru, and Stoffman (2017) (KPSS hereafter) create in their recently published paper using the announcement-day stock return of each patent. They develop a model that derives the dollar value (deflated to 1982 dollars) of each patent implied from the stock market reaction to the announcement of granting the patent. For each industry, I collect all patents over the six-year period prior to each year and take the average of their KPSS measures of economic value.¹² Then for each conglomerate, I compute the asset-weighted average of this industry-level patent economic value across all segments, which I define as the firm’s economic value of investment.

It is worth noting that the patent economic value varies significantly across industries and over time. In addition, at industry-level, the patent economic values of long product life-cycle industries are not necessarily greater than those of short product life-cycle industries. Furthermore, the overall ranking of industries in product life-cycle length and patent economic value does not apply to within-firm rankings in the same manner. For example, the SIC industry ‘367’ for ‘Electronic Components and Accessories’ has relatively short product life-cycle length of 7.39 years and low average patent economic value of \$9.65

¹²When measuring both corporate investment horizon and the value corporate investment, I use the USPTO-SIC concordance to aggregate the USPTO-class-level data at each three-digit SIC.

million in 1982 dollars. However, its product life-cycle length and average patent economic value are long and high compared to the SIC industry ‘383’ for ‘Electronics Machinery’ which has product life-cycle length of 5.99 years and average patent economic value of \$1.6 million in 1982 dollars. Therefore, for a conglomerate operating in both industries, the ‘Electronic Components and Accessories’ industry is deemed as a long-term valuable industry. These together imply that I need a cross-sectional analysis to see whether long-term investors influence managers to reallocate capitals toward divisions with long-term profitable investment projects, instead of simply checking whether long-horizon industries systematically have greater economic values of investments.

1.3.2.3 Managerial Incentive Horizon

To investigate whether long-term investors attempt to make any changes on a firm’s executive compensation structure so that the manager of the firm can pursue long-term profitable investment projects without pressures for short-term performance, I explore grant-level data on executive compensation collected from the Incentive Lab. In particular, I focus on CEOs and performance-related incentive plans in their compensation packages to create a firm-level measure of incentive horizon. A CEO’s compensation package consists of a number of grants that vary in many dimensions such as the composition of performance targets, vesting schedule, payment method, and so forth. Then each grant again comprises multiple awards that vary in performance metric, evaluation period, payout structure, etc.

I first calculate the average vesting period (or performance evaluation period) for each award and year. More specifically, I compute the exponentially-weighted average of vesting months between the start and the end of the award vesting period, i.e.,

$$\text{Average Vesting Period} = \frac{\sum_{n=1}^N M_n e^{-(N-n) \ln 2/h}}{\sum_{n=1}^N e^{-(N-n) \ln 2/h}}.$$

M_n is the n th month between the start month and the end month of the award vesting period. For example, if the start month and the end month of an award are 12th month and 36th month, respectively, 6th month is the 17th month. h denotes the half-life that makes the month that lie h months in the past weigh half as much as the end month. I choose the half life of 6 month assuming that managers would care more about the performance

goal as the end of vesting period approaches and they especially would do so most during the last 6 months.¹³

Then at grant level, I compute the value-weighted average of vesting period across all awards in a grant for each year. And finally, I again compute the value-weighted average of this grant-level vesting period across all grants in a compensation package for a CEO, which is my firm-level measure of managerial incentive horizon in months. This measure captures the average time period over which the firm performance is evaluated and hence likely how far in the future a manager whose incentives are tied to the firm performance would care about the success of the firm’s investment projects.

1.3.2.4 Long-term Institutional Ownership

The main explanatory variable of interest in this study is investor horizon. This paper focuses on investment horizons of institutional investors because their ownerships in stocks have been increased over time, especially more in recent years, and so has been the importance of institutional investors.¹⁴ Many ways to measure investor horizons of institutional investors have been introduced in the literature. Among others, there are two most recently introduced approaches to measure investor horizon: the first one is the measure based on portfolio turnover by institutional investors (e.g., Bushee (1998), Barber and Odean (2000), Gaspar, Massa, and Matos (2005), Polk and Sapienza (2009), and Derrien, Kecskes, and Thesmar (2013)), and the other one is the measure based on stock holding duration (Cremers, Pareek, and Sautner (2016)). The main difference between these two approaches is that the former aggregates all stock holdings at the investor level first and then aggregates the investors at the stock level while the latter only aggregates investors at the stock level without an aggregation at the investor level. This difference enables the latter to look into the holding duration of each stock in an investor’s portfolio and allow any investor to be short-term in some stocks and long-term in others, while making the former focus more on the trading patterns of the investor over all stocks in her portfolio. Since both measures of investor horizon have their own pros and cons, one needs to carefully pick a measure that best fits the research design.

For the best interest of the research design in this paper, I choose the turnover-based

¹³When I pick other choices of the half life such as 9 month or 12 month, the results remain largely the same.

¹⁴See Figure 1 in Cremers, Pareek, and Sautner (2016).

ownership measure over the stock duration measure. First, the ownership measure based on share turnovers works better for the identification strategy in the later section based on discontinuity around the Russell 1000/2000 index threshold. The exclusion restriction for the IV-2SLS estimations using this identification strategy is based on passive investments by quasi-indexers who do not have controls over the selection of stocks in their portfolios. While it is straightforward that the indexing by long-term quasi-indexers should lead to discontinuity in long-term institutional ownership around the Russell 1000/2000 threshold because stocks in Russell indexes are ranked based solely on market capitalizations and those on the top of Russell 2000 are assigned sharply greater index weights than those on the bottom of Russell 1000, it is not clear whether such passive indexing should lead to discontinuity in stock duration of firms around the threshold for the following reasons: there could exist short-term indexers as well, at least to some degree, and stocks that are newly added to Russell 2000 are indeed subject to a reduction rather than an increase in stock duration because they happen to be just included in an indexer’s portfolio.¹⁵

Second, long-term institutional ownership measure fits better the focus of this study, that is, the role of long-term institutional investors as owners of firms rather than arbitrageurs. The main interest of this study is whether monitoring by long-term institutional investors alleviates the negative effect of underpricing on corporate investment horizon, that is, the amplification of short-termism that pressures corporate managers to forgo long-term profitable projects. Stock duration measure is not ideal for this purpose because it tells us little about inherent characteristics of each institutional investor and hence we cannot judge whether any empirical results come from actual intentions of the investors.

To measure long-term institutional ownership at firm level, I follow Derrien, Kecskes, and Thesmar (2013).¹⁶ Using the quarterly data from 13F filings on institutional holdings, I first look back three years, i.e., twelve quarters, and calculate portfolio turnover for each institutional investor, which is the fraction of shares that are no longer held after three years of their purchases. For a given quarter, I compute the mean of this portfolio turnover during the most recent four quarters to keep one extreme quarter from distorting

¹⁵As a matter of fact, it is extremely challenging to justify the use of stock duration measure as an exogenous variable in any empirical studies. An investor’s decision on the duration of holding a specific stock is fully endogenous and stock duration dynamically varies at investor-stock level. Due to this endogeneity and the complexity in the source of variations, it has been unsuccessful in the literature to come up with an identification strategy that explores exogenous variations in the stock duration.

¹⁶For the complete procedure to measure long-term institutional ownership step by step, refer to Section 3.B of Derrien, Kecskes, and Thesmar (2013).

the portfolio turnover. Then I classify each institutional investor as long-term or short-term investor depending on whether the portfolio turnover is less or greater than 35% (cf. Froot, Perold, and Stein (1992)). Finally, for each firm and for a given quarter, I calculate the fraction of shares held by the long-term institutional investors out of the firm’s total shares outstanding to come up with the measure of long-term institutional ownership at firm level. Short-term institutional ownership, by construction, can be obtained by subtracting long-term institutional ownership from total institutional ownership of a firm.

The investor-level portfolio turnover represents an investor characteristic, that is, the average turnover across all shares in an institutional investor’s portfolio, by looking upon the portfolio as a bundle instead of separately looking into each stock in the portfolio. And Derrien, Kecskes, and Thesmar (2013) show that this investor portfolio turnover is stable over time¹⁷: each quarter, they sort all institutional investors whose holdings data are available from 13F filings into quartiles based on their portfolio turnovers, calculate the mean portfolio turnovers over the following quarters up to five years, and show that investors remain in their original quartiles over all twenty quarters, which means that short-term investors stay short-term and long-term investors stay long-term over time, and there is no such dramatic conversion that short-term investors become long-term or vice versa. Therefore, the long-term institutional ownership measure based on the investor portfolio turnover implicitly regards institutional investors as having time-invariant investment horizons regardless of which stocks they hold, and this feature is what makes it possible to examine the role and effect of long-term institutional investors while the measure does not separately look into holding duration of each stock in their portfolios.

1.3.2.5 Other Variables and Summary Statistics

The definitions of other firm-level variables used in the baseline specifications are as follows. Total institutional ownership (*Institutional ownership*) is defined as the sum of shares held by institutional investors divided by shares outstanding. Blockholder ownership (*Block ownership*) is defined as the sum of shares held by institutional investors with an ownership stake of greater than or equal to 5%. Sales growth (*Sales growth*) is the sales growth rate, which is defined as sales minus lagged sales divided by lagged sales. Cash flow (*Cash flow*) is earnings before interest and taxes plus depreciation divided by total assets. Leverage

¹⁷See Figure 1 in the paper.

(*Debt*) equals total debt over total assets. Firm size (*Size*) is equal to the natural logarithm of total assets. Tobin's Q (*Q*) is total assets minus book value of equity plus market value of equity over total assets. Investment (*Investment*) is defined as capital expenditure over total assets and R&D expenditure (*R&D*) is defined as research and development expense divided by total assets. The segment-level cash flow is defined in a slightly different manner as operating profit over total segment assets. All variables are winsorized at the 1% and 99% levels in all analyses.

Table 1.3 summarizes both the firm-level (Panel A) and the segment-level (Panel B) data for the sample periods (1990 to 2010) used in my analyses. The mean average product life-cycle (PLC) length at firm level is 9.64 years with the standard deviation of 1.44 years. Long-term institutional ownership is 32.3% on average with the standard deviation of 22.6% and total institutional ownership is 47.2% on average with the standard deviation of 32.1%. It can be observed by comparing with those reported in other work measuring long-term ownership from 13F institutional holding data (e.g., Derrien, Kecskes, and Thesmar (2013)) that the sample means of long-term ownership and institutional ownership in this paper are greater, which indicates that institutional investors, especially those with long investment horizons, are on average more likely to hold stocks of diversified conglomerates.

1.4 Baseline Results

To examine the relationship between investor horizon and corporate investment horizon, I estimate the following firm-level baseline specification using ordinary least squares (OLS) regressions:

$$\begin{aligned} AveragePLCLength_{i,t} &= \alpha + \beta Long-termOwnership_{i,t-1} \\ &+ \gamma InstitutionalOwnership_{i,t-1} + \eta' \cdot \mathbf{X}_{i,t-1} + \varphi_i + \tau_t + \varepsilon_{i,t} \end{aligned}$$

where i indexes firms, t indexes years, $\mathbf{X}$ is a vector of control variables based on firm characteristics, φ_i denotes firm fixed effects to control for unobserved time-invariant firm heterogeneity, and τ_t denotes year fixed effects to control for unobserved market-wide shocks for each year. To minimize the risk of simultaneity to bias our estimation results, all explanatory variables lag the data on average product life-cycle length by one year. The coefficient of interest here is β which estimates the marginal changes in the average product

life-cycle length in years in response to a one-unit increment in long-term institutional ownership. To solely focus on the effect of investor horizon, total institutional ownership is included in all specifications.

The estimation results are reported in Table 1.4, columns (1) and (2). Consistent with the primary implication of the horizon alignment hypothesis developed in Section 1.2, I find a positive and statistically significant relationship between long-term institutional ownership and corporate investment horizon proxied by average product life-cycle length. For example, in column (2) with both firm and year fixed effects, given that the sample standard deviation of long-term institutional ownership is 23%, a one-standard-deviation increase in long-term institutional ownership is associated with an increase in average product life-cycle length of 0.715 years which is approximately eight months and two weeks. This effect is economically significant as it is approximately 49.8% of the standard deviation of average product life-cycle length.

To investigate the relationship between investor horizon and the value of corporate investments, I repeat the baseline analyses replacing the average product life-cycle length with the average patent economic value (*Average PEV*) as the dependent variable. Table 1.4, columns (3) and (4) report the results that are largely consistent with the horizon alignment hypothesis. The coefficient on the long-term ownership is positive and statistically significant in all specifications, which suggests that an increase in long-term ownership is followed by greater value of overall corporate investment in the following year. For instance, in column (4), a one-standard-deviation increase in long-term institutional ownership is associated with an increase in the average patent economic value by 4.7%. Again, the negative and statistically significant coefficient on institutional ownership supports the short-termism implication of the horizon alignment hypothesis that short-term investors put pressures on manager’s investment decisions toward short-term even if it is value-destroying.

As I derive in Section 1.2, the horizon alignment hypothesis suggests the incentive plan channel through which long-term investors can influence managers of conglomerates in making investment decisions (or capital reallocation decisions) across segments with different horizons. To discover this channel, I repeat the baseline analyses, but now with the measure of managerial incentive horizon, i.e., the average CEO grant vesting period (*Average CGV period*) as the dependent variable.

The results from the OLS regressions are reported in Table 1.4, columns (5) and (6). The coefficient of interest on long-term ownership is positive and statistically significant

in all columns. These results provide support for the incentive plan channel. For example, in column (6), a one-standard-deviation increase in long-term institutional ownership is associated with an increase in the average CEO grant vesting period by four months and two weeks. This effect is also economically significant as it is approximately 53% of the standard deviation of the average CEO grant vesting period.

1.5 Identification

The positive relationships documented in Section 1.4, between investor horizon and corporate investment horizon, corporate investment value, and managerial incentive horizon, are consistent with the implications of the horizon alignment hypothesis. However, this evidence from the estimations using OLS regressions on large panel data is subject to endogeneity that there may be omitted variables that affect both long-term institutional ownership and corporate investment horizon, which would bias my estimates. Among many others, for example, simultaneity is one of the most severe concerns because long-term institutional investors may self-select stocks with long and more valuable investment projects, which should result in the same empirical evidence above. Addressing this endogeneity concern is critical for the contribution of this study because one of the most important implications in the horizon alignment hypothesis developed in Section 1.2 is that investor horizons have causal effects on corporate managerial decisions on the horizon of real investments.

This section discusses an identification strategy which is a 2SLS approach based on an instrumental variable, the Russell 2000 index membership within a narrow bandwidth around the Russell 1000/2000 threshold, and documents evidence on the causality of the results found earlier in Section 1.4 as well as on monitoring and governance channel behind the causal relationship. It also discusses, through a cross-sectional analysis, the higher profitabilities of long-horizon investment projects pursued by long-term institutional investors.

To implement the identification strategy discussed in this section, I construct a subsample of U.S. conglomerates ranked near the Russell 1000/2000 threshold. The annual Russell index constituents data are provided by Russell. Since I concentrate on firms around the threshold, I merge my original sample of U.S. conglomerate firms with the Russell data and confine the sample firms to those ranked within the bandwidth of 100 centered on

the index threshold, that is, firms ranked between 991 and 1100. Following the literature, I end the sample period in 2006 because Russell started applying the banding policy on their index assignments since 2007 (Boone and White (2015), Appel, Gormley, and Keim (2016), and Crane, Michenaud, and Weston (2016)).¹⁸ The resulting subsample consists of 319 firm-year observations.

1.5.1 Discontinuity in Long-term Ownership around the Russell 1000/2000 Threshold

To address the aforementioned endogeneity concern and establish causal inference of the evidence documented so far, I employ an identification strategy based on sharp discontinuity in long-term institutional ownership around the threshold between the Russell 1000 and 2000 indexes. The Russell indexes are reconstituted each year mechanically based on stock prices as of the last trading day of May: the largest three thousand stocks are ranked based on their market capitalizations from rank 1 to rank 3000, and the first one thousand stocks are assigned to the Russell 1000 index (Russell 1000) and the following two thousand stocks are assigned to the Russell 2000 index (Russell 2000). Within each index, stocks are assigned their index portfolio weights based on this market capitalization ranking. As a result, the firms whose stocks are on the top of Russell 2000 have drastically larger index weights than those whose stocks are on the bottom of Russell 1000. Since the Russell indexes are among the most popular benchmarks that are tracked by the funds operated by quasi-indexing institutional investors¹⁹ who are also classified as long-term investors based on the definition of the measure of long-term institutional ownership used here, long-term institutional ownerships are sharply higher for the firms on the top of Russell 2000 than those on the bottom of Russell 1000.

Figure 1.1 graphically shows the discontinuity in long-term institutional ownership around the Russell 1000/2000 threshold. In this figure, I plot the average long-term institutional ownership over stocks in each bin of ten ranks across all years between 1990 and 2006, against the distance from the Russell 1000/2000 threshold which is defined as the actual

¹⁸For the sake of reducing the index turnover cost, they now make some non-mechanical adjustments to keep consistency in their indexes when the market capitalizations of firms around the threshold are not significant.

¹⁹The Russell 2000 index is the most widely adopted benchmark for small cap stocks while the Russell 1000 index is less commonly benchmarked because it competes against other popular indexes for large and mid caps stocks such as the S&P 500, S&P 400, the CRSP U.S. midcap index, etc.

Russell rank minus 1000.²⁰ For example, the distance from the threshold of the 999th ranked stock is -1, and that of the 1001st ranked stock is 1. It shows that long-term institutional ownership is increasing in market capitalization, but at the threshold, firms with slightly less market capitalizations have much higher long-term institutional ownership. This discontinuity indicates that, within a narrow bandwidth of firms around the Russell 1000/2000 threshold, the Russell 2000 membership has a clear and strong impact on long-term institutional ownership. Nevertheless, such discontinuity alone cannot fully qualify the Russell 2000 membership as an instrumental variable for long-term institutional ownership. This naturally leads to the next issue.

1.5.2 The Exclusion Restriction

Despite the sharp discontinuity in long-term institutional ownership around the Russell 1000/2000 threshold, another condition must be met for the Russell 2000 membership to be used as an instrumental variable - the exclusion restriction. In other words, the Russell 2000 membership must be exogenous to corporate investment horizon, except through its effect on the long-term institutional ownership.

It is the local continuity in potential outcomes around the threshold that enables this identifying assumption to be plausible: other than for the long-term institutional ownership, firms on the bottom of Russell 1000 are similar to those on the top of Russell 2000, hence on average there would have been no difference in potential outcomes including corporate investment horizon between the two groups in the absence of the discontinuity in index weights and long-term ownership. This is a reasonable assumption because the index assignments by Russell are completely mechanical as explained earlier in the previous section, and there is no reason to expect systematic and sharp differences in potential outcomes around the threshold.

Unfortunately, it is impossible to directly test the exclusion restriction using the existing data. I, however, perform a robustness check through an investigation into pretreatment effects to further support the plausibility of the exclusion restriction (Angrist and Pischke (2009)). Any observed pretreatment effects of the Russell 2000 membership on firm characteristics including corporate investment horizon would potentially imply the existence of omitted variables or sample selection bias. Specifically, by regressing the lagged variables

²⁰For this graph, I use the sample of all U.S. public firms instead of conglomerates only.

on the Russell 2000 membership dummy for the firms ranked within a narrow bandwidth around the threshold, I estimate the mean differences in the main explanatory variable, i.e., the long-term institutional ownership and the dependent variable, i.e., the average product life-cycle length as well as other firm characteristics in the year prior to the index assignment between firms slightly above the threshold and those slightly below the threshold. Table 1.5 presents the results. Each cell of the table reports the estimated coefficient on the Russell 2000 membership dummy from each OLS regression and its t -statistic in the parenthesis. Each column corresponds to the pre-treatment firm characteristic examined in each regression and each row corresponds to the bandwidth of firms used in each regression. The results largely show that no significant differences are observed in various potential outcomes and other firm characteristics between firms slightly above and below the index cutoff, which supports the plausibility of the local continuity assumption around the Russell 1000/2000 threshold and subsequently the exclusion restriction as well.

Therefore, the sharp discontinuity between the firms on the bottom of Russell 1000 and those on the top of Russell 2000 exists only on long-term institutional ownership²¹, which motivates the use of the IV-2SLS approach.

1.5.3 IV-2SLS Estimations

Based on the mechanical index assignments by Russell and the pretreatment analysis, it can be reasonably assumed that the discontinuity around the Russell 1000/2000 threshold is present only on index weights and eventually on long-term institutional ownership, which subsequently implies that the Russell 2000 membership only affects long-term institutional ownership while it is not correlated with any other factors that may influence corporate investment horizon in a narrow bandwidth around the threshold. Therefore, using a dummy variable for the assignment to the Russell 2000 index as an instrumental variable for the long-term institutional ownership, I estimate the following two-stage least square (2SLS) specification:

$$\begin{aligned} LTO_{i,t} &= \alpha + \delta_1 STO_{i,t} + \delta_2 Russell2000_{i,t} + \delta_3 (Rank^*_{i,t} - 1000) \\ &+ \delta_4 Russell2000_{i,t} (Rank^*_{i,t} - 1000) + \delta_5 FloatAdj_{i,t} + \tau_t + \varepsilon_{i,t} \end{aligned}$$

²¹Note that the discontinuity in long-term institutional ownership originates from the mechanical discontinuity in index weights.

$$\begin{aligned}
AveragePLCLength_{i,t} &= \theta + \beta_0 \hat{LTO}_{i,t} + \beta_1 STO_{i,t} + \beta_2 (Rank^*_{i,t} - 1000) \\
&+ \beta_3 Russell2000_{i,t} (Rank^*_{i,t} - 1000) + \beta_4 FloatAdj_{i,t} + \varsigma_t + \nu_{i,t}.
\end{aligned}$$

Russell2000 is a dummy variable indicating whether the firm belongs to Russell 2000 in a given year t . *Rank** is the rank of the firm based on market capitalization as of the last trading day in May each year, and *Rank*−1000* represents the rank distance from the index threshold. Both the rank distance, *Rank*−1000*, and its interaction with the Russell 2000 dummy, *Russell2000* × *Rank*−1000*, are included to control for any size-related effects and to focus on the variation near the threshold. *FloatAdj* is the difference between the market capitalization-based rank and the actual rank assigned by Russell. I follow previous studies exploring the same discontinuity around the Russell index cutoff and include this variable to control for the variation in index weights attributed to non-mechanical float adjustments made by Russell on the last day of June (e.g., Appel, Gormley, and Keim (2016) and Crane, Michenaud, and Weston (2016)).²² The coefficient of interest is β_0 which estimates the marginal changes in average product life-cycle length in response to a one-unit increase in the instrumented long-term institutional ownership.

The results from the first-stage regression reported in Table 1.6, columns (1) and (2) (columns (3) and (4)), formalize the sharp discontinuity in long-term (block) institutional ownership around the Russell 1000/2000 threshold described in Section 1.5.1.²³ The positive and statistically significant coefficients on the dummy variable, *Russell2000*, indicate that, on average, firms slightly below the threshold exhibit sharply larger long-term institutional ownership than those slightly above the threshold. For instance, in column (2), the mean long-term institutional ownership is 13.07% higher for the firms on the top of Russell 2000 than for the firms on the bottom of Russell 1000. This mean difference is economically significant as it is approximately 66% of the standard deviation and 24% of the average of long-term institutional ownership over the subsample firms used in the identification specifications. Thus, for firms within a narrow bandwidth around the threshold, the Russell 2000 membership has a strong positive impact on long-term institutional

²²Russell’s float calculation to determine the market capitalizations of firms to be used for assigning the index weights is unobservable to researchers. It is mostly about determining which price to be used in case of multiple share classes. However, it does not invalidate any empirical designs including mine because the Russell index memberships can be observed by researchers and the variation in index weights caused by the Russell’s undisclosed float calculations can be controlled by the actual ranks assigned by Russell which is also observable to researchers.

²³I report the discontinuity in long-term *and* block institutional ownership for an additional test on the effect of long-term investors with potentially more intervenient power.

ownership.

Table 1.7 presents the results from the second stage regressions of the average product life-cycle length, the average patent economic value, and the average CEO’s grant vesting period, respectively in columns (1)-(2), (3)-(4), and (5)-(6), on the instrumented long-term institutional ownership predicted from the first-stage regression. The results in all specifications confirm that the positive relationships documented in Section 1.4 are causal, that is, an increase of long-term institutional ownership causes the corporate investment horizon, the value of corporate investment, and managerial incentive horizon to increase. The estimated coefficient 3.2568 in column (2) implies that, in the small bandwidth of ± 100 , a one-standard-deviation increase in long-term institutional ownership due to the index assignment to Russell 2000 leads to an increase in average product life-cycle length by 0.565 years which is approximately six months and three weeks. This effect is economically significant as it is approximately 54% of the standard deviation of the average product life-cycle length. In addition, the coefficient estimates in columns (4) and (6), respectively, indicate that a one-standard-deviation increase in long-term ownership due to the index assignment to Russell 2000 results in a 4.1%-increase in the average patent economic value and a longer average CEO’s grant vesting period by three months and two weeks.

In sum, the estimation results from IV-2SLS regressions here establish the causality of the evidence of the horizon alignment hypothesis documented through the baseline analysis in Section 1.4, which can be interpreted as an increased long-term institutional ownership causing firms to increase their investment horizons and values as well as managerial incentive horizons.

1.5.4 Horizon Alignment and Mispricing

To test another implication from the horizon alignment hypothesis that underpricing is the main driving force of the horizon alignment effect and hence the effects documented earlier are more pronounced for highly undervalued firms, I divide the sample into above-median- and below-median-undervaluation groups based on some proxies for undervaluation and conduct the IV-2SLS regressions separately for each subsample.

To measure the degree of undervaluation, I use four different proxies introduced in the literature: residual book-to-market ratio by regressing book-to-market on firm age, dividend payment dummy, leverage, size, return volatility, and return on equity (ROE) for each year (Pástor and Veronesi (2003)), residual book-to-market ratio by regressing book-to-

market on size, ROE if positive, ROE if negative, and leverage for each industry and each year (Rhodes-Kropf, Robinson, and Viswanathan (2005)), future excess returns (Baker, Stein, and Wurgler (2003) and Polk and Sapienza (2009)), and raw book-to-market ratio (Derrien, Kecskes, and Thesmar (2013)). The first two proxies based on residual book-to-market capture the deviation of the observed book-to-market ratio from the (expected) fundamental book-to-market ratio. Future excess return captures price correction in the future conditional on current misvaluation. The use of raw book-to-market is motivated by the purpose of capturing not only firm-specific relative mispricing but also industry-wide or market-wide absolute mispricing. For all these proxies for mispricing, the greater the value is, the more the firm is undervalued.²⁴

Table 1.8 presents the estimation results for this cross-sectional analysis. Columns (1)-(2), (3)-(4), (5)-(6), and (7)-(8) report the results using the Pástor and Veronesi (2003) residual book-to-market, the Rhodes-Kropf, Robinson, and Viswanathan (2005) residual book-to-market, future excess returns, and raw book-to-market as the proxy for mispricing, respectively. The estimated coefficients from 2SLS regressions of each dependent variable - average product life-cycle length, average patent economic value, and average CEO's grant vesting period, on the long-term institutional ownership instrumented by Russell 2000 index membership are reported. In all specifications for the subsamples with above-median degrees of undervaluation, I find positive and statistically significant coefficients on the instrumented long-term ownership. The effects are economically substantial. For instance, in column (2) with average product life-cycle length as the dependent variable using the Pástor and Veronesi (2003) undervaluation proxy, given that the sample standard deviation of long-term institutional ownership is 17.4%, a one-standard-deviation increase in long-term institutional ownership is followed by an increase in average product life-cycle length of 0.607 years which is seven months and one week. It is approximately 57% of the standard deviation of average product life-cycle length. On the other hand, for the subsamples of firms with below-median degrees of undervaluation, the estimated coefficients are much smaller in magnitude or are not statistically significant. The evidence from this cross-sectional analysis implies that the effects of long-term ownership on corporate investment horizon, the value of corporate investment, and managerial incentive horizon are stronger for highly undervalued firms, which is consistent with the horizon alignment hypothesis developed in Section 1.2.

²⁴To save space, I refer the reader to each paper for the details of estimating each proxy.

1.5.5 Investment Horizon and Capital Allocations

To investigate the capital allocation channel for the adjustment of corporate investment horizon in response to an increase in long-term institutional ownership, I estimate the following segment-level IV-2SLS specification:

$$\begin{aligned} LTO_{i,t} = & \alpha + \delta_1 STO_{i,t} + \delta_2 Russell2000_{i,t} + \delta_3 (Rank^*_{i,t} - 1000) \\ & + \delta_4 Russell2000_{i,t} (Rank^*_{i,t} - 1000) + \delta_5 FloatAdj_{i,t} + \tau_t + \varepsilon_{i,t} \end{aligned}$$

$$\begin{aligned} INV_{i,j,t} = & \theta + \beta_0 \hat{LTO}_{i,t} + \beta_1 LongPLC_{i,j} + \beta_2 LTO_{i,t-1} \times LongPLC_{i,j} + \gamma_1 STO_{i,t} \\ & + \gamma_2 (Rank^*_{i,t} - 1000) + \gamma_3 Russell2000_{i,t} (Rank^*_{i,t} - 1000) + \gamma_4 FloatAdj_{i,t} \\ & + \psi_{i,k} + \varsigma_t + \nu_{i,j,t}. \end{aligned}$$

where i indexes firms, j indexes segments, k indexes industries, t indexes years, INV is segment investment, which is capital expenditures of a segment over its identifiable total assets, $LongPLC$ is a dummy variable that equals one if the segment operates in an industry with above-median product life-cycle length, ς_t is year fixed effect, and $\psi_{k,t}$ denotes industry-firm fixed effects to control for unobserved heterogeneity at the industry-firm level.²⁵ The coefficients of interest in this segment-level specification are β_0 and $\beta_0 + \beta_2$ which estimate the marginal effects of the firm's long-term institutional ownership on the segment's investment if the segment's industry has short and long product life-cycles, respectively.

The results are presented in columns (1) and (2) of Table 1.9. In both regressions, the coefficient on long-term institutional ownership (β_0) is negative and statistically significant, suggesting that segments with short product life-cycles reduce their investments in physical assets in response to an increase in long-term ownership of their firms. On the other hand, the coefficient on the interaction term (β_2) is positive and statistically significant. Combining these two coefficients, i.e., by $\beta_0 + \beta_2$, I find that an increase in long-term institutional ownership of a firm is followed by an increase in investments for long product life-cycle segments. For example, the coefficient of -0.0072 on long-term ownership

²⁵Segment fixed effects cannot be included because Compustat Segment Data File does not provide a unique segment identifier across time. Firm fixed effects cannot be included either because it is not guaranteed that a firm is included in the sample in consecutive years within a narrow band-width around the index cutoff.

in column (2) indicates that a one-standard-deviation increase in long-term institutional ownership is associated with a reduction in capital expenditures of approximately 1.6% of total assets for short product life-cycle segments, which is approximately \$2.14 million cut on average given that the sample mean of segment assets is \$134 million. The sum of the two coefficients on long-term ownership and the interaction term, $-0.0072 + 0.0086 = 0.0014$, indicates that for long product life-cycle segments a one-standard-deviation increase in long-term institutional ownership is associated with an increase in capital expenditures of approximately 0.32% of segment assets, which is approximately \$428,800 raise on average.²⁶ The economic magnitudes of this differential effect for short and long product life-cycle segments are significant. The coefficient of 0.0086 on the interaction term implies difference in capital expenditures of approximately 1.95% of segment assets in response to a one-standard-deviation increase in long-term ownership, and this is nearly 34% of the standard deviation of segment investment.

To additionally examine whether these capital reallocations are made toward long-term *and* profitable segments, I execute cross-sectional analyses by interacting the aforementioned segment-level specification with another indicator variable for segments with greater values of investment projects, i.e., *High PEV*, which is defined as a dummy variable equal to one if the patent economic value of the segment's industry is above-median among all segments within the firm. The results are reported in columns (3) and (4) of Table 1.9. In both specifications, the coefficient on the interaction term, $LTO \times LongPLC \times HighPEV$, is positive and statistically significant, which implies that the documented capital reallocation effect of long-term ownership toward long-term segments in columns (1) and (2) is more pronounced among segments with high value of investment projects. Together with the negative and statistically significant coefficient on long-term ownership (*LTO*), this result shows that firms reallocate their capital from short-term *and* less profitable segments to longer-term *and* more profitable segments in response to an increase in long-term institutional ownership.

Overall, the results in this segment-level analysis suggest that, when there is an increase in long-term institutional ownership, conglomerate firms reallocate their capital toward segments with long-term profitable investment projects, which is consistent with the horizon alignment hypothesis.

²⁶It is worth noting that the overall decline in investments following an increase in long-term institutional ownership at the firm level found here is consistent with the evidence documented in Harford, Keckes, and Mansi (2016).

1.5.6 The Horizon Alignment through Long-term Block-holders

As mentioned earlier, the literature has evolved to look at institutional investors as the owners of firms rather than just trading agencies. Investors holding a large block of shares of a firm likely have more influence on the firm's choice of investment projects either because the firm's manager might observe changes in ownership by those investors thereby modifying the firm's investment policies due to tightened or relaxed pressures for short-run stock performance, or because the block shareholders are active enough to participate in the firm's board meetings and directly influence the firm's investment decisions or try to indirectly affect the corporate investment policies by voting for the changes in executive compensation structures.

To examine whether long-term investors with likely more intervenient power are more influential for the changes in managerial incentive horizon and a firm's choices of investment projects, I calculate the ownership by long-term institutional investors who own 5% or more of total shares of the firm. Then I repeat the same 2SLS regressions in section 1.5.3 replacing long-term ownership with this long-term block ownership. Many studies have shown that block shareholders in general indeed influence management and corporate policies (e.g., Holderness (2003), Chen, Harford, and Li (2007), Cronqvist and Fahlenbrach (2009), and Becker, Cronqvist, and Fahlenbrach (2011)). In addition, Brav et al. (2008) and Brav, Jiang, and Kim (2015) find that 13D filings by activist hedge funds with a large stake lead to higher firm value as well as improved firm-level operating performance and plant-level productivity.²⁷ Thus, a positive coefficient on long-term block ownership would support the aforementioned arguments on the potential channels through which long-term investors influence firms' investment project choices.

The estimation results from the 2SLS specifications on long-term block ownership are presented in Table 1.10. The positive coefficients on the instrumented long-term block institutional ownership are both statistically and economically significant in all specifications. In column (2) for example, with the average product life-cycle length as the dependent variable, a one-standard-deviation increase in long-term institutional ownership due to the index assignment to Russell 2000 leads to an increase in average product life-cycle length by 0.376 years which is approximately four months and two weeks. These results strengthen the plausibility of the documented causal horizon alignment effects.

²⁷Edmans (2014) reviews theoretical papers as well as other empirical papers supporting this view on block shareholders as active monitors rather than passive traders.

1.6 Conclusion

In this paper, I study the effect of investment horizons by institutional investors on the horizons of firms' real investments. A battery of analyses looking into institutional holdings and patent citation data provides strong empirical evidence that, in the presence of mispricing, an increase in long-term institutional ownership leads to a lengthened average product life-cycle length of U.S. conglomerate firms. This evidence can be interpreted that, when a stock price of a firm deviates from its fundamental value, the firm increases its corporate investment horizon in response to an inflow of long-term institutional investors as the firm's equity shareholders because it alleviates the equilibrium short-termism by credit- and maturity-constrained short-term arbitrageurs and firms that compensate their managers partly for short-term stock performance.

As a baseline estimation result using a large panel data set, I find a positive relationship between long-term institutional ownership and the average product life-cycle length. This relationship is stronger for firms with greater mispricing, which confirms that this horizon alignment comes from the alleviation of short-term investors' arbitrage-seeking behaviors. A plant-level analysis reveals the within-conglomerate capital reallocation channel behind this horizon alignment. To establish the causality of this baseline relationship, I exploit the firms in a narrow bandwidth around the Russell 1000/2000 index threshold and instrument long-term institutional ownership by the Russell 2000 membership dummy variable based on the sharp discontinuity in long-term ownership around the threshold which is not related to factors that may affect corporate investment horizons. Then, executing IV-2SLS regressions, I document the causal evidence that long-term institutional investors have positive influences on firms' average product life-cycle lengths through governance mechanisms such as large stake holdings or shareholder rights protection. Finally, as an indirect evidence of the higher fundamental value of long-term investment projects, I find that the short-run performance following an increase in long-term institutional ownership is higher for firms with long product life-cycle than for those with short product life-cycle.

To the best of my knowledge, this paper is the first to show that investor horizons affect the horizons of firms' real investments and that there exists horizon alignment between investors and firms. Some previous studies in the literature have already shown that the existence of short-term investors pressures managers to cut R&D spending to boost short-term earnings and thereby short-term stock prices in the spirit of, for example, Bolton, Scheinkman, and Xiong (2006) (e.g., Bushee (1998) and Cremers, Pareek, and Sautner

(2016)). However, while they compare the really-short-term earnings management versus overall investments in tangible or intangible assets regardless of their horizons, in this paper I compare real investments in short-term projects versus long-term projects.

This study also sheds light on the role of long-term institutional investors as owners of firms. In particular, the findings in this paper strengthen the view that lengthening investor horizons can mitigate short-termism problems prevailing among U.S. firms and help them pursue more productive long-term investment projects. Moreover, a further evidence that this effect is more pronounced among firms with large blockholder ownerships possibly opposes the argument that short-termism problems can be resolved by investors holding large stakes of the firms without having to induce investors to lengthen their investment horizons (e.g., Edmans (2015)). A compromised view, which is actually the key takeaway from this study, could be that it is the blockholders with long-term investment horizon who can help corporate managers pursue more profitable long-term investment projects without being distracted.

In this spirit, the evidence documented here also has a policy implication that regulations which would discourage short-term trading behaviors by investors could be a remedy to the prevalent short-termism among U.S. corporations, especially in the context of biased managerial decisions toward investment projects with shorter horizon. This implication in turn supports the recent moves by politicians and regulators such as the tax reforms proposed by Hilary Clinton in 2015.

1.7 Figures and Tables

Figure 1.1 Long-term Ownership around Russell 1000/2000 Threshold

This figure plots the long-term institutional ownership for the third quarter against the rank distance from the Russell 1000/2000 threshold during 1990-2005, within a narrow bandwidth around the threshold. The stocks are sorted into each bin of ten ranks, and for each bin the long-term institutional ownerships are averaged across all years (y -axis). The distances from threshold are calculated using the actual ranks assigned by Russell (x -axis).

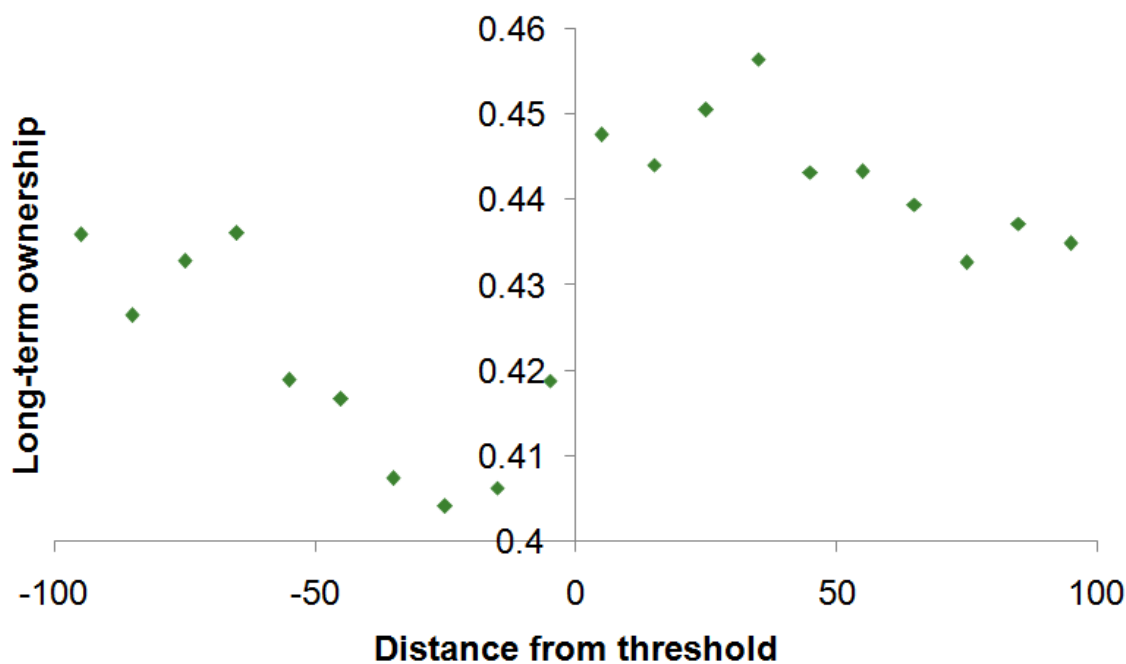


Table 1.1 Variable Definitions

<i>Average PLC length</i>	The asset-weighted average of industry-level product life-cycle length across all business segments of a publicly listed U.S. conglomerate firm. The product life-cycle length is calculated as the industry median of the patent-level average forward citation lag where the average forward citation lag is the average of the time lapse between the cited patent's grant date and a subsequent citation across all citing patents. For the details of the calculation of the average forward citation lag, see Bilir (2014).
<i>Average PEV</i>	The asset-weighted average of industry-level economic value of patents across all business segments of a publicly listed U.S. conglomerate firm. The economic value of patents for each industry is calculated as the average of the Kogan, Papanikolaou, Seru, and Stoffman's (2017) announcement-return-based measure across all patents in the industry over the six-year-period prior to each year.
<i>Ln(Average PEV)</i>	Natural lograithm of <i>Average PEV</i> .
<i>Average CGV period</i>	The average CEO grant vesting (CGV) period in months, calculated as the value-weighted average of vesting period across all performance-based grants in a CEO's compensation package, using the data collected from the Incentive Lab. The vesting period for each grant is computed as the exponentially-weighted average (with the half-life of 6 months) of vesting months between the start and the end of the award vesting period.

Table 1.1 (con't.): Variable Definitions

<i>Long-term ownership</i>	The fraction of shares held by long-term institutional investors whose portfolio turnover is less than or equal to 35%, where the portfolio turnover is calculated as the fraction of shares that are no longer held after three years of their purchases. For the details of the calculation of this measure, see Derrien, Kecskes, and Thesmar (2013).
<i>Institutional ownership</i>	The fraction of shares held by institutional investors in the 13F data.
<i>Block ownership</i>	The fraction of shares held by institutional investors who own 5% or more of total shares outstanding of the firm.
<i>Sales growth</i>	$[\text{Sales}(t) - \text{sales}(t-1)]/\text{sales}(t-1)$.
<i>Cash flow</i>	(Earnings before interest and taxes + depreciation)/total assets.
<i>Debt</i>	Total debt/total assets.
<i>Size</i>	Natural logarithm of total assets.
<i>Q</i>	(Total assets - book value of equity + market value of equity)/total assets.
<i>Investment</i>	Capital expenditure over total assets.
<i>R&D</i>	Research and development expenditure over total assets.
<i>PV B/M</i>	Residual book-to-market (Pástor and Veronesi (2003)).
<i>RRV B/M</i>	Residual book-to-market based on Rhodes-Kropf, Robinson, and Viswanathan (2005).
<i>Future excess return</i>	Future realized return in excess of its expected return based on Baker, Stein, and Wurgler (2003) and Polk and Sapienza (2009).
<i>Raw B/M</i>	The reciprocal of <i>Q</i> .
<i>Market cap.</i>	CRSP price multiplied by the number of shares outstanding as of the last trading day of May.

Table 1.1 (con't.): Variable Definitions

<i>Rank*</i>	The rank of each firm based on observed market capitalization as of the last trading day of May.
<i>Float adjustment</i>	The difference between <i>Rank*</i> and the actual rank assigned by Russell at the end of June.
<i>G-index</i>	The GIM governance index.
<i>ROA</i>	Net income divided by total assets.

Table 1.2 Product Life-cycle Lengths by Industry

SIC code	SIC industry name	PLC length
343	Heating Equipment, Except Electric	12.98
341	Metal Cans And Shipping Containers	12.75
345	Screw Machine Products, Bolts, Nuts, Screws	12.53
342	Cutlery, Handtools, And General Hardware	12.36
344	Fabricated Structural Metal Products	12.18
349	Miscellaneous Fabricated Metal Products	12.03
353	Construction, Mining, And Materials Handling	11.90
372	Aircraft and Parts	11.76
358	Refrigeration And Service Industry Machinery	11.62
366	Communications Equipment	11.47
351	Engines And Turbines	11.31
283	Drugs	11.19
369	Miscellaneous Electrical Machinery, Equipment	11.04
335	Rolling, Drawing, Extruding Of Metals	10.91
285	Paints, Varnishes, Lacquers, Enamels	10.75
354	Metalworking Machinery and Equipment	10.62
363	Household Appliances	10.58
352	Farm And Garden Machinery And Equipment	10.43
384	Surgical, Medical, Dental Instruments And Supplies	10.26
289	Miscellaneous Chemical Products	10.15
131	Crude Petroleum and Natural Gas Extraction	10.07
359	Miscellaneous Industrial And Commercial	9.94
371	Motor Vehicles And Motor Vehicle Equipment	9.81
346	Metal Forgings And Stampings	9.70
138	Oil and Gas Field Services	9.62
386	Photographic Equipment And Supplies	9.53
379	Miscellaneous Transportation Equipment	9.46
355	Special Industry Machinery, Except Metalworking	9.37
481	Telephone Communications	9.27

Table 1.2 (con't.): Product Life-cycle Lengths by Industry

220	Textile mill products	9.15
331	Steel Works, Blast Furnaces, Mills	9.01
737	Programming, Data, and Computer Related Services	8.88
356	General Industrial Machinery and Equipment	8.74
381	Detection and Navigation Instruments, Equipment	8.61
483	Radio and Television Broadcasting Stations	8.46
738	Miscellaneous Business Services	8.30
364	Electric Lighting and Wiring Equipment	8.15
291	Petroleum Refining	8.01
284	Soap, Detergents, Cosmetics	7.83
281	Industrial Inorganic Chemicals	7.62
367	Electronic Components And Accessories	7.39
287	Agricultural Chemicals	7.14
357	Computer and Office Equipment	6.90
365	Household Audio and Video Equipment	6.62
387	Watches, Clocks, Clockwork Operated Devices	6.29
383	Electronics Machinery	5.99

Table 1.3 Summary Statistics

This table reports summary statistics of the variables for the sample that I use to examine how long-term institutional ownership is associated with corporate investment horizon. All variables are defined in Table 1.1.

	Mean	SD	P25	P50	P75	N
Panel A. Firm-Level Variables						
Average PLC length	9.6409	1.4360	8.3579	9.6530	10.7377	6619
Average PEV	12.8608	4.1883	9.6518	11.6151	13.9902	6619
Ln(Average PEV)	2.5102	0.2838	2.2671	2.4523	2.6384	6619
Average CGV period	12.9456	8.3327	7.8750	11.5000	15.0313	1232
Long-term ownership	0.3228	0.2263	0.0968	0.3494	0.5080	6591
Long-term block ownership	0.1009	0.1107	0.0000	0.0912	0.1788	6591
Institutional ownership	0.4724	0.3213	0.1513	0.5115	0.7475	6591
Sales growth	0.1257	0.4047	-0.0288	0.0758	0.1885	6536
Cash flow	0.0981	0.1708	0.0731	0.1197	0.1672	6557
Debt	0.2199	0.1874	0.0722	0.2026	0.3159	6559
Size	6.4138	2.1904	4.8436	6.3758	7.9578	6569
Q	1.8476	1.4181	1.1250	1.4464	2.0610	6527
Investment	0.0509	0.0472	0.0224	0.0386	0.0647	6472
R&D	0.0539	0.0886	0.0083	0.0265	0.0696	6554
Panel B. Segment-Level Variables						
PLC length	9.5557	1.2362	8.7100	9.7300	10.6100	21170
PEV	16.7895	13.9524	9.7163	11.8385	16.0505	21170
Investment	0.0587	0.0578	0.0225	0.0433	0.0749	21035
Ln(Sales)	5.1674	2.1822	3.7091	5.2376	6.7154	20958
Cash flow	0.1212	0.2349	0.0469	0.1236	0.2119	18991
Size	4.9000	2.2330	3.3405	4.9399	6.5103	21027

Table 1.4 Horizon Alignment between Investors and Firms: Panel Regressions

This table reports the results of panel regressions on the relationship between long-term institutional ownership and corporate investment horizon, corporate investment value, and managerial incentive horizon, proxied by the average product life-cycle (PLC) lengths, the average patent economic value (PEV), and the average CEO's grant vesting (CGV) period, respectively. All variables are defined in Table 1.1. I include year fixed effects and/or firm fixed effects in the specifications. In each column, I report estimated coefficients from OLS regression and their t -statistics, calculated using heteroskedasticity-robust standard errors. ***, **, and * indicate the statistical significance at the 1%, 5%, and 10% levels, respectively. This table documents positive correlations between long-term institutional ownerships and the average PLC length, PEV, and CGV period in the following year.

	(1)	(2)	(3)	(4)	(5)	(6)
Dep. variable	Avg. PLC length		Ln(Avg. PEV)		Avg. CGV period	
LT ownership	3.1923** (2.61)	3.1577** (1.98)	0.2123** (2.78)	0.2055** (2.46)	37.1639*** (3.84)	19.5515** (2.17)
Inst. ownership	-0.8280 (-1.01)	-0.8275 (-1.51)	-0.2095*** (-3.88)	-0.1637** (-2.25)	-15.4475*** (-3.86)	-9.2222** (-2.04)
Sales growth	0.1795*** (3.85)	-0.0117 (-0.39)	-0.0525** (-2.40)	0.0028 (0.25)	0.9387 (0.53)	0.8867 (0.67)
Cash flow	0.0014 (0.04)	0.0052 (0.25)	0.0852*** (3.47)	-0.0733 (-1.62)	13.5285*** (4.54)	0.9754 (0.18)
Debt	0.3612*** (7.23)	0.0796 (1.42)	0.0547 (1.50)	-0.0669* (-1.69)	1.3466 (0.67)	-3.8583 (-1.62)
Size	-0.0814*** (-15.28)	-0.0416 (-1.27)	0.0210*** (8.27)	0.0105 (0.69)	0.3767 (1.66)	-0.0435 (-0.04)
Q	-0.0470*** (-3.88)	0.0130 (1.02)	0.0113** (2.55)	0.0001 (0.02)	-0.2881 (-0.91)	-0.3840 (-1.29)
Investment	-1.4071** (-2.56)	-0.1976 (-1.31)	-0.0709 (-0.64)	-0.0923 (-0.90)	-13.4945 (-1.31)	9.8252 (0.80)
R&D	-2.2622*** (-7.79)	0.1332 (0.76)	0.4869*** (4.94)	-0.0219 (-0.28)	-19.4588*** (-4.70)	-6.6132 (-1.15)
Constant	9.6705*** (705.95)	9.5818*** (182.25)	1.7925*** (64.65)	1.8119*** (20.07)	7.8656*** (3.60)	9.3395 (1.16)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	No	Yes	No	Yes	No	Yes
N	6,052	6,052	6,052	6,052	1,190	1,190
R^2	0.0826	0.1471	0.0595	0.0966	0.0695	0.1040

Table 1.5 Pre-treatment sample differences around the Russell 1000/2000 threshold

This table reports the mean differences in various firm characteristics around the Russell 1000/2000 threshold in the year prior to the index assignment. The discontinuity tests are done by regressing each firm characteristic on the dummy variable *Russell 2000* (*Russ2000*) which is equal to one if the firm belongs to the Russell 2000 index, for each subsample with different bandwidths in the neighborhood of the threshold. The bandwidths 20, 25, 30, and 35 indicate the subsamples of firms ranked in [981, 1020], [976, 1025], [971, 1030], and [966, 1035], respectively, based on observed market capitalization from CRSP as of the last trading day of May. All dependent variables are defined in Table 1.1. ***, **, and * indicate the statistical significance at the 1%, 5%, and 10% levels, respectively. This table shows that there is no significant differences in observed market capitalization, long-term institutional ownership, sales growth, cash flow, debt ratio, and average product life-cycle length in very small bandwidths around the Russell 1000/2000 threshold in the year prior to the index assignment, which means that firms are very similar on both sides of the threshold.

Dependent variable	(1) Market cap.	(2) Long-term ownership	(3) Sales growth	(4) Cash flow	(5) Debt	(6) Average PLC length
Russ2000 (bandwith=20)	10.76 (0.06)	0.00 (0.09)	0.00 (0.07)	-0.00 (-0.02)	0.01 (0.21)	0.04 (0.31)
Russ2000 (bandwith=25)	13.92 (0.10)	0.00 (0.08)	-0.00 (-0.02)	-0.01 (-0.41)	0.02 (0.39)	0.04 (0.34)
Russ2000 (bandwith=30)	-16.27 (-0.19)	0.00 (0.25)	-0.00 (-0.03)	-0.01 (-0.60)	0.00 (0.19)	0.02 (0.19)
Russ2000 (bandwith=35)	-71.22 (-0.94)	0.01 (0.73)	0.02 (0.33)	-0.02 (-0.98)	0.02 (0.66)	0.05 (0.41)

Table 1.6 Differences in Long-term Ownership around the Russell 1000/2000 Threshold:
First-Stage Regressions

This table reports the regression discontinuity test results from first-stage regressions on the differences in long-term (block) institutional ownership around the Russell 1000/2000 threshold. *Russell 2000* is defined in Table 1.5. *Rank** is the rank of each firm based on observed market capitalization as of the last trading day of May. *Float adjustment* is defined as the difference between *Rank** and the actual rank assigned by Russell at the end of June. All other variables are defined in Table 1.1. I include year fixed effects in all specifications. In each column, I report estimated coefficients from OLS regression and their *t*-statistics, calculated using heteroskedasticity-robust standard errors. ***, **, and * indicate the statistical significance at the 1%, 5%, and 10% levels, respectively. This table shows that there is a sharp discontinuity in long-term (block) institutional ownership around the Russell 1000/2000 threshold, i.e., long-term (block) institutional ownerships of firms that are at the top of the Russell 2000 are much larger than those of slightly larger firms at the bottom of the Russell 1000.

	(1)	(2)	(3)	(4)
Dependent variable	Long-term ownership		Long-term block ownership	
Russell2000	0.0635*** (4.73)	0.0612*** (4.18)	0.0310** (2.34)	0.0331** (2.68)
(Rank* - 1000)	-0.0006 (-1.38)	-0.0005 (-1.16)	0.0003 (0.73)	0.0002 (0.47)
(Rank* - 1000) x Russell 2000	0.0002 (0.64)	0.0001 (0.43)	-0.0006 (-1.43)	-0.0005 (-1.17)
Float adjustment	0.0003*** (12.40)	0.0003*** (10.50)	0.0001** (2.77)	0.0001** (2.79)
Constant	0.3103*** (17.20)	0.3065*** (12.78)	0.1161*** (4.37)	0.1269*** (4.92)
Year FE	No	Yes	No	Yes
<i>N</i>	366	366	366	366
<i>R</i> ²	0.1412	0.2157	0.0480	0.0582

Table 1.7 Horizon Alignment between Investors and Firms: Instrumental Variable Estimates

This table presents the results of 2SLS regressions on the effects long-term institutional ownership on corporate investment horizon, the value of corporate investment, and managerial incentive horizon, proxied by the average product life-cycle (PLC) length, the average patent economic value (PEV), and the average CEO's grant vesting (CGV) period, respectively. 2SLS regressions instrument long-term ownership using the dummy variable *Russell 2000* defined in Table 1.5. *Rank** and *Float adjustment* are defined in Table 1.6. All other variables are defined in Table 1.1. I include year fixed effects in all regressions. In each column, I report estimated coefficients from 2SLS regression and their *t*-statistics, calculated using heteroskedasticity-robust standard errors. ***, **, and * indicate the statistical significance at the 1%, 5%, and 10% levels, respectively. This table shows that through sharply increased long-term institutional ownerships, the average product life-cycle length, the average PLC length, PEV, and CGV period of the firms at the top of the Russell 2000 are significantly greater than those of the slightly larger firms at the bottom of the Russell 1000.

Dep. variable	(1) Avg. PLC length	(2) Avg. PLC length	(3) Ln(Avg. PEV)	(4) Ln(Avg. PEV)	(5) Avg. CGV period	(6) Avg. CGV period
Long-term ownership	3.2317** (2.52)	3.2568** (2.47)	0.2450** (2.58)	0.2366** (2.40)	21.2536** (2.54)	20.6219** (2.50)
(Rank* - 1000)	0.0004 (0.34)	0.0004 (0.35)	0.0010 (1.43)	0.0010 (1.27)	0.1501 (0.54)	0.1522 (0.59)
(Rank* - 1000) x Russell 2000	-0.0001 (-0.11)	-0.0001 (-0.12)	-0.0020 (-1.59)	-0.0019 (-1.46)	-0.2399 (-0.53)	-0.2408 (-0.54)
Float adjustment	-0.0001 (-0.64)	-0.0001 (-0.57)	0.0002 (0.88)	0.0002 (0.79)	0.0236 (0.57)	0.0244 (0.61)
Year FE	No	Yes	No	Yes	No	Yes
<i>N</i>	366	366	324	324	77	77

Table 1.8 Horizon Alignment between Investors and Firms: Cross-sectional Effects

This table reports the results of IV-2SLS regressions on the effects of long-term ownerships on corporate investment horizons, the value of corporate investment, and managerial incentive horizon, *separately* for the subsamples of more (above-median) and less (below-median) undervalued firms. Undervaluation is proxied by four different measures: residual book-to-market based on Pástor and Veronesi (2003) (*PV residual B/M*); residual book-to-market based on Rhodes-Kropf, Robinson, and Viswanathan (2005) (*RRV residual B/M*); future excess returns based on Baker, Stein, and Wurgler (2003) and Polk and Sapienza (2009) (Future excess return); and raw book-to-market based on Derrien, Kecskes, and Thesmar (2013) (Raw B/M). Long-term ownership is instrumented by the dummy variable *Russell 2000* defined in Table 1.5. I control for distance from threshold, float adjustment, and year fixed effects in all specifications. In each column, I report estimated coefficients from 2SLS regression and their *t*-statistics, calculated using heteroskedasticity-robust standard errors. ***, **, and * indicate the statistical significance at the 1%, 5%, and 10% levels, respectively. This table shows that the horizon alignment effects are stronger for more undervalued firms.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Undervaluation Proxy							
	<i>PV</i> B/M		<i>RRV</i> B/M		Fut. exc. ret.		Raw B/M	
	Low	High	Low	High	Low	High	Low	High
Dep. Var.	Average PLC length							
<i>LTO</i>	2.9128* (1.91)	3.5014** (2.63)	2.6687* (1.86)	3.7870*** (2.98)	2.0776 (0.83)	3.5707*** (3.09)	0.6655 (0.26)	3.2216** (2.14)
<i>N</i>	190	175	182	163	157	185	171	192
Dep. Var.	Ln(Average PEValue)							
<i>LTO</i>	-0.1226 (-0.44)	0.2408** (2.60)	0.8950 (0.94)	0.2503** (2.35)	-0.2502 (-0.28)	0.2297** (2.29)	-0.1195 (-0.26)	0.2367** (2.44)
<i>N</i>	160	154	158	151	143	169	145	164
Dep. Var.	Average CGV period							
<i>LTO</i>	-7.2935 (-0.39)	22.7628*** (3.42)	4.0811 (0.48)	20.6900** (2.40)	-2.4752 (-0.24)	21.9286** (3.44)	1.5061 (0.16)	22.0803*** (3.24)
<i>N</i>	39	38	37	32	35	42	37	40
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 1.9 Long-Term Institutional Ownership and Investments across Segments

This table reports the results of IV-2SLS regressions on the cross-sectional differences across segments in the effect of long-term institutional ownership (*LTO*) on segment investments depending on the segments' product life-cycle lengths. *Long PLC* is a dummy variable equal to one for the segments with above-median product life-cycle lengths within the firm in a given year. *High Value* is a dummy variable equal to one for the segments with above-median patent economic values within the firm in a given year. Long-term ownership is instrumented by the dummy variable *Russell 2000* defined in Table 1.5. I control for distance from threshold, float adjustment, firm-industry fixed effects, and year fixed effects in all specifications. In each column, I report estimated coefficients from 2SLS regression and their *t*-statistics, calculated using heteroskedasticity-robust standard errors clustered by *industry*. ***, **, and * indicate the statistical significance at the 1%, 5%, and 10% levels, respectively. This table shows that an inflow of long-term institutional investors leads to capital reallocations by firms from short-horizon and less-profitable to long-horizon and more-profitable segments.

Dependent variable	(1)	(2)	(3)	(4)
	Investment			
<i>LTO</i>	-0.0075** (-2.02)	-0.0072** (-1.99)	-0.0079** (-2.12)	-0.0069** (-2.06)
Long PLC	0.0004 (0.23)	0.0027* (1.73)	-0.0042* (-1.77)	-0.0053* (-1.95)
High PEV			0.0053* (1.80)	0.0062* (1.85)
<i>LTO</i> $\times$ Long PLC	0.0092** (2.08)	0.0086** (2.04)	-0.0002 (-0.03)	-0.0030 (-0.69)
<i>LTO</i> $\times$ High PEV			-0.0032 (-0.43)	-0.0045 (-0.61)
Long PLC $\times$ High PEV			-0.0019 (-0.32)	0.0004 (0.09)
<i>LTO</i> $\times$ Long PLC $\times$ High PEV			0.0286*** (2.66)	0.0238** (2.19)
Constant	0.0708*** (55.25)	0.0683*** (54.07)	0.0701*** (45.84)	0.0680*** (45.14)
Controls	No	Yes	No	Yes
Industry x Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
<i>N</i>	988	988	811	811

Table 1.10 Horizon Alignment between Block-holders and Firms: Instrumental Variable Estimates

This table presents the results of 2SLS regressions on the effects long-term *block* institutional ownership on corporate investment horizon, the value of corporate investment, and managerial incentive horizon, proxied by the average product life-cycle (PLC) length, the average patent economic value (PEV), and the average CEO's grant vesting (CGV) period, respectively. 2SLS regressions instrument long-term ownership using the dummy variable *Russell 2000* defined in Table 1.5. *Rank** and *Float adjustment* are defined in Table 1.6. All other variables are defined in Table 1.1. I include year fixed effects in all regressions. In each column, I report estimated coefficients from 2SLS regression and their *t*-statistics, calculated using heteroskedasticity-robust standard errors. ***, **, and * indicate the statistical significance at the 1%, 5%, and 10% levels, respectively. This table shows that through sharply increased long-term *block* institutional ownerships, the average product life-cycle length, the average PLC length, PEV, and CGV period of the firms at the top of the Russell 2000 are significantly greater than those of the slightly larger firms at the bottom of the Russell 1000.

Dep. variable	(1) Avg. PLC length	(2) Avg. PLC length	(3) Ln(Avg. PEV)	(4) Ln(Avg. PEV)	(5) Avg. CGV period	(6) Avg. CGV period
Long-term block ownership	2.3016** (2.33)	2.1672*** (3.10)	0.1503** (2.11)	0.1891** (2.46)	13.9178** (2.31)	14.6171** (2.39)
(Rank* - 1000)	-0.0044 (-0.77)	-0.0018 (-0.82)	0.0048 (0.83)	0.0044 (0.85)	0.0815 (0.58)	0.0142 (0.13)
(Rank* - 1000) x Russell 2000	0.0068 (0.89)	0.0029 (1.05)	-0.0068 (-0.96)	-0.0063 (-0.99)	-0.1513 (-0.68)	-0.0384 (-0.24)
Float adjustment	-0.0003 (-0.49)	-0.0002 (-0.75)	0.0002 (0.34)	0.0002 (0.31)	-0.0026 (-0.10)	-0.0226 (-0.61)
Year FE	No	Yes	No	Yes	No	Yes
<i>N</i>	366	366	324	324	77	77

CHAPTER 2

FINANCIAL CRISIS AND OPERATIONAL RISK MANAGEMENT OF BUSINESS GROUPS

2.1 Introduction

We investigate risk-management of Korean business groups, called *chaebol*, in the aftermath of the 1997 Asian financial crisis. The 1997 Asian financial crisis was an unexpected event that unarguably reduced the supply of liquidity in Korean markets and thus sharply increased the cost of external financing. When the cost of external financing increases, firms are expected to reduce risk or, cash-flow volatility. This is because high cash-flow volatility increases the probability of cash-flow shortfalls, which in turn increases demand for external financing (Minton and Schrand (1999)). *Chaebol* have strategic advantages over stand-alone firms in achieving risk reduction. First, a *chaebol* consists of multiple member firms that operate in various industries that involve varying levels of risk. Second, internal capital markets enable *chaebol* to transfer cash across member firms, in particular transferring cash from risky member firms to safe member firms to increase (reduce) investment in the latter (former), whereas risky stand-alone firms may have to cut back on investment to reduce risk. On the other hand, the expectation that the Korean government would rescue *chaebol* in case of financial distress may disincentivize *chaebol* to reduce risk in the aftermath of the crisis. The goal of this study is to investigate whether internal capital markets and risk-variability across member firms allowed *chaebol* to reduce risk in the aftermath of the 1997 financial crisis. It is a suitable time to study operational risk management of firms because hoarding cash as a financial risk management strategy was extremely costly during the financial crisis period. In addition, firms were unable to manage risk using derivative because financial derivatives markets were not well developed in emerging markets in 1990s.

Our results indicate that risky *chaebol* member firms reduced investment to a greater extent than safe member firms during the post-crisis period (1997-1998) compared with the pre-crisis period (1995-1996). As a main proxy for level of risk, we use firm-level volatil-

ity of cash flows (*CF vol*), which is defined as the standard deviation of earnings before interest and taxes plus depreciation divided by total assets over the 1990 through 1997 period.¹ Controlling for *chaebol*-year fixed effects, investment opportunities and other firm characteristics, a one-standard-deviation decrease in *CF vol* is associated with a smaller decline in capital expenditures of approximately 3.2% of firm assets. This effect is economically significant, as it equals approximately 24% of the standard deviation and 34% of the sample average value of investment.

We provide evidence that internal capital markets provide the channel through which *chaebol* reduced risk. Like Almeida, Kim, and Kim (2015), we analyze equity investments across member firms and find that low-risk member firms sold equity to high-risk member firms in the post-crisis period.² This result suggests that a one-standard-deviation decrease in *CF vol* is associated with an increase in net equity transfer of approximately 7.5% of firm assets. Thus, *chaebol* firms with low *CF vol* received economically substantial transfers of capital following the crisis. However, *chaebol* firms do not exhibit a similar pattern of equity investments in the pre-crisis period.

We conduct cross-sectional analyses across *chaebol* to strengthen the interpretation of risk reduction in response to increased costs of external financing. We first investigate whether within-group risk-variability helped *chaebol* reduce risk. If all member firms have the same level of risk, capital reallocation would not contribute to risk reduction. However, if member firms were to vary significantly along the level of risk, a given group would be better able to reduce risk effectively through capital reallocation to safe member firms. For the analysis, we define risk variability as the standard deviation of *CF vol* across member firms in each *chaebol* group. We then examine the possible association between risk variability and risk reduction.

Our empirical result indicates that the negative association between *CF vol* and post-crisis investment is stronger for high-risk-variability *chaebol* compared with low-risk-variability *chaebol*. In particular, a one-standard-deviation decrease in *CF vol* is associated with an increase in capital expenditure of approximately 1.9% of firm assets among below-median risk-variability groups, whereas the same decrease in *CF vol* is associated with an increase in capital expenditures of approximately 4.6% of firm assets among above-median risk-

¹In section VII.D, we use alternative measures of risk and the results of all analyses remain qualitatively the same.

²Almeida, Kim, and Kim (2015) find evidence that *chaebol* transfer cash to group firms with more lucrative investment opportunities (measured by Tobin's Q) after the crisis. Thus, we control for Tobin's Q in all analyses.

variability groups. This result is consistent with the proposition that high risk variability helps *chaebol* reduce risk effectively.

We next examine the association between risk reduction and group-level external financing dependence.³ Because firms that depend heavily on external financing would be more severely affected by a sudden increase in the cost of external financing following the crisis, *chaebol* with high external financing dependence are expected to engage more actively in risk reduction. We find support for this prediction. Our empirical results indicate that a one-standard-deviation decrease in *CF vol* is associated with an increase in post-crisis capital expenditures of approximately 1.8% of firm assets among below-median external financing-dependence groups, whereas the same decrease in *CF vol* is associated with an increase in post-crisis capital expenditures of approximately 4.7% of firm assets among above-median external-financing-dependence groups.

To further ensure that risk variability and internal capital markets allowed *chaebol* to reduce risk in the aftermath of the crisis, we compare investment of *chaebol* firms with investment of otherwise similar stand-alone firms. Like *chaebol*, stand-alone firms, especially risky ones, are expected to reduce investment during the crisis. Because stand-alone firms are unable to reallocate capital toward safer firms, however, their aggregate investment would decrease to a greater extent than that of *chaebol*. On the other hand, if the reduction in investment by stand-alone firms were to be similar to that of *chaebol*, stand-alone firms would be collectively less successful in achieving risk reduction.

Our results support this expectation. Expanding the sample to all public stand-alone firms in Korea, we find that stand-alone firms reduced investment, but risky firms reduced investment to a greater extent than safe firms after the crisis. However, when we repeat the baseline analysis using pseudo-*chaebol* groups whose member firms are selected from stand-alone firms via a matching procedure,⁴ we do not find a negative association between risk and post-crisis investment within each pseudo-*chaebol* group. This result indicates that stand-alone firms with characteristics similar to those of our sample *chaebol* firms did not exhibit similar investment patterns.

We further find support for the aforementioned expectations from the comparison anal-

³While some fundamental variables such as cash holdings and cash flow are widely used measures of corporate liquidity in the literature, we use a more exogenous measure of external financing dependence, proxied by Rajan and Zingales's (1998) industry-level technology-based external financing dependence measure, following Almeida, Kim, and Kim (2015).

⁴We base our matching procedure on the pre-crisis level of investment, investment growth rate, *CF vol*, Tobin's Q, size, cash flow, cash, leverage, and industry.

yses of aggregate investment and overall risk between *chaebol* and pseudo-*chaebol* around the Asian crisis. The result of the aggregate investment analysis indicates that both *chaebol* and pseudo-*chaebol* reduced investment in 1998 compared with 1997 but *chaebol* reduced investment to a lesser extent than pseudo-*chaebol*. In particular, the reduction in aggregate capital expenditures by *chaebol* was approximately 2% of assets, whereas that of pseudo-*chaebol* was 6% of assets. The matching estimator suggests that *chaebol* firms were able to reduce capital expenditures less by 4.45% of their assets compared with pseudo-*chaebol* firms. More importantly, the overall risk of *chaebol* decreased to a significantly greater extent than that of pseudo-*chaebol*. We find that the asset-weighted average of *CF vol* of *chaebol* is significantly lower than that of pseudo-*chaebol* during the post-crisis period, whereas these averages are similar during the pre-crisis period. These results are consistent with the proposition that stand-alone firms need to cut investment to reduce risk, whereas internal capital markets allow *chaebol* to better reduce risk while reducing investment to a lesser extent.

We consider alternative explanations of our findings. First, we examine the possibility that the negative association between *CF vol* and post-crisis investment is attributable to investment opportunities. For example, the association between *CF vol* and investment opportunities could have become negative after the crisis. Another possibility is that *CF vol* and investment opportunities are generally negatively associated but *chaebol* became more sensitive to investment opportunities after the crisis. That would increase investment in member firms with better investment opportunities relative to other within-group firms (Almeida, Kim, and Kim(2015)). However, our empirical results indicate that *CF vol* is associated with neither investment opportunities in general nor post-crisis investment opportunities. We also consider the possibility that low-risk firms systematically generate high cash flows and that *chaebol* allocated more resources to member firms that produce higher cash flows in response to the increased cost of external financing. We do not, however, find any supporting evidence for this possibility. One might be concerned that our findings are attributable to debt capacity. For example, low-risk firms likely have higher debt capacity and thus would be able to invest more robustly during the post-crisis period. To address this possibility, we examine the relationship between debt growth and *CF vol* but find no evidence of differential debt growth in low- and high-risk firms within each *chaebol*.

We repeat our baseline specification tests for placebo (nonexistent) crises in 1995 and 2005 but find no significant association between risk and investment either before or after

the placebo crises. It appears that the negative association between risk and investment hold only when the cost of external financing increases suddenly.

We investigate the possibility that the negative association between *CF vol* and post-crisis investment is attributable to negative demand shock in product markets following the crisis rather than to the increased cost of external financing. One possible scenario, for example, is that high-risk firms were more adversely affected by demand shock than low-risk firms during the post-crisis period, thereby reducing investment still further. However, we do not find a negative relationship between *CF vol* and investment during a recessionary period that was not accompanied by a reduction in the supply of external liquidity. This result suggests that our baseline results are less likely to be attributable to demand shock in product markets.

We also examine whether the degree of diversification increased after the crisis, which could be another way of reducing risk for *chaebol*. For this analysis we employ a diversification measure developed by Duchin (2010) but find no evidence of increased diversification among *chaebol* during the post-crisis period.

Our results continue to hold for alternative measures of risk. For example, the results remain qualitatively the same when we use *CF vol* computed over five years prior to the crisis (over the 1993 through 1997 period). We also consider the possibility that the risk of group firms changed differentially after the crisis. Because we use predetermined levels of risk, we cannot draw the same conclusion if each group firm's risk after the crisis differs from its pre-crisis level. However, we find that a member firm's within-group rank in *CF vol* does not change after the crisis.

This paper contributes to studies on corporate diversification. A number of papers provide evidence of the existence and (in)efficiency of internal capital markets in diversified firms. Among those, our study is most closely related to Almeida, Kim, and Kim (2015), who use the same 1997 Asian financial crisis to provide evidence of the efficiency of *chaebol*'s internal capital markets. In particular, they show that *chaebol* made efficient investments by allocating resources to member firms with better investment opportunities, and thus could reduce investment to a lesser extent than stand-alone firms. Although we use the same event, we differ from Almeida, Kim, and Kim (2015) in that we focus on risk management in *chaebol*.

This paper is also related to Duchin (2010), who studies cash holdings of diversified firms. He theoretically and empirically shows that diversified firms hoard less cash due to lower levels of risk, which arise from less-than-perfect cross-divisional correlations in investment

opportunities or cash flows. Although both our paper and Duchin (2010) consider the risk and liquidity of diversified firms, we differ from Duchin (2010) in at least two important ways. First, we focus on risk management responses to changes in the cost of external liquidity, whereas Duchin (2010) focuses on liquidity management at a given level of risk. Second, with respect to risk, Duchin (2010) focuses on coinsurance benefits, whereas we focus on benefits that arise from variability in risk across operational subunits.

This paper is related to studies investigating the consequences of financial crises. Most of these studies use the 2007 U.S. financial crisis as an adverse shock to the supply of external finance and investigate its effect on levels of investment. For example, Almeida, Campello, Laranjeira, and Weisbenner (2011) use that episode and find that firms whose long-term debt was maturing immediately after the crisis reduced investment to a greater extent than otherwise similar firms whose debt was mostly scheduled to mature in later years. Similarly, Duchin, Ozbas, and Sensoy (2010) find that investment decreased significantly in the aftermath of the crisis, especially in financially constrained firms with low cash holdings and high short-term debt that operate in industries with high external financing dependency. Campello, Graham, and Harvey (2010) show through survey results that, in the aftermath of the financial crisis, constrained firms had to bypass attractive investment opportunities, use up more cash and draw more credit lines, and reduce capital expenditures and employment. Song and Lee (2012), on the other hand, use the 1997 Asian financial crisis to study the long-run impact of the crisis on corporate cash holdings in East Asian countries and find that Asian firms started building up their cash holdings after the crisis, motivated to make precautionary savings. To the best of our knowledge, our study is the first to provide empirical evidence of reduced risk-taking following a financial crisis. In this regard, our paper is related to studies that document increased risk aversion on the part of individual investors following the 2007 U.S. financial crisis (Hoffmann, Post, and Pennings (2013), Chiang and Xiao (2017)).

The paper proceeds as follows. In Section 2.2, we describe the 1997 Asian financial crisis. In Section 2.3, we describe the data and summary statistics. We report baseline results in Section 2.4. In Section 2.5, we report the results of cross-sectional analyses. Section 2.6 present the results of analyses comparing *chaebol* with stand-alone firms. In Section 2.7, we address alternative explanations. We conclude in Section 2.8.

2.2 1997 Asian Financial Crisis and Korean *Chaebol*

The 1997 Asian financial crisis was the most catastrophic event ever to afflict the wider Korean economy. The crisis was truly unprecedented and unexpected in terms of both the timing and the magnitude of the shock to the Korean economy.⁵ It started in early 1997 in Southeast Asia and many Korean firms went bankrupt over the course of the year. However, the Korean government, along with too many firms, banks, financial institutions, investors, and even some international institutions such as the International Monetary Fund (IMF), did not take it seriously.⁶ As a result, Korea ran out of foreign exchange reserves and found itself in a sovereign default situation. To avoid default, the Korean government agreed in December 1997 to the terms of a bailout by the IMF. This series of events had a serious impact on the Korean economy. In particular, it severely affected the supply of liquidity inside the economy. At the onset of the Asian crisis, most funding sources in Korea dried up and consequently the cost of external financing dramatically increased. In practice, it was almost impossible for Korean firms to attract funding from outside in the aftermath of the crisis.

Even though studying investment by conglomerates around the 2007 U.S. financial crisis could provide an alternative laboratory in which to study similar phenomena, we exploit the Asian financial crisis and study *chaebol*. First, *chaebol* are far more diversified than U.S. conglomerates. *Chaebol* consist of multiple group member firms operating in multiple, often unrelated, industries. This feature increases variability in firm characteristics, including the cash-flow risk within each *chaebol* group. Moreover, we can directly observe the workings of internal capital markets in *chaebol* by analyzing equity transfers across member firms. In combination these two features enable us to examine how internal capital markets with diversified divisions facilitate corporate risk management when the costs of external financing increase sharply.

Studying Korean *chaebol* provides an additional comparative advantage over using U.S. segment- or plant-level data with respect to measuring two important firm-level variables in our study, that is, Tobin's Q and cash-flow risk: each member firm in a *chaebol* issues its own financial statement and equity, providing us with accurate and detailed information

⁵For details on the magnitude of the shock to the Korean economy and financial markets, see Almeida, Kim, and Kim (2015).

⁶Based on reports by various institutions or articles in the media, they were rather positive and hopeful about the prospects for the Korean economy. The OECD membership that Korea acquired 1996 also blinded them to the real threat to the economy.

on each firm’s characteristics, including market value. This is an important feature of our data because researchers need not only to look at the level of investment and cash-flow risk in each operational subunit inside the member corporations to study how firms (or business groups) manage and respond to risk in their operations, but also to control for subunit-level investment opportunities to make this investment model comprehensive.⁷ On the other hand, U.S. segment- and plant-level data are limited for this purpose insofar as the former do not provide a unique identifier for each segment, which prevents researchers from tracing time-series variation on any segment characteristics, and the latter do not provide information on the cost of goods sold or sales, or general or administrative expenses, taxes, etc. Because of these limitations, researchers can neither measure division-level investment opportunities nor calculate each division’s cash-flow volatilities using U.S. data.

2.3 Data and summary statistics

2.3.1 Data and variables

The data for this paper are compiled from several sources. Firm-level accounting information is obtained from the TS2000 provided by the Korea Listed Companies Association, which is deemed to be one of the most complete and representative corporate databases. The list of *chaebol* member firms is acquired from the White Paper on Fair Trade, which is published annually by the Korean Fair Trade Commission. Finally, we hand-collect data on intra-*chaebol* equity transfers from disclosure filing documents in the Korea Investor’s Network for Disclosure (KIND) System developed by the Korea Exchange.

Insofar as we concentrate on *chaebol* groups, our sample for the baseline analyses includes all publicly listed firms in the top 30 largest *chaebol* as of 1997 ranked by the Korean Fair Trade Commission (KFTC). For these *chaebol* member firms in the sample, we draw accounting and financial information for the 1990 through 1999 period using company names and company histories to minimize the loss of relevant observations, because the KFTC

⁷Risk-taking behaviors among financial institutions such as banks (e.g., Acharya and Naqvi (2012)), insurance companies (e.g., Ellul, Jotikasthira, Lundblad, and Wang (2015)), and even industrial firms (e.g., Duchin, Gilbert, Harford, and Hrdlicka (2017)) are studied using the composition of financial asset holdings in each firm. While this approach is useful for studying corporate risk management through financial assets in developed markets, it may not work for emerging markets where financial assets, especially derivatives, are not well developed.

provides no identification code for *chaebol* firms.⁸ We then eliminate firms with missing data for 1997 - immediately before the Asian financial crisis, or for 1998 - immediately after the crisis. Our baseline tests focus on the 1996 through 1999 period (centered on the crisis). For this period, the final sample consists of 414 (*chaebol*) firm-years.

To understand how *chaebol* groups reallocate their internal resources across member firms, we hand-collect additional data on intra-*chaebol* equity investments from the KIND System by reading each disclosure file as in Almeida, Kim, and Kim (2015).⁹ Each disclosure file describes a transaction in which a *chaebol* firm transfers cash to another member firm in exchange for acquiring an equity stake. We merge these data with our accounting and financial data from TS2000. All the data on equity investments must be manually and individually matched to the accounting and financial data using company names as well as company histories. We eliminate observations from firms that are not successfully matched. These procedures lead to 1,341 public firm-level transactions.

Our main variable of interest is the firm-level volatility of cash flows (*CF vol*), which we use as a proxy for the level of risk at the onset of the Asian financial crisis. Following other studies (e.g., Zhang (2006), Avramov et al. (2007), Giroud and Mueller (2010), Acharya, Almeida, and Campello (2013), etc.), we define *CF vol* as the standard deviation of earnings before interest and taxes plus depreciation divided by total assets over the 1990 through 1997 period, namely,

$$\sigma(CF)_{1990,1997}^i = \sigma((EBITDA^i / Total Assets^i)_{1990,1997}).$$

The definitions of other variables are as follows. Investment (*Investment*) is defined as capital expenditures over total assets. Firm size (*Size*) is equal to the natural logarithm of total assets. Tobin's Q (*Q*) is total assets minus the book value of equity plus the market value of equity over total assets. Cash flow (*Cash flow*) is earnings before interest and taxes plus depreciation divided by total assets. Cash (*Cash*) is the sum of cash holdings and short-term investments divided by total assets, and leverage (*Debt*) equals total debt over total assets. Net equity transfer (*Net equity transfer*), our measure of capital reallocation across member firms within a *chaebol* group, is defined as the sum of equities sold to other member firms minus equities purchased from other member firms, divided by total assets. This firm-level variable is obtained by aggregating all transaction observations for

⁸We use data prior to 1995 to obtain enough variability in return on assets, which is used to calculate our measure of corporate risk.

⁹See section II.F in Almeida, Kim, and Kim (2015) for details on the data collection procedure.

each firm-year and scaling by total firm assets. After eliminating private *chaebol* firms the market values of whose equities are not observable, the final sample for the capital reallocation analyses consists of a panel of 250 firm-years with yearly transaction-level data. All variables are winsorized at the 1% and 99% levels in all our analyses.

2.3.2 Summary statistics

Table 2.2 summarizes the firm-level Korean *chaebol* data for the sample periods (1996 through 1999) used in our analyses. Our sample consists of 26 *chaebol* groups with 414 member firm-year observations, namely, 16 (publicly listed) firm-year observations for each *chaebol* group on average. For interpretation purposes the table also reports data on within-*chaebol* variation in our risk measures. The statistics reported in this paper are largely consistent with those reported in other work using Korean data from the Asian crisis (e.g., Almeida, Kim, and Kim (2015)).

2.4 Baseline results

2.4.1 Investment

Table 2.3 presents the results of regression analyses of the relationship between risk and investment on *chaebol* around the crisis. The dependent variable is *Investment*. *After* is an indicator variable that is equal to one for the post-crisis period, i.e. 1998-1999, and zero for the pre-crisis period, i.e. 1996-1997. The main variable of interest is the interaction between *CF vol* and *After*. We control for *Size*, *Q*, *Cash flow*, *Cash*, and *Debt*. To control for changes in the association between investment and our control variables around the crisis, we also include interactions between *After* and all control variables. We additionally control for *chaebol* fixed effects, as seen in columns (1) and (2), *chaebol* fixed effects and year fixed effects, as seen in columns (3) and (4), and *chaebol*-year fixed effects, as seen in columns (5) and (6). Standard errors are clustered at the group level.

In all specifications, the coefficients on interaction between *CF vol* and *After* are negative and statistically significant. Combined with the existing evidence of the decline in investments among Korean firms during the Asian crisis (e.g., Almeida, Kim, and Kim (2015)), this result indicates that low-risk member firms reduced investments to a lesser

extent than high-risk member firms in the same *chaebol* in the aftermath of the Asian crisis. Given that the standard deviation of the within-*chaebol* variation in *CF vol* is 0.0234, the coefficient on the interaction between *CF vol* and *After* in column (6) indicates that a one-standard-deviation decrease in *CF vol* is associated with a smaller decline in post-crisis capital expenditures of approximately 3.2% of firm assets. This effect is economically significant as it is approximately 24% of the standard deviation and 34% of the sample average value of investment.

On the other hand, the coefficient on *CF vol* is positive and statistically significant but smaller in magnitude than the coefficient on the interaction between *CF vol* and *After*. This implies that high-risk member firms invested more than low-risk member firms during the pre-crisis period. This evidence suggests that there was a clear change in *chaebol* firms' investment patterns with regard to the level of cash-flow risk around the crisis.

2.4.2 Capital reallocation

As a potential channel that enabled post-crisis changes in investment, as mentioned above, we investigate capital reallocation within each *chaebol* group. In particular, we analyze intra-*chaebol* equity investments for the pre-crisis and post-crisis periods, respectively.

The results are reported in Table 2.4. The dependent variable is *Net equity transfer* in all columns. Following Almeida, Kim, and Kim (2015) we use Industry *Q* as a proxy for firm-level growth opportunities in panel A and firm-level *Q* in panel B. The sample period is 1998-1999 (post-crisis) in columns (1) and (2) of both panels and 1996-1997 (pre-crisis) in columns (3) and (4). We control for only *chaebol*-year fixed effects in columns (1) and (3), whereas we control for firm characteristics as well in columns (2) and (4). In addition to *Size*, *Q*, *Cash flow*, *Cash*, and *Debt*, we control for Rajan and Zingles's (1998) industry-level *external finance dependence* measure, which is a relatively exogenous proxy for a firm's liquidity.¹⁰ Standard errors are clustered at the group level. The coefficients on the variable of interest, *CF vol*, seen in columns (1) and (2) of panel A, are negative and statistically significant, indicating that high-risk member firms bought equities from low-risk member firms. In other words, *chaebol* used equity investments to transfer cash to low-risk member firms during the post-crisis period. Insofar as the standard deviation of the within-*chaebol* variation in *CF vol* is 0.0234, the coefficient estimate shown in column

¹⁰Higher external financing dependence means less liquidity.

(2) suggests that a one-standard-deviation decrease in *CF vol* is associated with an increase in net equity transfer of approximately 7.5% of firm assets. Thus, *chaebol* firms with low *CF vol* received economically substantial transfers of capital following the Asian crisis. In addition, the positive and statistically significant coefficients on external financing dependence in columns (1) and (2) show that member firms with lower liquidity received more within-*chaebol* capital than those with higher liquidity when the costs of external financing rose, which is consistent with existing theories and evidence in the literature. Meanwhile, the coefficients on *CF vol* are seen to be statistically and economically insignificant in columns (3) and (4), indicating that *chaebol* firms do not exhibit similar equity transfer patterns in the pre-crisis period. In addition, the number of observations indicates that the frequency of equity transfer is significantly higher during the post-crisis period. We obtain similar results as seen in panel B, in which we control for firm-level Tobin's *Q* instead of industry-level Tobin's *Q*. Overall, the results reported in Table 2.4 suggest that internal capital markets provide the channel through which *chaebol* shifted investment-cash-flow risk patterns in the aftermath of the Asian financial crisis. This result also suggests that post-crisis changes in *chaebol* investment were endogenous and helps to rule out the possibility that investment by risky member firms decreased to a greater extent than that of safe member firms for exogenous reasons.

2.5 Cross-sectional test

In this section, we conduct cross-sectional analyses across *chaebol* groups to strengthen the interpretation of risk reduction undertaken by *chaebol* in response to increased costs of external finance. First, we examine the relationship between the variability in risk across member firms and risk reduction. *Chaebol* with high risk variability across member firms are expected to be better able to reduce risk than *chaebol* with low risk variability across member firms. Next, we analyze the association between external financing dependence and risk reduction. Because firms that depend heavily on external financing would be affected more severely by a sudden increase in the cost of external liquidity, *chaebol* that are more dependent on external financing are expected to exhibit greater risk reduction.

2.5.1 Risk variability

We define risk variability as the standard deviation of *CF vol* across member firms within a *chaebol* group. We then create an indicator variable, High Risk Var *chaebol*, which is equal to one if a firm belongs to a *chaebol* group with above-median risk variability and zero otherwise. The results of the analyses are reported in Table 2.5. The dependent variable is *Investment* and the variable of interest is the triple interaction, $CF\ vol \times After \times High\ Risk\ Var\ chaebol$. Columns (1), (3), and (5) do not control for firm characteristics, whereas columns (2), (4), and (6) control for firm characteristics. Columns (1) and (2) control for *chaebol* fixed effects, columns (3) and (4) control for *chaebol* fixed effects and year fixed effects, columns (5) and (6) control for *chaebol*-year fixed effects. Standard errors are clustered at group level.

Consistent with the results provided in Table 2.3, the coefficients on $CF\ vol \times After$ are negative and statistically significant in all columns, indicating that *chaebol* reduced investment in high-risk firms in the aftermath of the crisis. In addition, the coefficients on $CF\ vol \times After \times High\ Risk\ Var\ chaebol$ are negative and statistically significant in all columns. This result suggests that the negative association between risk and post-crisis investment is significantly more pronounced among *chaebol* with high risk variability. For instance, the coefficient estimate shown in column (6) indicates that, among *chaebol* groups with below-median risk variability, a one-standard-deviation decrease in *CF vol* is associated with a smaller decline in post-crisis capital expenditures of approximately 1.9% of firm assets. On the other hand, the same decrease in *CF vol* is associated with a smaller decline in post-crisis capital expenditure of approximately 4.6% of firm assets for groups with above-median risk variability. This result is consistent with the proposition that within-group risk-variability helped *chaebol* to reduce risk during the post-crisis period.

2.5.2 External finance dependence

We examine the association between external financing dependence and post-crisis risk reduction at the group level. For the analysis, we exploit Rajan and Zingales's (1998) industry-level technology-based measure of external financing dependence, following Almeida, Kim, and Kim (2015). In particular, we first compute the average of external financing dependence of all member firms in each *chaebol*. We then define an indicator variable, *High EFD Chaebol*, which is equal to one if a firm belongs to an above-median external financing

dependence group and zero otherwise.

Table 2.6 reports the results of the analysis. The dependent variable is *Investment* and the variable of interest is the triple interaction, $CF\ vol \times After \times High\ EFD\ Chaebol$. As in Table 2.5, columns (1), (3), and (5) do not control for firm characteristics, whereas columns (2), (4), and (6) control for firm characteristics. Columns (1) and (2) control for *chaebol* fixed effects, columns (3) and (4) control for *chaebol* fixed effects and year fixed effects, columns (5) and (6) control for *chaebol*-year fixed effects. Standard errors are clustered at a group level.

Consistent with the results shown in Table 2.3, the coefficients on $CF\ vol \times After$ are negative and statistically significant in all columns, indicating that *chaebol* reduced investment in high-risk firms in the aftermath of the crisis. The coefficients on $CF\ vol \times After \times High\ EFD\ Chaebol$ are also negative and statistically significant in all columns. This result suggests that the negative association between risk and post-crisis investment is significantly more pronounced among *chaebol* with high dependence on external financing. For example, the coefficient estimate shown in column (6) indicates that a one-standard-deviation decrease in *CF vol* is associated with a smaller post-crisis reduction in capital expenditure of approximately 1.8% of firm assets among groups with below-median external financing dependence, whereas the same decrease in *CF vol* is associated with a smaller post-crisis reduction in capital expenditures of approximately 4.7% of firm assets among groups with above-median external financing dependence.

2.6 *Chaebol* vs stand-alone firms

In this section, we compare investment patterns of *chaebol* and stand-alone firms around the crisis. As with *chaebol* firms, we expect risky stand-alone firms to reduce risk to a greater extent than safe stand-alone firms during the post-crisis period. Because stand-alone firms are unable to reallocate capital toward safe ones, however, their aggregate investment would decrease to a greater extent than investment on the part of *chaebol*. On the other hand, if the reduction in investment of stand-alone firms is similar to that of *chaebol*, stand-alone firms would be less able to reduce risk collectively. To test this expectation, we construct pseudo-*chaebol* groups using stand-alone *chaebol* firms that are selected via a matching procedure, which is based on their pre-crisis levels of investment, investment growth rates, *CF vol*, Tobin's *Q*, size, cash flow, cash, leverage, and industry.

We then compare the within-group association between investment and cash-flow risk of *chaebol* and pseudo-*chaebol* firms. We also investigate post-crisis changes in the aggregate investment of *chaebol* and pseudo-*chaebol* firms. Lastly, we compare post-crisis changes in the overall cash-flow risk of the treated *chaebol* and pseudo-*chaebol* groups.

2.6.1 Risk and investment

We examine the relationship between cash-flow risk and post-crisis investment among stand-alone firms. As with *chaebol*, we expect to find a negative association between risk and post-crisis investment as risky stand-alone firms would be expected, in an effort to reduce risk, to reduce investment to a greater extent than safe firms. The empirical results are reported in columns (1) and (2) of Table 2.7. The dependent variable is *Investment* and the variable of interest is $CF\ vol \times After$. Given that the standard deviation of *CF vol* for the sample of stand-alone firms is 0.0329, the coefficient on interaction between *CF vol* and *After* shown in column (2), for instance, indicates that a one-standard-deviation decrease in *CF vol* is associated with a smaller decline in capital expenditures of approximately 1.8% of firm assets. This result suggest that stand-alone firms, especially risky ones, reduced investment as the costs of external financing increased.¹¹

We next examine whether the negative relationship between risk and post-crisis investment holds within each pseudo-*chaebol* group. In other words, we repeat the analysis reported in Table 2.3 using pseudo-*chaebol* firms, controlling for pseudo-*chaebol*-year fixed effects. The results are presented in columns (3) and (4). The dependent variable is *Investment* the variable of interest is $CF\ vol \times After$. The statistically and economically insignificant coefficient on $CF\ vol \times After$ indicates that pseudo-*chaebol* groups do not exhibit a negative association between risk and post-crisis investment within each group.

Lastly, we compare the risk-investment relationship between *chaebol* and pseudo-*chaebol* firms. The results are presented in columns (5) and (6). The variable of interest is $CF\ vol \times After \times chaebol$ and we control for (pseudo-)*chaebol*-year fixed effects. The coefficient on the variable of interest is negative and statistically significant, whereas the coefficient on $CF\ vol \times After$ is insignificant in both columns. This result indicates that the negative within-group risk-investment relationship during the post-crisis period holds only among *chaebol* firms and is consistent with the proposition that internal capital markets and risk

¹¹We repeat the tests reported in columns (1) and (2) of Table 2.7 using only matched pseudo-*chaebol* firms and find a negative and statistically significant coefficient on $CF\ vol \times After$.

variability helped *chaebol* reduce risk in the aftermath of the financial crisis.

2.6.2 Aggregate investment

We examine changes in aggregate investments of *chaebol* and pseudo-*chaebol* firms around the Asian financial crisis. Table 2.8 reports the results of the analysis. Panel A shows the average levels of investment of *chaebol* and pseudo-*chaebol* firms in 1997 and 1998. In 1997, both groups of firms invested approximately 10.5% of assets and the difference between the two groups is statistically insignificant. On the other hand, the difference becomes statistically and economically significant in 1998. Although both groups reduced investment in 1998, the reduction was significantly greater for pseudo-*chaebol* firms. In particular, the reduction in capital expenditures of *chaebol* was approximately 2% of assets, whereas that of pseudo-*chaebol* firms was 6% of assets. The matching estimator suggests that *chaebol* firms reduced capital expenditures by 4.45% of assets less than pseudo-*chaebol* firms. This result is consistent with the proposition that stand-alone firms needed to reduce investment to reduce risk, whereas risk-variability and internal capital markets allowed *chaebol* to reduce risk without significantly cutting back on investment.

In panel B, we repeat the analysis for the 1996-1997 period. In both years *chaebol* firms invested more than pseudo-*chaebol* firms but the difference is insignificant. Although both groups of firms reduced investment slightly in 1997, the difference in magnitude of the reduction between the two groups is statistically and economically insignificant. This result suggests that the results we document in panel A are less likely to be attributable to pre-existing trends in investment.

2.6.3 Group-level risk

We examine group-level cash-flow risk of *chaebol* and pseudo-*chaebol*. For each group, we compute the asset-weighted average of *CF vol* across member firms, which we define as *CF vol-grp*. The results are presented in Table 2.9. Panel A reports *CF vol-grp* for *chaebol* and pseudo-*chaebol* groups in 1997 and 1998. In 1997, the difference in *CF vol-grp* between the two groups is insignificant. However, the difference becomes statistically and economically significant in 1998. In particular, *CF vol-grp* of pseudo-*chaebol* groups did not change in 1998, while that of *chaebol* groups decreased by 0.0319, which is 68% of the mean. The difference-in-differences estimator suggests that the post-crisis reduction

in the cash-flow risk of *chaebol* groups is statistically significant compared with that of pseudo-*chaebol* groups.

In panel B, we repeat the analysis for the 1996-1997 period. However, we find no differences in *CF vol*-grp or trends in *CF vol*-grp between the two groups. The overall results presented in Table 2.9 confirm that *chaebol* reduced risk to a greater extent while reducing investment to a lesser extent than similar stand-alone firms.

2.7 Alternative explanations

In this section, we address alternative explanations to the results we present in this paper.

2.7.1 Investment opportunities, cash flows, debt capacity

We examine the possibility that post-crisis changes in investment patterns are attributable to investment opportunities. For example, our baseline results might be explained by a negative association between *CF vol* and post-crisis investment opportunities. Another possibility is that *CF vol* and investment opportunities are negatively associated in general and *chaebol* became more sensitive to investment opportunities after the crisis. Then investment in member firms with better investment opportunities would increase (Almeida, Kim, and Kim(2015)). Although we control for *Q* and interaction between *Q* and *After* in all of our regression tests, we directly examine the association between *CF vol* and *Q*. The results are presented in columns (1) and (2) of Table 2.10. The dependent variable is *Q*. None of the coefficients on *CF vol* or interaction between *CF vol* and *After* is statistically or economically significant. This result indicates that *CF vol* and *Q* are not particularly associated in either the pre-crisis or post-crisis periods.

Next, we consider the possibility that *CF vol* and post-crisis cash flows are negatively associated and that *chaebol* allocated more resources to member firms that generate higher cash flows to accelerate the generation of internal cash flows. Another possibility is that *CF vol* and cash flows are generally negatively associated and cash flows became more important during the post-crisis period. Although we control for *Cash flow* and interaction between *Cash flow* and *After* in all of our regression tests, we directly examine the association between *CF vol* and cash flows. The results are presented in columns (3) and (4) of Table 2.10. The dependent variable is *Cash flow* and none of the coefficients on *CF vol*

or interaction between *CF vol* and *After* is statistically significant. This result indicates that *CF vol* and cash flows are not particularly associated in either the pre-crisis or the post-crisis period and that demand for cash flow is unlikely to be the driving force behind the results we document in this paper.

One might be concerned that the differential patterns in investment in low risk-member firms and high-risk member firms during the post-crisis period might be attributable to differential supplies of liquidity. For example, low-risk firms may have higher debt capacity, enabling them to reduce investment to a lesser extent during the post-crisis period. To address this possibility, we examine the relationship between debt growth and *CF vol*. If our results are attributable to debt capacity, low-risk member firms would exhibit high debt growth after the crisis compared with high-risk member firms. The results are presented in columns (5) and (6). The dependent variable is *Debt growth* and the variable of interest is the interaction between *CF vol* and *After*. The coefficient of interest is statistically insignificant, suggesting that our findings cannot be explained by the external liquidity channel.

2.7.2 Placebo tests

Although we examine the association between *CF vol* and *Q* above, a possible concern is that cash flow risk at a given point in time might be negatively correlated with unobservable changes in investment opportunities. If this was the case, low-risk member firms would tend to increase investment in the following years irrespective of the negative shock to the supply of external liquidity. To test this possibility, we repeat our base specification tests for placebo crises occurring in 1995 and 2005. If there always exist a negative association between risk and future investment, we would find the same negative association during the placebo periods.

The results are presented in Table 2.11. The dependent variable is *Investment* and the variable of interest is $CF\ vol \times After$, where *CF vol* is measured in the years prior to the placebo crisis and *After* is an indicator variable that equals one for years after the placebo crisis and zero otherwise. Columns (1) and (2) show the results for the 1995 placebo crisis and columns (3) and (4) show the results for the 2005 placebo crisis. None of the coefficients on the variable of interest is negative or statistically significant. This result suggests that the negative association between risk and investment occurs only when the cost of external financing increases suddenly.

Another possibility is that the negative relationship between risk and investment is attributable to negative demand shocks in product markets following the crisis. If high-risk firms were more heavily affected in product markets than low-risk firms, the negative association between *CF vol* and postcrisis investment could not be explained by *chaebol* efforts to reduce risk in response to higher costs of external financing. To rule out this possibility, we conduct a placebo test in which we exploit the 2003 credit card crisis that created the largest negative shock to aggregate demand in Korea since the recovery from the 1997 Asian financial crisis.¹² If the results that we report in this paper are attributable to the economy-wide negative demand shock, we should observe a similarly negative relationship between risk and investment during the recession period as well. The results are presented in columns (5) and (6). None of the coefficients of interest is significant, suggesting that the negative association between risk and post-crisis investment is unlikely to be attributable to negative demand shocks in product markets.

2.7.3 Economic downturn

The 2003 placebo test, however, cannot completely rule out alternative stories that rely on time-varying unobservable characteristics. For example, the economic downturn might have had differential impacts on high- and low-risk *chaebol* firms, particularly during the post-crisis period. To address this limitation of the 2003 placebo test, we conduct an additional analysis.

To the degree that our measure of risk, cash-flow volatility, captures a firm's market fluctuation sensitivity to cash flows, firms with low risk may be those in which cash flows are insensitive to fluctuations in product market demand. Given that the 1997 Asian financial crisis was accompanied by an economic downturn, low-risk firms are expected to suffer less than high-risk firms that are sensitive to cash flows during the post-crisis period. Our evidence is therefore potentially subject to an alternative explanation that *chaebol* concentrated their resources in member firms that are less sensitive to product market demand, namely, firms with low cash-flow volatility

Although we control for firm-level cash flows in our analyses, we decompose our risk

¹²To quickly stimulate the economy by encouraging domestic consumption, the Korean government relaxed the regulations regarding credit card businesses, which led to an oversupply of credit to households. Subsequently, the deregulation led to the collapse of the bubble, which generated nearly a million credit card delinquents. This crisis finally resulted in the deepest recession period ever that was not accompanied by a financial crisis.

measure into idiosyncratic and systematic components and repeat our baseline tests with each of the risk components to clearly rule out this alternative story. We measure systematic risk by multiplying cash-flow beta with the standard deviation of industry median cash flow, i.e.,

$$Systematic\ Risk = \frac{Cov(FirmCF, IndustryCF)}{Var(IndustryCF)} \times \sigma(IndustryCF).$$

Then the idiosyncratic component can be computed as

$$Idiosyncratic\ Risk = \sqrt{Total\ Risk^2 - Systematic\ Risk^2}.$$

The results are presented in Table 2.12. We repeat our baseline regression analyses, replacing *CF vol* with idiosyncratic risk and systematic risk in panel A and panel B, respectively. The results shown in panel A indicate that the baseline results continue to hold when we use idiosyncratic risk as a measure of risk. As in the previous tables, we control for *chaebol* fixed effects (columns (1) and (2)), *chaebol* fixed effects and year fixed effects (columns (3) and (4)), and *chaebol*-year fixed effects (columns (5) and (6)). The coefficient of interest is statistically significant and negative in all columns. Given that the standard deviation of the within-*chaebol* variation in idiosyncratic risk is 0.0166, the coefficient of -1.848 shown in column (6) indicates that a one-standard-deviation decrease in idiosyncratic risk is associated with an increase in investment of approximately 3.1% of firm assets. This effect is economically significant as it is approximately 23% of the standard deviation and 33% of the sample average value of investment. This economic significance is almost equivalent to that of our baseline results.

As shown in panel B, however, when we use systematic risk as our measure of risk, the coefficient of interest loses significance in all specifications. The results presented in Table 2.12 indicate that our main specification results are not driven by a firm's market fluctuation sensitivity of cash flow during the economic downturn.

2.7.4 Degree of diversification

A business group (conglomerate) generally faces lower cash-flow risk due to diversification that arises from less-than-perfect cross-member-firm (cross-divisional) correlations in cash flows. In this section, we examine whether *chaebol* increased diversification as a way of

reducing risk during the post-crisis period. For the analysis, we exploit Duchin’s (2010) measure of diversification in cash flow and compute each *chaebol* group’s cross-member firm correlation in cash flows, which we define as $Corr_{CF}$.¹³ $Corr_{CF}$ is always less than or equal to zero and lower $Corr_{CF}$ indicates greater diversification.

We find that the average of pre-crisis- $Corr_{CF}$ (as of 1997) is -0.00387, whereas the average of post-crisis- $Corr_{CF}$ (as of 1998) is -0.00343.15 The estimated mean-difference is 0.0004 (t-statistic equal to 0.29). These results indicate that the cross-member correlation in cash flow increased but was statistically and economically insignificant, suggesting that *chaebol* reduced risk in the immediate aftermath of the crisis but probably not through increasing diversification with respect to cash flows.

2.7.5 Alternative measures of risk

We address concerns arising from the way we measure risk. First, a firm’s pre-crisis risk and post-crisis risk may differ. Because we use predetermined levels of risk, we cannot draw the same conclusion if each group firm’s post-crisis level of risk differs from its pre-crisis level. To address this possibility, we examine the association between pre-crisis risk and post-crisis risk of sample firms. However, the two measures of risk are significantly and positively associated. In particular, the estimated coefficient of correlation is 0.98 with a *t*-statistic of 159.56.

We also confirm that a member firm’s within-group rank in *CF vol* does not change after the crisis. Specifically, we draw the rank of each member firm in terms of *CF vol* within a group to which it belongs for the pre-crisis and post-crisis periods, respectively. We then estimate the correlation coefficient between the two ranks. The estimated coefficient of correlation is 0.93 with a *t*-statistic of 25.38. This result suggests that there have been no significant changes in ranks of our risk measure since the crisis. In addition, we replicate base specifications while replacing pre-crisis risk with post-crisis risk, but the results remain largely the same.

Lastly, we use a five-year window (1993 through 1997) instead of our original eight-year window (1990 through 1997) to compute *CF vol*. We repeat our baseline tests with the five-year window *CF vol* and all results remain largely the same (e.g., the coefficient on the interaction term - *CF vol* $\times$ *After* - in the investment regression is -1.3215 with a *t*-statistic

¹³Refer to Duchin (2010) for details on the measure.

of -2.84).

2.8 Conclusion

Exploiting the 1997 Asian financial crisis, this paper provides empirical evidence that *chaebol* were able to reduce cash-flow risk to a greater extent than stand-alone firms while reducing investment to a lesser extent in response to a sudden increase in the cost of external finance. This paper adds to the literature on corporate diversification by documenting an additional benefit of diversified business organizations, which is effective operational risk management. Our empirical evidence suggests that such risk management is enabled by internal capital markets along with high-risk variability within diversified *chaebol* organizations.

2.9 Figures and Tables

Table 2.1 Variable Definitions

<i>CF vol</i>	The standard deviation of earnings before interest and taxes plus depreciation divided by total assets over the 1990 to 1997 period.
<i>CF vol within a chaebol</i>	<i>CF vol</i> minus the average <i>CF vol</i> across all firms in the same <i>chaebol</i> .
<i>Investment</i>	Capital expenditure over total assets.
<i>Size</i>	Natural logarithm of total assets.
<i>Q</i>	(Total assets - book value of equity + market value of equity)/total assets.
<i>Cash flow</i>	(Earnings before interest and taxes + depreciation)/total assets.
<i>Cash</i>	(Cash + short-term investments)/total assets.
<i>Debt</i>	Total debt/total assets.
<i>Debt growth</i>	[Total debt(t) - total debt($t-1$)]/total assets($t-1$).
<i>Net equity transfer</i>	The sum of equities sold to other <i>chaebol</i> firms minus the amount of equities purchased from other <i>chaebol</i> firms, in Korean won. We aggregate all transaction observations for each firm-year by taking the sum of transaction amounts, and scale by firm assets.
<i>RiskVar</i>	The standard deviation of <i>CF vol</i> across all member firms in a <i>chaebol</i> group.
<i>High RiskVar Chaebol</i>	A dummy variable equal to one if the <i>chaebol</i> group has above-median <i>RiskVar</i> .
<i>External finance dependence</i>	An industry-level measure of external finance dependence suggested by Rajan and Zingales (1998).

Table 2.1 (con't.): Variable Definitions

<i>High EFD Chaebol</i>	A dummy variable equal to one if the firm belongs to a <i>chaebol</i> with above-median <i>external finance dependence</i> .
<i>Corr_{CF}</i>	A <i>chaebol</i> -level asset-weighted cross-member-firm correlation in cash flow suggested by Duchin (2010).

Table 2.2 Summary Statistics

This table reports summary statistics on the variables for the sample *chaebol* firms. It also reports summary statistics on *Net equity transfer* for the sample that we use to investigate capital reallocation across *chaebol* firms during the pre-crisis and post-crisis periods. All variables are defined in Table 2.1.

	Mean	<i>SD</i>	P25	P50	P75	<i>N</i>
Corporate Risk						
<i>CF vol</i>	0.0293	0.0302	0.0095	0.0179	0.0364	400
<i>CF vol</i> within a <i>chaebol</i>	0.0000	0.0234	-0.0133	-0.0035	0.0069	400
Idiosyncratic risk	0.0213	0.0221	0.0070	0.0129	0.0265	396
Idiosyncratic risk within a <i>chaebol</i>	0.0000	0.0166	-0.0092	-0.0024	0.0064	396
Systematic risk	0.0104	0.0221	0.0006	0.0054	0.0138	400
Systematic risk within a <i>chaebol</i>	0.0000	0.0243	-0.0103	-0.0017	0.0046	400
Investment						
Investment	0.0928	0.1336	0.0065	0.0427	0.1195	392
Other Firm Characteristics						
Size	27.4192	1.4675	26.4181	27.4760	28.4962	412
<i>Q</i>	0.9526	0.3114	0.8143	0.8939	0.9826	368
Cash flow	0.0598	0.0474	0.0358	0.0582	0.0833	412
Cash	0.0695	0.0614	0.0271	0.0499	0.0878	396
Debt	0.6326	0.2659	0.4249	0.6119	0.7689	412
Capital Reallocation						
Precrisis period, 1996 - 1997						
Net equity transfer	0.0115	0.0699	-0.0108	-0.0005	0.0090	45
Postcrisis period, 1998 - 1999						
Net equity transfer	-0.0037	0.2298	-0.0304	0.0000	0.0184	205
Chaebol-level Risk Variability						
Risk variability	0.0220	0.0158	0.0079	0.0193	0.0260	80

Table 2.3 Risk and Investment before and after the Financial Crisis

This table reports the results of panel regressions on the relationship between risk and investment in *chaebol* firms before and after the 1997 Asian crisis. *After* is an indicator variable for the post-crisis period. All other variables are defined in Table 2.1. We report estimated coefficients and their *t*-statistics, calculated using heteroskedasticity-robust standard errors clustered by *chaebol*. ***, **, and * indicate the significance at the 1%, 5%, and 10% levels, respectively. This table shows that investment of higher risk *chaebol* firms decreased more after the crisis.

Dep. variable	Investment					
<i>CF vol</i>	1.1861** (2.47)	1.1322** (2.31)	1.1861** (2.39)	1.1461** (2.22)	0.9673*** (2.97)	0.9973** (2.45)
After	0.0137 (1.21)	-0.2914 (-1.04)				
<i>CF vol</i> × After	-1.5830*** (-3.68)	-1.6622*** (-3.01)	-1.5830*** (-3.56)	-1.7167*** (-2.84)	-1.1934** (-2.67)	-1.4152*** (-3.20)
Size		0.0041 (0.43)		0.0048 (0.49)		0.0043 (0.47)
Size × After		0.0078 (0.81)		0.0071 (0.74)		0.0063 (0.58)
<i>Q</i>		0.0147 (0.42)		0.0015 (0.04)		-0.0162 (-0.23)
<i>Q</i> × After		0.0268 (0.60)		0.0497 (0.88)		0.0748 (0.73)
Cash flow		0.0728 (0.22)		0.1271 (0.38)		0.2039 (0.68)
Cash flow × After		-0.0287 (-0.08)		-0.0775 (-0.22)		-0.1583 (-0.53)
Cash		-0.1972 (-1.44)		-0.1858 (-1.33)		-0.0303 (-0.25)
Cash × After		0.1318 (0.66)		0.0982 (0.48)		0.0449 (0.30)
Debt		-0.1409 (-1.26)		-0.1202 (-1.05)		-0.0354 (-0.26)
Debt × After		0.2003* (1.94)		0.1510 (1.48)		-0.0201 (-0.14)
Constant	0.0657*** (5.02)	-0.0051 (-0.02)	-0.0164 (-0.66)	-0.2645 (-1.08)	0.0744*** (6.02)	-0.1445 (-0.61)
<i>Chaebol</i> × Year FE	No	No	No	No	Yes	Yes
Year FE	No	No	Yes	Yes	No	No
<i>Chaebol</i> FE	Yes	Yes	Yes	Yes	No	No
<i>N</i>	380	363	380	363	380	363
<i>R</i> ²	0.0580	0.0894	0.1461	0.1759	0.0284	0.0526

Table 2.4 Risk and Capital Reallocation Before and After the Asian Crisis

This table presents the relationship between predetermined risk and capital reallocation through intrachebol equity investments for the post-crisis period of 1998-1999 (columns (1) and (2)) and for the pre-crisis period of 1996-1997 (columns (3) and (4)). Following Almeida, Kim, and Kim (2015), panels A and B, respectively, use *Industry Q* and firm-level *Q* measured in the year prior to the 1997 crisis (or as of 1995 for the pre-crisis tests) as a proxy for a firm's exogenous growth opportunities. All other variables are defined in Table 2.1. All control variables are measured as of 1997 (or as of 1995 for the pre-crisis tests). We include *chaebol*-year fixed effects in all regressions. In each column, we report estimated coefficients from OLS regression and their *t*-statistics, calculated using heteroscedasticity robust standard errors clustered by *chaebol*. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. This table shows that *chaebol* used equity transfers to transfer cash to member firms with low-risk, high-growth opportunities, and high external financing dependence in the aftermath of the Asian crisis.

Panel A. Using Industry <i>Q</i> as a Control				
Dependent variable	Net equity transfer			
	(1)	(2)	(3)	(4)
Period	Post-crisis (1998-99)		Pre-crisis (1996-97)	
<i>CF vol</i>	-2.0422** (-2.10)	-3.2261*** (-2.95)	0.7984 (1.45)	-0.1221 (-0.18)
Industry <i>Q</i>		0.0895** (2.43)		-0.0655 (-0.99)
Size		-0.0047 (-0.59)		0.0029 (0.61)
Cash		0.0354 (0.14)		-0.0368 (-0.34)
Debt		0.0441 (0.39)		0.0186 (0.39)
External finance dependence		0.0201** (2.06)		0.0000 (0.99)
Constant	0.0753* (1.68)	-0.6456* (-1.98)	-0.0249 (-1.39)	-0.0180 (-0.10)
<i>Chaebol</i> × Year FE	Yes	Yes	Yes	Yes

Table 2.4 (con't.): Risk and Capital Reallocation Before and After the Asian Crisis

N	143	130	30	28
R^2	0.0412	0.1901	0.1491	0.5375
Panel B. Using Firm Q in 1997 as a Control				
Dependent variable	Net equity transfer			
	(1)	(2)	(3)	(4)
Period	Post-crisis (1998-99)		Pre-crisis (1996-97)	
$CF\ vol$	-2.0422**	-3.3266***	0.7984	0.7167
	(-2.10)	(-2.93)	(1.45)	(0.60)
Q 1997 (1995)		0.5392**		-0.1006
		(2.27)		(-0.42)
Size		-0.0052		-0.0086
		(-0.67)		(-0.97)
Cash		0.0252		0.0752
		(0.27)		(0.67)
Debt		0.0250		0.0111
		(0.21)		(0.21)
External finance dependence		0.0230**		0.0000
		(2.34)		(1.24)
Constant	0.0753*	-1.3969***	-0.0249	-0.3311
	(1.68)	(-3.03)	(-1.39)	(-0.79)
$Chaebol \times Year$ FE	Yes	Yes	Yes	Yes
N	143	126	30	28
R^2	0.0412	0.1864	0.1491	0.4668

Table 2.5 Risk and Investment in *Chaebol* Firms with High and Low Risk Variability

This table presents the relationship between corporate risk and investments of firms in high and low risk variability *chaebol*. *High RiskVar Chaebol* is an indicator of whether a firm belongs to a *chaebol* with above-median risk variability, where *risk variability* is defined as the standard deviation of corporate risk across member firms of a *chaebol* group. *After* is defined in Table 2.3. All other variables are defined in Table 2.1. Control variables are size, *Q*, cash flow, cash, debt, and their interaction terms with *After*. In each column, we report estimated coefficients from OLS regression and their *t*-statistics, calculated using heteroskedasticity-robust standard errors clustered by *chaebol*. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. This table shows that the negative relationship between risk and investment after the crisis is more pronounced among firms in *chaebol* with higher variability in risk across member firms.

Dep. variable	(1)	(2)	(3)	(4)	(5)	(6)
	Investment					
<i>CF vol</i>	1.1665*	1.1490*	1.1665*	1.1713*	1.0247*	1.0220*
	(2.04)	(1.86)	(1.97)	(1.83)	(2.06)	(1.97)
<i>High RiskVar Chaebol</i>			-0.1083***	-0.1008**		
			(-4.70)	(-2.34)		
<i>After</i>	0.0071	-0.2789				
	(0.46)	(-1.06)				
<i>CF vol</i> × <i>After</i>	-0.9115*	-1.1131*	-0.9115*	-1.1094*	-0.6779	-0.7932*
	(-1.84)	(-1.96)	(-1.89)	(-2.02)	(-1.69)	(-1.83)
<i>High RiskVar Chaebol</i> × <i>After</i>	0.0146	0.0094	0.0146	0.0139		
	(0.30)	(0.19)	(0.29)	(0.27)		
<i>CF vol</i> × <i>High RiskVar Chaebol</i>	0.0169	-0.0426	0.0169	-0.0484	-0.1010	-0.0439
	(0.02)	(-0.05)	(0.02)	(-0.05)	(-0.15)	(-0.07)
<i>CF vol</i> × <i>High RiskVar Chaebol</i> × <i>After</i>	-1.4156*	-1.1310*	-1.4156*	-1.2616*	-1.0661*	-1.1696*
	(-1.96)	(-1.90)	(-1.94)	(-1.90)	(-1.82)	(-1.86)
Constant	0.0660***	-0.0057	0.0909***	-0.1546	0.0733***	-0.1336
	(5.77)	(-0.02)	(22.36)	(-0.63)	(6.18)	(-0.58)
Controls	No	Yes	No	Yes	No	Yes
<i>Chaebol</i> × Year FE	No	No	No	No	Yes	Yes
Year FE	No	No	Yes	Yes	No	No
<i>Chaebol</i> FE	Yes	Yes	Yes	Yes	No	No
<i>N</i>	380	363	380	363	380	363
<i>R</i> ²	0.0591	0.0900	0.1471	0.1766	0.0297	0.0541

Table 2.6 Risk and Investments in High- and Low- Liquidity *Chaebol* Firms

This table presents the relationship between corporate risk and investments of firms in high- and low-liquidity *chaebol*. *High EFD Chaebol* is an indicator of whether the firm belongs to a *chaebol* with above-median Rajan and Zingales (1998) external financing dependence measure. *After* is defined in Table 2.3. All other variables are defined in Table 2.1. Control variables are size, *Q*, cash flow, cash, debt, and their interaction terms with *After*. We report estimated coefficients from OLS regression and their *t*-statistics, calculated using heteroskedasticity-robust standard errors clustered by *chaebol*. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. This table shows that the negative relationship between risk and operations after the crisis is more pronounced among firms in *chaebol* with high external financing dependence, namely, firms in *chaebol* with low liquidity.

Dep. variable	(1)	(2)	(3)	(4)	(5)	(6)
	Investment					
<i>CF vol</i>	0.7694 (1.37)	0.8030 (1.56)	0.7694 (1.33)	0.7929 (1.26)	1.0571** (2.23)	1.1139** (2.16)
High <i>EFD Chaebol</i>			0.0911** (2.24)	0.1357** (2.67)		
After	0.0039 (0.28)	-0.2911 (-1.07)				
<i>CF vol</i> × After	-0.8734** (-2.32)	-1.0519** (-2.16)	-0.8734** (-2.25)	-1.0493** (-2.11)	-0.6452** (-2.21)	-0.7666** (-2.32)
High <i>EFD Chaebol</i> × After	0.0189 (0.58)	0.0124 (0.30)	0.0189 (0.56)	0.0113 (0.26)		
<i>CF vol</i> × High <i>EFD Chaebol</i>	0.8893 (1.11)	0.6922 (0.76)	0.8893 (1.07)	0.7382 (0.77)	-0.2187 (-0.35)	-0.2784 (-0.37)
<i>CF vol</i> × High <i>EFD Chaebol</i> × After	-1.4844** (-2.67)	-1.2511* (-1.87)	-1.4844** (-2.58)	-1.3716* (-2.00)	-1.1280** (2.06)	-1.2220** (-2.11)
Constant	0.0695*** (5.38)	-0.0161 (-0.05)	-0.0122 (-0.33)	-0.2702 (-1.10)	0.0739*** (5.75)	-0.1426 (-0.59)
Controls	No	Yes	No	Yes	No	Yes
<i>Chaebol</i> × Year FE	No	No	No	No	Yes	Yes
Year FE	No	No	Yes	Yes	No	No
<i>Chaebol</i> FE	Yes	Yes	Yes	Yes	No	No
<i>N</i>	380	363	380	363	380	363
<i>R</i> ²	0.0683	0.0963	0.1555	0.1838	0.0312	0.0550

Table 2.7 Risk and Investment for Treated and Control Firms Before and After the Crisis

This table presents the relationship between risk and investments for firms in the treatment and control groups before and after the 1997 Asian crisis. All *chaebol* firms constitute the treatment group. The control group is a subset of *nonchaebol* firms that are best matched to the *chaebol* firms based on the following covariates as of 1997: size, *Q*, cash flow, cash, debt, investment, investment growth, *CF vol*, and industry. To benchmark our results for the sample of all treated and control firms reported in columns (5) and (6), we also report the relationships for the nontreated group consisting of all *nonchaebol* firms (columns (1) and (2)) as well as for the control group firms (columns (3) and (4)). *Chaebol* is a dummy variable equal to one for *chaebol* firms and zero for control firms. *After* is defined in Table 2.3. Control variables are size, *Q*, cash flow, cash, debt, and their interaction terms with *After*. We use matched control firms to construct *pseudo-chaebol* groups to control for counterfactual within-group variations in risk and investment for *nonchaebol* firms. We include this *pseudo-chaebol*- as well as *chaebol*-year fixed effects to absorb time-varying group investment trends for both *chaebol* and *nonchaebol* firms. We report estimated coefficients from the regression and their *t*-statistics, calculated using heteroskedasticity-robust standard errors clustered by *chaebol*. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. This table shows that the negative relationship between risk and investment after the crisis holds for *chaebol* firms even after controlling for *nonchaebol* firms.

Dep. variable	Investment					
	Sample					
	Nontreated		Control		Treated and control	
<i>CF vol</i>	0.3338 (1.45)	0.4313* (1.66)	0.1737 (0.34)	0.1055 (0.29)	0.1737 (0.34)	0.2683 (0.64)
After	0.0246* (1.88)	0.0847 (0.51)	0.0556 (0.58)	0.3244 (0.90)	0.0556 (0.59)	0.0112 (0.04)
<i>CF vol</i> × After	-0.4825* (-1.89)	-0.5507* (-1.95)	0.2698 (0.36)	0.3273 (0.74)	0.2698 (0.36)	0.3722 (0.62)
<i>CF vol</i> × <i>Chaebol</i>					0.9100 (1.45)	0.8597 (1.54)
<i>CF vol</i> × <i>Chaebol</i> × After					-1.6315* (-1.81)	-1.7692** (-2.42)
Constant	0.0566*** (5.82)	-0.2375** (-1.98)	0.0345 (0.69)	-0.4570** (-2.72)	0.0438 (0.90)	-0.1855 (-0.78)
Controls	No	Yes	No	Yes	No	Yes
<i>Chaebol</i> × Year FE	No	No	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	No	No	No	No
<i>N</i>	1,302	1,248	356	356	716	712
<i>R</i> ²	0.0101	0.0327	0.0078	0.0854	0.0220	0.0434

Table 2.8 Investment before and after the Financial Crisis and Placebo Test

Panels A and B report changes in investments around the Asian crisis and around a noncrisis year, respectively, with the results of difference-in-differences tests for treated and control firms. Treated and matched control groups are defined in Table 2.7. In each panel, we also report the average treatment effects on the treated firms estimated by the matching procedure. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Panel A shows that *chaebol* firms reduced their investments to a significantly lesser extent than similar control non-*chaebol* firms in the aftermath of the Asian crisis. Panel B, on the other hand, shows that there is no difference in investment patterns between *chaebol* and control firms in the placebo year preceding the 1997 Asian crisis.

Panel A. Investments before and after 1997 Financial Crisis (Treated vs. Control)			
	1997	1998	1998-1997
Treated Firms	0.1044	0.0849	-0.0195** (-1.99)
Control Firms	0.1057	0.0454	-0.0603*** (-3.24)
Difference (<i>t</i> -statistics)	-0.0013 (-0.19)	0.0395*** (-2.71)	0.0408** (2.18)
Matching estimator (ATT)			0.0445** (2.27)
Panel B. Investments before and after 1996 (Treated vs. Control)			
	1996	1997	1997-1996
Treated Firms	0.1291	0.1057	-0.0234** (-2.09)
Control Firms	0.1093	0.0971	-0.0122* (-1.91)
Difference (<i>t</i> -statistics)	0.0198 (1.22)	0.0086 (0.59)	-0.0112 (-0.62)
Matching estimator (ATT)			0.0028 (0.158)

Table 2.9 Cash-Flow Volatility before and after the Financial Crisis and Placebo Test

Panels A and B report the (*pseudo*) *chaebol*-level changes in cash flow volatility around the Asian crisis and around a noncrisis year, respectively, with the results of difference-in-differences tests for treated (*chaebol*) and control (*pseudo-chaebol*) groups. Treated and matched control (*pseudo-chaebol*) groups are defined in Table 2.7. (*Pseudo*) *chaebol*-level cash flow volatility is calculated as the asset-weighted average of cash flow volatility across member firms. In each panel, we also report the average treatment effects on the treated firms estimated by the matching procedure. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Panel A shows that *chaebol* groups significantly reduced their overall cash flow volatility in the aftermath of the Asian crisis while the cash flow volatility of similar control *pseudo-chaebol* groups did not change. Panel B, on the other hand, shows that there is no difference in changes in cash flow volatility between *chaebol* groups and control *pseudo-chaebol* groups in the placebo year preceding the 1997 Asian crisis.

Panel A. CF volatility before and after 1997 Financial Crisis (Treated vs. Control)			
	1997	1998	1998-1997
<i>Chaebol</i> Groups	0.0473	0.0154	-0.0319** (-2.19)
<i>Pseudo-Chaebol</i> Groups	0.0412	0.0415	0.0003 (0.06)
Difference (<i>t</i> -statistics)	0.0061 (0.18)	-0.0261** (-2.02)	-0.0322** (-2.23)
Regression adjustment estimator (ATT)			-0.0322** (-2.29)
Panel B. CF volatility before and after 1996 (Treated vs. Control)			
	1996	1997	1997-1996
<i>Chaebol</i> Groups	0.0474	0.0473	-0.0000 (-0.00)
<i>Pseudo-Chaebol</i> Groups	0.0427	0.0425	-0.0002 (-0.03)
Difference (<i>t</i> -statistics)	0.0047 (0.40)	0.0048 (0.41)	0.0002 (0.00)
Regression adjustment estimator (ATT)			0.0002 (0.04)

Table 2.10 Corporate Risk and Investment Opportunity, Cash Flow, and Debt Growth

This table reports the results of panel regressions on the relationship between cash flow volatility (*CF vol*) and investment opportunity (*Q*), cash flow (Cash flow), and debt growth (Debt growth) before and after the Asian crisis. *After* is defined in Table 2.3. All other variables are defined in Table 2.1. We include *chaebol*-year fixed effects in all regressions to absorb time-varying *chaebol* trends in investment opportunity, cash flow, and debt growth. We report estimated coefficients and their *t*-statistics, calculated using heteroskedasticity-robust standard errors clustered by *chaebol*. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. This table shows that there is no evidence of greater investment opportunity, higher cash flow, or larger growth in debt for low-risk-*chaebol* firms than for high-risk-*chaebol* firms in the aftermath of the Asian crisis.

Dep. variable	<i>Q</i>		Cash flow		Debt growth	
<i>CF vol</i>	0.4354 (0.94)	0.4408 (1.00)	0.0978 (0.47)	0.1427 (0.61)	0.4137 (0.40)	1.0796 (0.81)
<i>CF vol</i> × After	0.5661 (0.76)	0.7277 (0.88)	0.1946 (1.10)	0.1910 (0.95)	-0.6070 (-0.32)	-1.1425 (-0.57)
Size		-0.0104 (-1.20)		0.0026 (0.68)		0.0584* (2.02)
Size × After		0.0167 (1.33)		-0.0043 (-0.96)		-0.1121** (-2.35)
<i>Q</i>				0.0014 (0.17)		0.0276 (0.19)
<i>Q</i> × After				-0.0187 (-1.30)		-0.1696 (-0.58)
Cash flow		0.0411 (0.16)				-1.7971 (-1.17)
Cash flow × After		-0.6732* (-1.75)				0.4885 (0.29)
Cash		-0.0600 (-0.26)		0.0209 (0.25)		1.8426* (1.90)
Cash × After		0.1150 (0.42)		0.0453 (0.55)		-1.8061 (-1.46)
Debt		0.2877* (2.06)		-0.0274 (-0.99)		
Debt × After		-0.0077 (-0.03)		-0.0105 (-0.32)		
Constant	0.8637*** (55.23)	0.8496*** (4.29)	0.0502*** (5.86)	0.0511 (0.46)	-0.0405 (-1.27)	-0.0200 (-0.03)
<i>Chaebol</i> × Year FE	Yes	Yes	Yes	Yes	Yes	Yes
<i>N</i>	365	365	398	365	391	358
<i>R</i> ²	0.0813	0.1064	0.0432	0.0661	0.0042	0.0672

Table 2.11 Placebo Tests on the Relationship between Risk and Investment

This table presents the results of panel regressions on the relationship between risk and investment of *chaebol* firms during normal periods, i.e., two noncrisis periods around 1995 and 2005, or during an economic downturn period without financial turmoil, i.e., the 2003 credit card crisis. *After* is a dummy variable for the two later years of the four years of each sample period. All other variables are defined in Table 2.1. We report estimated coefficients and their *t*-statistics, calculated using heteroskedasticity-robust standard errors clustered by *chaebol*. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. This table shows that there is no negative relationship between risk and investment in the placebo periods.

Dep. variable	Investment					
	Test period					
	Around 1995		Around 2005		2003 Credit Card Crisis	
<i>CF vol</i>	0.1648 (0.47)	0.0069 (0.02)	-0.0767 (-1.00)	-0.0471 (-0.60)	0.2119 (0.68)	0.2943 (0.95)
<i>CF vol</i> $\times$ After	0.1689 (0.28)	0.2557 (0.53)	0.0234 (0.29)	0.0043 (0.05)	-0.0965 (-0.35)	-0.1192 (-0.41)
Size		0.0025 (0.85)		0.0049*** (3.48)		0.0085 (1.09)
Size $\times$ After		0.0046 (0.80)		-0.0060** (-2.30)		-0.0035 (-0.43)
<i>Q</i>		-0.0057 (-0.24)		0.0113 (1.19)		-0.0029 (-0.22)
<i>Q</i> $\times$ After		0.0526 (1.02)		-0.0038 (-0.41)		0.0111 (0.52)
Cash flow		-0.1191 (-0.86)		-0.0292 (-0.47)		0.2656* (2.04)
Cash flow $\times$ After		-0.2749* (-1.94)		0.0124 (0.14)		-0.2634 (-1.52)
Cash		-0.1701* (-1.84)		-0.1081* (-1.78)		-0.0172 (-0.20)
Cash $\times$ After		-0.0591 (-0.44)		0.0343 (0.46)		0.0032 (0.03)
Debt		-0.0523** (-2.41)		0.0137 (0.34)		0.1249** (2.74)
Debt $\times$ After		-0.0258 (-0.33)		-0.0079 (-0.16)		-0.0936* (-2.01)
Constant	0.0361*** (7.20)	-0.0767 (-0.78)	0.0108*** (4.71)	-0.0491 (-1.61)	0.0033 (0.73)	-0.1810** (-2.37)
<i>Chaebol</i> $\times$ Year FE	Yes	Yes	Yes	Yes	Yes	Yes
<i>N</i>	318	275	388	384	344	338
<i>R</i> ²	0.0051	0.0437	0.0113	0.0613	0.0275	0.1094

Table 2.12 Decomposed Risk and Investment before and after the Financial Crisis

Panels A and B of this table report the results of panel regressions on the relationship between idiosyncratic and systematic corporate risk, respectively, and investment of *chaebol* firms before and after the Asian crisis. We report estimated coefficients and their *t*-statistics. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. This table shows that investment of higher idiosyncratic risk *chaebol* firms decreased to a significantly greater extent during the crisis while there is no such relationship in the case of systematic risk.

Panel A. Relationship between Idiosyncratic Risk and Investment						
Dep. variable	Investment					
<i>Idio.</i> Risk	0.8067 (1.50)	0.8299 (1.58)	0.8067 (1.45)	0.8548 (1.59)	0.7646* (1.92)	0.8241** (2.07)
After	0.0074 (0.63)	-0.3517 (-1.08)				
<i>Idio.</i> Risk $\times$ After	-1.8621** (-2.61)	-2.0764*** (-3.09)	-1.8621** (-2.52)	-2.1027*** (-2.95)	-1.8779** (-2.71)	-2.0111*** (-3.11)
Size		0.0015 (0.14)		0.0021 (0.19)		0.0019 (0.19)
Size $\times$ After		0.0097 (0.91)		0.0093 (0.85)		0.0080 (0.72)
<i>Q</i>		0.0127 (0.36)		-0.0005 (-0.01)		-0.0159 (-0.24)
<i>Q</i> $\times$ After		0.0250 (0.71)		0.0461 (1.05)		0.0745 (0.81)
Cash flow		0.1566 (0.44)		0.2094 (0.58)		0.3039 (0.91)
Cash flow $\times$ After		-0.1110 (-0.31)		-0.1620 (-0.45)		-0.2518 (-0.82)
Cash		-0.2184 (-1.39)		-0.2068 (-1.28)		-0.0600 (-0.43)
Cash $\times$ After		0.1156 (0.55)		0.0849 (0.40)		0.0624 (0.40)
Debt		-0.1631 (-1.45)		-0.1433 (-1.28)		-0.0501 (-0.38)
Debt $\times$ After		0.2450** (2.41)		0.1987* (2.04)		0.0203 (0.16)
Constant	0.0847*** (6.46)	0.0870 (0.27)	0.0186 (0.60)	-0.1889 (-0.78)	0.0897*** (7.69)	-0.0920 (-0.39)

Table 2.12 (con't.): Decomposed Risk and Investment before and after the Financial Crisis

<i>Chaebol</i> × Year FE	No	No	No	No	Yes	Yes
Year FE	No	No	Yes	Yes	No	No
<i>Chaebol</i> FE	Yes	Yes	Yes	Yes	No	No
<i>N</i>	376	363	376	363	376	363
<i>R</i> ²	0.0417	0.0813	0.1313	0.1675	0.0257	0.0503

Panel B. Relationship between Systematic Risk and Investment						
Dep. variable	Investment					
<i>Sys.</i> Risk	0.4875 (1.52)	0.5193 (1.19)	0.4875 (1.53)	0.4909 (1.18)	0.4896 (1.61)	0.5148 (1.25)
After	-0.0338 (-1.58)	-0.5495 (-1.52)				
<i>Sys.</i> Risk × After	0.1475 (0.32)	0.1088 (0.34)	0.1475 (0.32)	0.1143 (0.38)	0.1452 (0.30)	0.1102 (0.29)
Size		-0.0018 (-0.16)		-0.0013 (-0.11)		0.0019 (0.20)
Size × After		0.0177 (1.45)		0.0174 (1.41)		0.0103 (0.80)
<i>Q</i>		0.0421 (1.08)		0.0312 (0.85)		0.0291 (0.63)
<i>Q</i> × After		-0.0359** (-2.29)		-0.0168 (-0.87)		0.0063 (0.10)
Cash flow		0.0542 (0.14)		0.1021 (0.27)		0.1804 (0.54)
Cash flow × After		-0.1090 (-0.27)		-0.1522 (-0.39)		-0.2429 (-0.72)
Cash		-0.1745 (-1.10)		-0.1670 (-1.05)		-0.0067 (-0.05)
Cash × After		0.1196 (0.53)		0.0918 (0.41)		0.0640 (0.46)
Debt		-0.1573 (-1.29)		-0.1409 (-1.21)		-0.0584 (-0.46)
Debt × After		0.2038* (2.02)		0.1610* (1.77)		-0.0022 (-0.02)

Table 2.12 (con't.): Decomposed Risk and Investment before and after the Financial Crisis

Constant	0.0312** (2.61)	0.0928 (0.29)	0.0145*** (5.83)	-0.1876 (-0.80)	0.0855*** (26.17)	-0.1292 (-0.56)
<i>Chaebol</i> × Year FE	No	No	No	No	Yes	Yes
Year FE	No	No	Yes	Yes	No	No
<i>Chaebol</i> FE	Yes	Yes	Yes	Yes	No	No
<i>N</i>	380	363	380	363	380	363
<i>R</i> ²	0.1340	0.1698	0.1211	0.1532	0.0204	0.0397

CHAPTER 3

THE DARK SIDE OF INSIDER OWNERSHIP

3.1 Introduction

Stock ownership by corporate insiders is a central feature of modern corporate governance. The impact of insider stock ownership on firm value is, however, ambiguous. On the one hand, stock ownership exposes insiders to stock prices and thus gives them an incentive to maximize firm value. Insider stock ownership can thereby reduce agency costs that result from the separation of ownership and control in public firms (e.g., Jensen and Meckling (1976)). This is the *bright* side of insider ownership.

On the other hand, there might be costs that offset the benefits of significant insider ownership. High levels of ownership provide insiders with voting rights, which can result in entrenchment and thus enable the insider to waste corporate resources in the pursuit of his or her private benefits (e.g., Demsetz (1983) and Fama and Jensen (1983)). This is the *dark* side of insider ownership. In their seminal paper, Morck, Shleifer, and Vishny (1988) document a significant non-monotone relation between management ownership and market valuation of a firm, as measured by Tobin's Q: Q first increases, then declines, and finally rises slightly as management's ownership share increases.

We introduce a new cost of insider ownership. We hypothesize that if a firm's shareholder base is heterogenous, and the interest of the insider is aligned with that of the minority group, then higher insider ownership can result in value-destroying actions because it increases the likelihood of adopting policies that benefit the minority group at the expense of the majority group. We call this the *minority-alignment* hypothesis. Importantly, insider ownership is the *cause* of this inefficiency: This cost would not exist if the insider's stock ownership were zero.¹

¹This effect of ownership is different from that of entrenchment, where increased insider ownership merely further enables agency problems that are already there (e.g., consumption of private benefits).

A necessary condition for this situation to arise is that the interests of various groups of shareholders differ and may conflict. In general, any corporate decision which has consequences that depend on investor characteristics will have a heterogeneous effect on a firm's investors. For example, "cliente effects" due to tax differences across investors have been shown to affect payout policy (e.g., Chetty and Saez (2005), Brown, Liang, and Weisbenner (2007), and Becker, Ivkovic, and Weisbenner (2011)). Further, shareholders can derive private benefits from corporate decisions, as, for example, in the case of union pension funds (e.g., Agrawal (2012)).

The minority-alignment hypothesis implies that if an insider is mis-aligned with the majority of shareholders in a firm and faces a decision which will impact shareholders differentially, higher insider ownership can play a negative role. To test the minority-alignment hypothesis, we would ideally like to identify companies that are in a position to make significant discrete decisions whereby the interests of distinct groups of shareholders are not aligned. We would also like to be able to identify the interests of these distinct shareholder groups as well as the interests of the insiders. The firms' actions would need to be observable and the valuation effects measurable.

Analyzing this hypothesis is empirically challenging. Measuring the impact of firms' decisions on value is often difficult because these decisions (and their timing) may be unobservable or difficult to distinguish from other decisions (e.g., if they take place over a long period). As a result, it is often impossible, using standard event study methodologies, to draw inference about the valuation implications of these decisions, for example, using standard event study methodologies, is often impossible. In addition, a firm's shareholder base (e.g., tax-exempt vs. taxable), incentive structure (e.g., compensation contracts), and decisions are endogenously determined.

This paper exploits a unique natural experiment to test whether the minority-alignment problem affects corporate decisions and whether this effect has negative consequences. Barack Obama's re-election in November 2012 as the president of the United States was followed by a period of immense fiscal uncertainty during which the country approached what was known as the "fiscal cliff." As part of the fiscal cliff, many temporary tax cuts were set to expire so that several tax rates would revert to higher levels. One of the tax rates that was set to revert was the personal income tax on dividends, which was expected to increase from a maximum federal rate of 15% to a maximum rate of 43.4%. Despite ongoing negotiations in Congress over these tax increases, it was widely expected during the final months of 2012 that dividend income would face higher taxes. Thus, companies

had less than seven weeks to pay out dividends at the current tax rate.²

As a result, many companies rushed to pay out large special dividends before the tax rates were expected to increase. For example, in December, Costco paid out an extra dividend of \$7 per share, and Las Vegas Sands paid out an extra \$2.75 per share, both payouts representing around 7% of the market capitalization of these firms.

This situation had a heterogeneous impact in how various groups of shareholders were to be affected by the anticipated tax increase. Many of these firms had a majority of shareholders that were exempt from individual dividend taxes. For example, Costco had high institutional ownership (around 80%) and most of these institutions are not subject to individual dividend taxes. For these shareholders, the anticipated increase in dividend taxes was of no consequence. Other shareholders, in particular taxable shareholders, (including insiders) are affected by dividend taxes and had much to gain from special dividend payments. For example, Steve Wynn who owned 10% of Wynn Resorts reportedly stood to save more than \$20 million in taxes on the dividend being paid out before the end of the year.³

For such shareholders, the optimal response is to shift future dividends forward to 2012, in order to save on taxes, even if these payments would have a negative impact on their respective firms. Taxable shareholders could be better off if their firms were to pay out dividends now, even if that causes the present value of all *pre-tax* payouts to decrease. A negative effect on the present value of pre-tax payouts would hurt tax-exempt investors.

Because insiders are subject to individual taxes, their tax preferences are naturally aligned with that of other taxable shareholders. Therefore, the higher the proportion of tax-exempt shareholders (e.g., pension funds, hedge funds, endowments, etc.) in a firm, the greater the misalignment between insiders and the firm's investor base for decisions that involve taxes. Moreover, the higher insider ownership, the stronger the insider's incentive to take action that benefits him or her as a taxable shareholder.

Thus, this environment is suitable for testing the minority-alignment hypothesis. First, the payout incentives of insiders and tax-exempt investors differ. Second, firms had to decide and act on whether to pay out additional dividends within a short time period, and

²Even though the fiscal cliff had been foreseen, the likelihood that dividend tax rates would go up increased significantly during the final months of 2012. For example, if Mitt Romney had been elected instead of Barack Obama, he had vowed not to let tax rates rise. The evidence also suggests that few firms acted to pay out additional dividends in the months before the election date, indicating that the election outcome indeed played a significant role in determining firms' decision to pay special dividends.

³*New York Times*, November 18, 2012 "Investors Rush to Beat Threat of Higher Taxes"

we can identify which firms chose to pay out extra dividends. Third, we can measure the valuation implications of paying out these special dividends by calculating the abnormal returns around the special dividend announcements. Finally, the anticipated change in the tax code was significant (from 15% to 43.4%), which means that these decisions had large value implications.

We examine firms' decisions on whether to pay a special dividend in anticipation of the tax rate change during the period November 2012-December 2012, as well as the valuation effects of these decisions. We identify over 160 special dividend announcements between the presidential election on November 6, 2012 and the resolution of the fiscal cliff on January 1, 2013 (hereafter called the event period). The aggregate amount of these special dividends was around \$16 billion, and the number of special dividends during this period was 13 times larger compared with the same period in 2011.

We find that firms with higher insider ownership were more likely to pay a special dividend during the event period. However, the choice as to whether to pay a special dividend is not significantly associated with the fraction of non-taxable (institutional) shareholders in the firm. Notably, firms in which insiders have a lower personal stake in the payout decision (i.e., firms with low insider ownership) do respond to the investor base, and are less likely to announce special dividends when the firm has a greater proportion of non-taxable shareholders. Thus, firms with high insider ownership are less responsive to whether the firm has many taxable as opposed to non-taxable shareholders. This evidence is consistent with the minority-alignment hypothesis.

The minority-alignment hypothesis also implies a negative association between the degree of misalignment and the valuation consequences of decisions made by insiders. In the context of the anticipated dividend tax rate increase, payout decisions made by insiders in firms with a larger fraction of taxable as opposed to non-taxable investors combined with high ownership by insiders should have worse valuation implications.

Consistent with this hypothesis, the abnormal returns around the special dividend announcement date were the lowest among firms with high insider ownership combined with high ownership by non-taxable investors. In contrast, the highest abnormal returns were among firms with high insider ownership combined with high ownership by taxable investors. Thus, when insiders' interests are aligned with a larger (smaller) fraction of the firm's shareholders, payout decisions made by insiders during the event period are associated with higher (lower) abnormal returns.

The main methodological advantage of looking at announcement returns around these

special dividend announcements is that the information about the ownership structure that we use in the regressions is pre-determined and observable to investors and therefore is reflected in prices before the special dividend announcement. As a result, even though ownership structure is not randomly assigned, we do not have endogeneity concerns that might bias these estimates.

Given the large size of these special dividend payments, we finally examine how these payments affected the firms' cash reserves and future payouts. We find that these special dividend payments were followed by large drops in cash reserves, but that the firms replenished their cash within the following quarter. Firms that paid special dividends did not change their regular dividend payments, but they did reduce share repurchases in the subsequent quarter.

This paper contributes to two strands of the literature. First, the study is related to the agency theory literature that studies the role of insider ownership in incentive provision (e.g., Jensen and Meckling (1976) and Jensen and Murphy (1998)). To the best of our knowledge, we are the first to introduce this novel cost of insider ownership. This cost is most evident when high insider ownership aligns incentives of an insider with the interests of only a small fraction of shareholders. Importantly, insider ownership is the source of the cost, as this cost would not exist if the insider's stock ownership were zero. This cost might be present in several other settings, such as when insiders exhibit different time discounting or risk tolerance from that of other investors.

Second, the paper is related to studies that examine the relationship between taxes, payout policy, and insider ownership. Previous papers on the response of dividend policy to tax rate changes (e.g., Chetty and Saez (2005), Brown, Liang, and Weisbenner (2007), and Hanlon and Hoopes (2014)) have found that firms' payout policies tend to respond more strongly to tax changes when a firm has high insider ownership. We contribute to this literature by examining the valuation effects of these decisions, and, in particular, we ask whether firms with higher insider ownership make better or worse decisions. We can thus also distinguish whether the stronger response by insiders is good for investors or not.

The rest of the paper is organized as follows. Section 3.2 describes the data and summary statistics. Section 3.3 studies determinants of special dividend payments. Section 3.4 reports the valuation implications of special dividends. Section 3.5 reports the effects of special dividends on future outcomes. Section 3.6 concludes.

3.2 Sample Description

Data for this study were compiled from several sources. We obtained data on special dividends from Capital IQ, and firm-level accounting information from Compustat. Stock returns and prices came from the Center for Research in Security Prices (CRSP). Data on institutional common stock holdings and insider ownership were obtained from Thomson-Reuters.

The sample was constructed as follows. First, we collected data on all special dividend payments announced between January 1, 2011 and December 31, 2012. The sample excludes dividends that were scheduled to be paid in 2013. The data from Capital IQ includes the special dividend announcement date and the dividend amount. Second, we merged the sample with daily stock return data from CRSP and firm characteristics from Compustat. Firm characteristics were measured at the end of fiscal year 2011. Finally, we merged these data with institutional ownership and insider ownership data from Thomson-Reuters. The final sample consists of a cross-section of 3,361 firms. Table 3.1 describes variables used in the paper.

Table 3.2 presents summary statistics. All variables are winsorized at the 1% and 99% levels. Panel A reports summary statistics for the full sample and Panel B reports summary statistics for the subsample of firms that announced a special dividend in November and December of 2012 ('the event period'). While 4.82% of firms made a special dividend announcement during the event period, only 0.36% made a special dividend announcement during the same period in 2011.

Figure 3.1 visualizes the pattern of special dividend announcements during July-December of 2011 and the same period in 2012. The dark area shows the cumulative number of special dividend announcements during these months in 2011, and the grey area shows the same for 2012. We see that special dividend announcements in both years accelerate in November and early December. However, in 2012, the acceleration in special dividend announcements towards the end of the year is many times more pronounced.

Several pieces of evidence are consistent with these dividend payments being motivated by anticipated higher taxes. Table 3.3 lists media excerpts from a sample of these announcements. Many of these announcements explicitly mention anticipated higher taxes as the main reason for the special dividend payments.

Second, the average dividend-to-asset ratio is 0.9% across the full sample. Within the sample of firms that announced a special dividend payment the dividend-to-asset ratio is

2.22%. Thus, firms that announced a special dividend have a stronger ex-ante reason to react to the anticipated increase in the dividend tax rate because they make more use of dividends in general.

Finally, marginal investors in the firms that announced special dividends are also likely to face higher dividend tax rates. The median stock price drop (as a fraction of the size of prior dividends within the last five years) on the ex-dividend date is 0.82 across the full sample. When we consider the sample of firms that announced a special dividend, we find that the median stock price drop on ex-dividend dates is 0.69. This evidence indicates that in the sample of firms that announced a special dividend, the marginal investor faces a higher dividend tax rate.

Table 3.2 also shows that the average (median) special dividend announcement-date CAR is 2.42% (1.49%), suggesting that the decision to pay a special dividend on average had a positive impact on firm value. The average (median) direct insider ownership is 4.48% (1.70%) across the full sample. Within the sample of firms that announced a special dividend, the average (median) direct insider ownership is 7.88% (4.42%). Thus, compared with the full sample, companies that announced a special dividend during the event period exhibit higher insider ownership.

Overall, these results are consistent with the anticipated increase in the special dividend tax rate being the main reason for the special dividend announcement.

3.3 Determinants of Special Dividend Payments

Following the presidential election of 2012, many firms rushed to pay out large special dividends in anticipation of a dividend tax increase in 2013. We begin by studying which firm characteristics and ownership characteristics predict which firms are likely to make special dividend payments during the event period (November-December 2012). In particular, we seek to analyze whether firms with higher insider ownership (involving shareholders who are personally subject to dividend taxes) are more likely to pay special dividends during this period, and whether firms where institutions own a larger fraction of shares (involving shareholders who do not pay dividend taxes and thus would be unaffected by a tax increase) are less likely to make these tax-motivated dividend payments.

We thus estimate the following cross-sectional linear probability model:

$$\begin{aligned} Special_i = & \alpha + \beta_1 InsiderOwnership_i + \beta_2 InstOwnership_i \\ & + \beta_3 InsiderOwnership_i * InstOwnership_i + \beta_4 X_i + \eta_j + \varepsilon_i, \end{aligned} \quad (3.1)$$

where $Special_i$ is a dummy variable equal to one if a firm announced a special dividend during the event period. $InsiderOwnership$ is the proportion of shares directly owned by the firm's executives and directors. $InstOwnership$ is the proportion of shares owned by institutional investors (excluding mutual funds). X is a vector of control variables. The control variables are stock returns over the past five years, size, an indicator for whether the firm has repurchased shares during the prior year, the ratio of total dividend payments to assets, the Hadlock and Pierce (2010) index of financial constraints, and the ratio of cash to assets. All control variables are measured as of the end of 2011. η_j are industry fixed effects based on the Fama-French 48-industry classification.

We exclude the fraction of shares held by mutual funds from institutional ownership, because a majority of investors in mutual funds do pay dividend taxes. The share of institutional investors is thus a measure of the proportion of a firm's investors that are not affected by changes in dividend taxes. Table 3.4 shows that institutional ownership (net of mutual funds) is a valid proxy for dividend tax preferences of a firm's investors. The table shows that the average stock price drop on ex-dividend dates as a fraction of the dividend (measured around all ex-dividend dates between October 2010 and September 2012) is lower among firms with low institutional ownership (0.717) than among firms with high institutional ownership (0.9965) (the difference is also statistically significant), which suggests that a high fraction of institutional ownership is a good proxy for a lower tax rate for the firm's marginal investors (Elton and Gruber (1970)).

The results from regression (3.1) are presented in Panel A of Table 3.5. In columns (1) and (3), the coefficient on $InsiderOwnership$ is positive and statistically significant at the 1 % level. This evidence shows that firms with higher insider ownership were more likely to pay out special dividends in anticipation of a dividend tax increase. Specifically, the result in column (1) indicates that a one-standard-deviation increase in insider ownership (7.48%) is associated with a 2.15 percentage point increase in the likelihood of paying a special dividend. This effect is large compared with the unconditional probability of announcing a special dividend during this period, which was 4.88%. This result is consistent with evidence from past tax reforms on the relationship between insiders and firms' payout

response to changes in dividend tax rates (e.g., Chetty and Saez (2005), Brown, Liang, and Weisbenner (2007), and Hanlon and Hoopes (2014)).

Columns (2) and (3) nevertheless show that a decision to pay a special dividend during this period is on average not related to the tax incentives of a firm’s investor base. This result is evident from the coefficient on the fraction of institutional ownership, which is not significant. In other words, while differences in insiders’ tax incentives do matter for a payout decision, the tax incentives of the firm’s investor base do not. In sum, in making these special dividend payout decisions, firms were (on average) not responsive to the tax preferences of their investors.

In column (4), we further interact insider ownership with institutional ownership. This column shows that the result that there is no relationship on average between special dividends in this period and the tax incentives of the investor base is driven mainly by firms with high insider ownership. Specifically, when we include the interaction term, we see that the coefficient on institutional ownership becomes negative. This means that when insider ownership is low, the tax incentives of the investor base are associated with paying a special dividend during the event period, as we would expect if investors’ taxes matter for payout policy. Among these firms, higher institutional ownership makes it less likely that a firm will make a special dividend payment. For example, firms with insider ownership at the 25th percentile (0.56%) are less likely to pay special dividends the more their investor base is made up of institutional investors (in column (3), $0.56\% \times 1.3864 - 0.0434 < 0$). So when the insider has little or no personal stake in the decision on whether to pay a special dividend before the anticipated tax increase, the firm is more responsive to shareholders’ tax incentives. However, as the insider ownership share increases, the firm becomes less responsive to the tax incentives of the investor base and increasingly responsive to insiders’ own tax incentives. Columns (5) and (6) further show that these results are robust to controlling for industry fixed effects as well as other firm characteristics.

As a placebo test, Panel B shows the results of the same regression for special dividend payments made between January and September 2012. These results show that there is no significant economic or statistical relationship between special dividend payout decisions in these other times and the ownership variables we study. This supports the conclusion whereby the results in Panel A are specifically driven by insiders’ and other investors’ tax incentives, and not driven by, for example, unobserved omitted variables that are correlated with both these ownership variables and the special dividend payouts.

Importantly, because firms had a limited period of time during which to decide whether

to make special dividend payments or not, this setting alleviates potential concerns about endogenous changes in ownership structure before the special dividend announcement date. To examine whether insiders changed their ownership in anticipation of these tax changes or special dividend payments, Table 3.6 examines the ratio of insider selling to buying in a difference-in-difference test between firms that paid special dividends and other firms, before and after the presidential election. This evidence shows that there were no important differences in the relative selling and buying behavior of insiders between firms that paid special dividends and those that did not in the months before and after the presidential election in November.

Overall, we show that a firm’s ownership structure is associated with whether the firm responds to an anticipated dividend tax increase. Firms with high insider ownership respond more strongly to anticipated changes in tax rates. But such a response is not related to the tax incentives of the investor base, which is inconsistent with a tax clientele hypothesis that would predict that higher institutional ownership should be negatively related with paying tax-motivated special dividends. Furthermore, the zero average relationship with the investor base is entirely driven by firms with high insider ownership. By contrast, among firms in which insider ownership is low (and thus insiders have smaller personal stakes in payout decisions), special dividend payouts do respond to the composition of the investor base.

In sum, these results are consistent with insiders’ personal tax incentives being the principal driver of firms’ special payout decisions around tax changes, and that increasing insider ownership makes firms less responsive to the tax incentives of their investor bases.

3.4 Special Dividends: Valuation Implications

3.4.1 Empirical Strategy

In this section we study the valuation implications of the special dividend payments made during the event period (November-December 2012). As discussed in the introduction, the principal reason behind these payments was to make significant payouts before an anticipated dividend tax increase. To measure the valuation implications, we employ an

event study methodology and estimate the following regression:

$$\begin{aligned} CAR_{special,i} = & \alpha + \beta_1 InsiderOwnership_i + \beta_2 InstOwnership_i \\ & + \beta_3 InsiderOwnership_i \times InstOwnership_i + \eta_j + \varepsilon_i, \end{aligned} \quad (3.2)$$

where $CAR_{special,i}$ is the cumulative abnormal return over three trading days $[-1, +1]$ around firm i 's special dividend announcement and η_j are industry fixed effects. The definitions of the ownership variables are the same as in the previous sections.

This regression seeks to answer the following questions. Did the reaction to these special dividends depend on the alignment of tax preferences between a firm's insiders and its other investors? Specifically, if tax preferences are not aligned, did higher insider ownership result in lower abnormal returns around the special dividend announcements? Or conversely, if tax preferences are aligned (i.e., insiders and most shareholders have similar tax preferences), do the abnormal returns increase with higher insider ownership?

The main methodological advantage of looking at announcement returns around these special dividend announcements is that the information about the ownership structure that we use in the regressions is pre-determined and observable to investors and therefore is reflected in prices before the special dividend announcement. As a result, even though ownership structure is not randomly assigned, we do not have endogeneity concerns that might bias these estimates.

Whereas previous research has shown that payout policy decisions depend on the tax preferences of insiders and investors (Chetty and Saez (2005) and Brown, Liang, and Weisbenner (2007)), these studies do not study whether decisions to change dividend payout policy in response to tax changes have any valuation consequences.⁴ To the best of our knowledge, this is the first study to examine the valuation implications of tax-motivated payout decisions using an event study methodology. Importantly, this methodology allows us to study not only whether the decision to pay out special dividends has positive or negative consequences on average, but also whether the valuation implications depend on the ownership structure and the tax alignment between insiders and other investors.

In contrast to previous changes in dividend tax rates, firms had a limited period of time

⁴Brown, Liang, and Weisbenner (2007) exploited a sequence of eight legislative events surrounding the 2003 dividend tax cut. They find that the stock price reaction was higher for firms with high individual ownership and high dividends-to-assets ratio. They could not, however, perform the event study analysis to study the valuation implications of changes in dividend payout policy because firms implemented these changes by only gradually raising dividends over time.

during which to respond to the impending tax change and needed to make discrete and large dividend payments if they wanted to take advantage of the existing low tax rate. The reason behind this urgency was that the presidential candidates had opposite views on whether dividend taxes should increase. As a result, there was considerable uncertainty about the future dividend tax rate until the very end of the presidential campaign. After the election outcome, a dividend tax increase at the end of the year became widely expected, and firms therefore had less than two months to take advantage of the existing low tax rates. In contrast to the dividend tax decrease of 2003, firms did not have the option of gradually changing their payout policy, but needed to make large discrete payments within a short window of time. The discrete and observable nature of these decisions allows us to employ the event study methodology.

3.4.2 Event study results

In this section we report the event study results from estimating equation (3.2). Table 3.7 reports the results.

Column (1) shows that the level of insider ownership did not (on average) affect the valuation implications of the payout decision. However, this result is unconditional on the firm's investors' tax preferences. As we show below, this unconditional result masks two opposite effects of insider ownership.

In Columns (2) and (3) we show that insider ownership does matter for the valuation implications of these special dividends if we also consider the investor base. We do so by interacting insider ownership with institutional ownership. The purpose of this interaction is to test whether stronger alignment between insiders' and shareholders' tax incentives is associated with more efficient dividend payout decisions. We find that when there is a smaller fraction of non-taxable investors (as measured by institutional ownership less mutual fund ownership), higher insider ownership is associated with higher abnormal returns around the special dividend announcements. The coefficient of *Insider Ownership* in column (2) indicates that a one-standard deviation increase in insider ownership (7.84%) is associated with a 0.48% ($7.48\% \times 6.15\%$) higher cumulative abnormal return. In these firms, the insiders' tax preferences are aligned with a larger fraction of investors. Therefore, because higher insider ownership is going to make the insider care more about maximizing the value of the payout decision, it results in higher value among firms with mainly taxable investors. These payout decisions are thus better received by the market. This is the *bright*

side of insider ownership.

The interaction term shows the *dark* side of insider ownership. The worst valuation consequences of special dividend payments in this period were for firms that had a combination of high insider ownership and high institutional ownership, i.e., where the tax misalignment was the highest and insiders also had a strong reason to personally care about the decision. If a firm has many non-taxed (institutional) investors, higher insider ownership is associated with lower abnormal returns around these special dividend announcements. For example, column (2) shows that the valuation consequences of these special dividends as we increase insider ownership is predicted to turn negative when institutional ownership rises above 27% (0.0615/0.2271), which is below the median (36.6%) of non-taxable ownership among the special dividend payers in our sample.

These results show that having misaligned tax incentives between insiders and the investor base results in lower valuation consequences of these special dividends. In Panel B of Table 3.7, we show the results of testing whether these payouts were more likely to have negative consequences, or whether they were merely less positive. We employ the same independent variables as in equation 3.2, but replace the dependent variable (CAR) with an indicator of a negative CAR.

We find strong support for the special dividend payments being more likely to result in negative stock market reactions when tax incentives are misaligned. This result is evident in the coefficient of the interaction between insider ownership and institutional ownership. Among firms with low institutional ownership and high insider ownership (when tax incentives are aligned), the stock market reactions are *less* likely to be negative (the bright side of insider ownership). But as institutional ownership increases, the relation between higher insider ownership and the probability of a negative return around these special dividend announcements also increases (the dark side of insider ownership). As in Panel A, the predicted valuation consequence of higher insider ownership turns negative around the median level of institutional ownership.

Overall, we find that differences in insider ownership (which makes up a small fraction of total ownership) have a large impact on both the probability that a firm reacts to tax changes and the valuation implications for firms that do react. That is, while insider ownership in most firms is a small fraction of total shares (median 1.7%), it has a big impact on firm's response to changes in dividend tax rates. Further, the stronger response is not always in the interest of shareholders. In contrast, non-taxable institutions own a large fraction of shares outstanding in many firms and should be important in determining firms'

payout policies. But we show that the investor base plays only a weak role on average in determining firms' responsiveness to dividend tax changes. Finally, when firms have high insider ownership and high non-taxable ownership, the payout decisions in response to the anticipated tax change are on average less efficient and more likely to have negative valuation consequences.

3.5 Special dividends and payout policy

We now turn to examining whether the large special dividend payouts firms made before the fiscal cliff were associated with changes in future payouts. In particular, we hypothesize that these special dividend payments were followed by reductions in payouts and reductions in firms' cash levels.

To examine this question we analyze the following difference-in-difference regression:

$$\begin{aligned}
y_{i,t} = & \alpha + \beta_1 I_{PaidSpecial,i} + \beta_2 EventPeriod_t + \beta_3 PostPeriod_t \\
& + \beta_4 I_{PaidSpecial,i} \times EventPeriod_t + \beta_5 I_{PaidSpecial,i} \times PostPeriod_t + \eta_j + \varepsilon_{it},
\end{aligned} \tag{3.3}$$

where y_{it} are our dependent variables (dividends, repurchases, and cash, all normalized by lagged assets, measured quarterly). $I_{PaidSpecial,i}$ is an indicator equal to one if the firm announced a special dividend during the event period. To analyze changes in payouts over time, we include indicators for the EventPeriod (specifically, the fiscal quarter that includes at least November of 2012) and PostPeriod (the first two quarters after the event period), as well as interactions of these period indicators with $I_{PaidSpecial,i}$. The baseline time period (omitted category) is the last quarter preceding the event period. We also include firm fixed effects (η_j) in some regressions, which subsume $I_{PaidSpecial,i}$ when included. Table 3.8 presents the results.

Column (1) shows that firms that paid special dividends before the fiscal cliff also had a higher level of baseline dividend payments; specifically, they paid 0.31% more of assets in dividends than other firms in the pre-event period. Firms that paid special dividends in the event period increased their total dividend payments between the pre-period and event period more than firms that did not pay any special dividends (the diff-in-diff between the pre-period and event period is 2.54% of assets). However, in the post period, the firms that had paid special dividends in the event period actually reduced their dividends

more (compared to what they did in the pre-event period) than the firms that did not pay special dividends. These results show that there was some substitution of dividends over time among the special dividend payers—so that the firms that paid special dividends in November and December subsequently reduced dividends in later months. However, while this substitution is statistically significant, it is nevertheless economically quite small—around 0.05-0.07% of assets—compared with the special dividends that these firms paid that were, on average, more than 2% of assets.

Columns (3) and (4) further show that the special dividend payers also cut future repurchases. While there is no relative change in repurchases in the event period between special dividend payers and the firms that did not pay a special dividend, the coefficient on $I_{PaidSpecial,i} \times PostPeriod$ shows that the firms that paid special dividends subsequently reduced repurchases by more than the firms that did not pay special dividends. This result is thus evidence of *substitution* between the tax-motivated special dividends and future repurchases.

This substitution result is also different from that observed around previous tax changes: Chetty and Saez (2005) find that firms that increased dividends after the dividend tax decrease in 2003 did not reduce repurchases. Also Floyd, Li, and Skinner (2013) point out that the longer-term evidence following the 2003 tax change is inconsistent with tax-motivated substitution between repurchases and dividends, as repurchases have continued to increase throughout the last decade. Of course, while we find evidence of short-term substitution (quarter to quarter) between dividends and repurchases, it remains to be seen to what extent these special dividend payments also will have a longer-term impact on total payouts. One possible concern when testing substitution is that the choice as to whether to pay out special dividends is endogenous. For example, an alternative explanation for our substitution result could be that the firms that paid out special dividends would have reduced their repurchases anyway, even absent making these special dividend payments. While this story is difficult to rule out, we see no relative changes in repurchases until exactly the quarter after these firms paid out special dividends. Such *short-term* substitution alleviates the concern that a potential time-varying omitted variable could be driving these results.

Finally, in columns (5) and (6), we analyze the changes in cash holdings around the event period. We find that while cash levels are lower in the quarter of the special dividend payments, we surprisingly find no evidence of relatively lower cash holdings one quarter later (the coefficient on $I_{PaidSpecial,i} \times PostPeriod$ is economically small and insignificant).⁵

⁵There is nevertheless a downward trend in the uninteracted period indicators, which shows that cash is

This result implies that firms that paid out special dividends replenished their cash levels remarkably quickly, as they accumulated additional cash of around 3% of assets within the two quarters compared with the non-payers.

3.6 Conclusion

The bright side of insider ownership is that it improves the alignment between corporate insiders and shareholders. This paper nevertheless documents evidence of a dark side of insider ownership using a unique natural experiment that was made possible by the impending fiscal cliff towards the end of 2012. As a result of a sharp increase in expected dividend tax rates, many companies rushed to pay out large special dividends before the end of the year. Individual shareholders (including insiders)—whose dividends are taxed—would prefer that firms pay out large dividends before the tax rate change, whereas non-taxable investors would prefer not receiving a special dividend if paying these dividends would have other adverse consequences for the firm.

We find that firms with high insider ownership were more likely to pay a special dividend during this period. But for these firms, the choice as to whether to pay a special dividend was not associated with the share of non-taxable (institutional) as opposed to taxable shareholders. Notably, the subsample of firms in which insiders have low personal stakes in the payout decision (i.e., where insiders have low ownership) do respond to the investor base, and are less likely to announce special dividends when the firm has a higher proportion of non-taxable investors. The main implication of this finding is that in situations in which insiders have a strong personal stake in a firm’s decision, they are less likely to be responsive to the preferences of other shareholders.

We then study the valuation implications of these special dividends. We find that the effect of the special dividend announcements on firm value is positive on average. The abnormal returns were, however, significantly lower among firms with higher insider ownership combined with higher non-taxable ownership, i.e., where the tax incentives between insiders and non-insider investors were particularly *misaligned*. This result shows that insiders can sacrifice firm value to increase their personal wealth.

Finally, we find that the large special dividends substituted for future dividends and repurchases, although much of this substitution was weak. Moreover, while these dividends were decreasing during the period for all firms, just not more than among the firms that paid special dividends.

dend payments consumed large amounts of cash (almost 3% of assets), firms were able to replenish their cash levels within the following quarter.

Taken together, these results show that insider ownership can lead to inefficient decisions, in particular when the insiders' incentives differ from those of other shareholders. Here, insider ownership is the *cause* of this inefficiency. An analysis of the trade-off between the costs and benefits of insider ownership therefore should consider this cost as a distinct component of this trade-off.

3.7 Figures and Tables

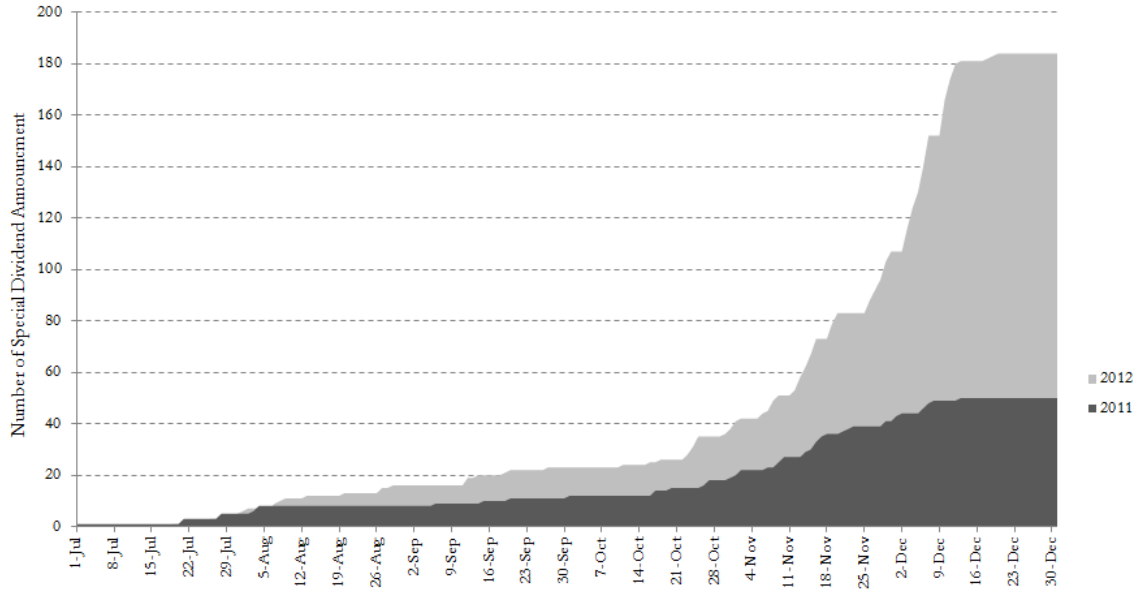


Figure 3.1 **Special Dividend Announcements.** The dark area plots the cumulative number of special dividend announcements between July 1, 2011 and December, 31 2011. The grey area cumulatively plots the number of special dividend announcements between July 1, 2012 and December, 31 2012. We exclude dividends that are scheduled to be paid after year-end.

Table 3.1 **Variable Definitions.** This table defines the variables used in the paper. All firm characteristics are as of the fiscal year end of 2011.

Variable	Definition
$CAR_{special}$	The sum of a special-dividend-paying-firm's abnormal returns over three days from one trading day before to one trading day after the announcement of the special dividend.
Payout Policy	
Paid special dividend during event period	A dummy equal to one if a firm announced a special dividend during the event period and zero otherwise.
Paid special dividend	A dummy equal to one if a firm paid special dividends in 2011 and zero otherwise.
Paid dividend during event period	A dummy equal to one if a firm paid any dividend over the event period and zero otherwise.
Paid dividend	A dummy equal to one if a firm paid any dividend in 2011 and zero otherwise.
Repurchased shares	A dummy equal to one if a firm repurchased shares in 2011 and zero otherwise.
Special-to-market cap	Total special dividends paid during the event period, normalized by market capitalization.
Dividend-to-asset	The total dividend amount, divided by the book value of assets (DVC/AT).
Stock Ownership	
Insider ownership	The sum of shares held by insiders who are current or past executives or directors, divided by shares outstanding in the fourth fiscal quarter of 2011 (Thomson Insiders Database).
Institutional ownership	The sum of shares held by institutional investors, divided by shares outstanding in the fourth fiscal quarter of 2011 (Thomson 13F Database).
Mutual fund ownership	The sum of shares held by mutual funds, divided by shares outstanding in the fourth fiscal quarter of 2011 (Thomson Mutual Fund Holdings Database).
Other Firm Characteristics	
Past return	Past five-year stock return, calculated by compounding monthly CRSP returns.
Size	Log (total assets).
Cash-to-assets	Cash/Total assets (CHE/AT).
Hadlock-Pierce index	Hadlock and Pierce (2010) financial constraints measure.
Average stock price fall on ex-dividend date	The average of market return adjusted ex-dividend price change over the past five years.
Insider Trading	
Insider sold ratio	(Sum of shares sold)/(Sum of shares purchased + Sum of shares sold) by insiders who are current or past executives or directors.

Table 3.2 Summary Statistics. This table reports summary statistics of firm characteristics defined in Table 3.1. Panel A reports summary statistics for the sample that consists of all firms with ordinary common shares in the CRSP-Compustat universe that operated both in 2011 and 2012. Panel B repeats the analysis from Panel A for the subsample of firms that paid a special dividend during the event period.

	Mean	Standard Deviation	1 st percentile	25 th percentile	50 th percentile	75 th percentile	99 th percentile	N
Panel A: All Firms								
paid special dividend during event period	0.0488	0.2154	0.0000	0.0000	0.0000	0.0000	1.0000	3363
paid special dividend in 2011	0.0036	0.0596	0.0000	0.0000	0.0000	0.0000	0.0000	3363
paid dividend during event period	0.3298	0.4702	0.0000	0.0000	0.0000	1.0000	1.0000	3363
paid dividend in 2011	0.4028	0.4905	0.0000	0.0000	0.0000	1.0000	1.0000	3359
insider ownership	0.0448	0.0748	0.0000	0.0056	0.0170	0.0479	0.4388	3363
institutional ownership	0.5822	0.3084	0.0079	0.3129	0.6418	0.8536	1.0000	3363
mutual fund ownership	0.1945	0.1422	0.0000	0.0576	0.1969	0.3062	0.5064	3363
repurchased shares in 2011	0.3123	0.4635	0.0000	0.0000	0.0000	1.0000	1.0000	3362
dividend-to-asset	0.0090	0.0220	0.0000	0.0000	0.0000	0.0078	0.1458	3268
past return	-0.1152	0.6335	-0.9684	-0.5770	-0.2248	0.1895	2.3669	3353
size	6.6435	2.0325	2.3130	5.2413	6.6063	7.9786	11.8818	3341
cash-to-asset	0.1983	0.2189	0.0007	0.0418	0.1104	0.2755	0.9310	3341
Hadlock-Pierce index	-3.5056	0.7154	-4.6369	-3.9969	-3.5061	-3.0561	-1.7053	3361
average stock price fall on ex-dividend date	0.8596	2.2944	-5.4962	0.0606	0.8242	1.4762	11.9225	1607
Panel B: Firms that Paid Special Dividend during November-December 2012								
paid special dividend in 2011	0.0732	0.2612	0.0000	0.0000	0.0000	0.0000	1.0000	164
paid dividend in 2011	0.6748	0.4699	0.0000	0.0000	1.0000	1.0000	1.0000	163
insider ownership	0.0779	0.0982	0.0000	0.0102	0.0430	0.1030	0.4388	164
institutional ownership	0.5490	0.2685	0.0432	0.3237	0.5966	0.7865	1.0000	164
mutual fund ownership	0.1811	0.1211	0.0002	0.0731	0.1810	0.2954	0.4305	164
repurchased shares in 2011	0.3476	0.4777	0.0000	0.0000	0.0000	1.0000	1.0000	164
dividend-to-asset	0.0224	0.0371	0.0000	0.0000	0.0060	0.0266	0.1458	162
past return	0.0646	0.5765	-0.8410	-0.3436	-0.0657	0.3563	1.9301	164
size	6.5107	1.7430	2.7250	5.4334	6.4161	7.5046	10.4924	164
cash-to-asset	0.2092	0.1961	0.0007	0.0514	0.1522	0.3187	0.8443	164
Hadlock-Pierce index	-3.6060	0.5971	-4.6369	-3.9867	-3.6080	-3.2392	-2.1734	164
average stock price fall on ex-dividend date	0.4624	1.7173	-5.1309	-0.3016	0.6917	1.4295	4.2907	127
special dividend announcement-date CAR	0.0239	0.0486	-0.0520	-0.0016	0.0149	0.0369	0.2255	164
special-to-market cap	0.0719	0.0969	0.0052	0.0202	0.0398	0.0789	0.5363	164

Table 3.3 Examples of Special Dividend Announcements. This table presents examples of media quotes regarding the reasons for announcing special dividend payments during the event period.

Company Name	Announcement	Media Quotes	Sources
Costco Wholesale Corp.	Nov 28, 2012	"... saving shareholders from a big bite should taxes rise due to the fiscal cliff."	CNNMoney
Las Vegas Sands Corp.	Nov 26, 2012	"... Moves Up Payout To Avoid Fiscal Cliff Taxes"	Huffington Post
EnviroStar, Inc.	Nov 09, 2012	"..., taking into consideration present tax policies, ..."	Business Wire
NIC Inc.	Nov 08, 2012	"... given the uncertainty of future dividend tax rates."	Press release
Erie Indemnity Company	Nov 19, 2012	"..., given the potential significant increases in tax rates on dividend ..."	Reuters
Southside Bancshares Inc.	Nov 08, 2012	"... due to the potential changes in the tax code ..."	Reuters
Sun Hydraulics Corp.	Dec 02, 2012	"In anticipation of expected tax law changes in 2013, ..."	Reuters
HEICO Corp.	Dec 05, 2012	"... to ensure shareholders may take advantage of 2012 tax rates."	Globe Newswire
U.S. Global Investors	Dec 12, 2012	"... as it braces for the possible impact of the fiscal cliff."	Business Journals
Ilkonics Corp.	Dec 10, 2012	"... this one-time event prior to potential tax rate increases in 2013."	Business Journals
Sterling Financial Corp.	Dec 12, 2012	"... in light of expected changes in tax rates applicable to cash dividends, ..."	Business Wire
National Healthcare Corp.	Dec 06, 2012	"... to avoid potentially higher taxes next year amid heated "fiscal cliff" ..."	WSJ
Teche Holding Company	Nov 29, 2012	"Because of the uncertainty in the tax rate ... on dividends in 2013 ..."	Marketwire
Evolving Systems Inc.	Dec 07, 2012	"... will be paid before the end of 2012 to avoid tax ..."	Reuters
FedFirst Financial Corp.	Nov 14, 2012	"Given the potential increase in tax rates on dividends beginning next year ..."	WSJ
Access National Corp.	Nov 20, 2012	"... a significant increase in the federal tax rate of qualified dividends in 2013 ..."	Business Wire
Canterbury Park Holding Corp.	Dec 07, 2012	"... special dividend is a tax-efficient way to return value to our shareholders."	Business Wire
Heritage Financial Group	Dec 07, 2012	"Considering the ongoing uncertainties regarding federal taxation next year ..."	Business Wire
OmegaFlex, Inc.	Nov 15, 2012	"... to secure for the shareholders the benefits of the current dividend tax ..."	Globe Newswire
Southern National Bancorp of Virginia	Nov 29, 2012	"... this unusual and non-recurring action in light of ... pending tax hikes."	Globe Newswire
United-Guardian Inc.	Dec 06, 2012	"Given the uncertainty of the tax treatment of dividends ..."	Globe Newswire
Bolt Technology Corp.	Nov 20, 2012	"... take advantage of current dividend tax rates which may increase in 2013."	Globe Newswire

Table 3.4 **Average Stock Price Fall on Ex-dividend Date.** This table presents a comparison of the average stock price fall on ex-dividend dates over the past five years between firms with high *Institutional - MF ownership* and firms with low *Institutional - MF ownership*. All variables are as defined in Table 3.1. Columns (1) and (2) report the average stock price fall on ex-dividend date as a fraction of the dividend paid. The difference between the means is reported in Column (3). *p*-value of the difference is reported in Column (4).

Low: 787 firms (1)	High: 820 firms (2)	Difference (3)	p-value (4)
0.7170	0.9965	-0.2794	0.0143

Table 3.5 **Determinants of Special Dividend Payment.** This table presents the relationship between firm characteristics and the likelihood of paying a special dividend during November-December 2012. The table reports estimates from OLS regressions. *Institutional - MF ownership* is *Institutional ownership* minus *Mutual fund ownership*. The control variables used for column (6) include *past return*, *size*, *dividend-to-asset*, *cash-to-asset*, *repurchased shares in 2011*, and the *Hadlock-Pierce index*. All other variables including the control variables are defined in Table 3.1. In each column, we report estimated coefficients and their *t*-statistics, calculated using heteroscedasticity robust standard errors clustered by Fama-French 48 industry classifications. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	Dependent variable: Firm paid special dividend {0,1}					
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Fiscal Cliff Period (Nov-Dec 2012)						
Insider ownership	0.2888*** (4.29)		0.2929*** (4.16)	-0.0133 (-0.15)	-0.0109 (-0.13)	0.0175 (0.20)
Institutional - MF ownership		-0.0232 (-1.44)	0.0057 (0.33)	-0.0434** (-2.42)	-0.0535*** (-2.90)	-0.0701*** (-2.72)
Insider ownership * (Institutional - MF ownership)				1.3864*** (3.73)	1.2974*** (3.66)	1.1970*** (3.17)
Constant	0.0358*** (8.97)	0.0578*** (7.59)	0.0335*** (3.91)	0.0478*** (5.63)	0.0258*** (3.55)	-0.0336 (-0.97)
N	3,363	3,363	3,363	3,363	3,363	3,257
R ²	0.0101	0.0005	0.0101	0.0173	0.0420	0.0638
Panel B: Pre-Fiscal Cliff Period (Jan-Sep 2012)						
Insider ownership	0.0215 (0.67)		0.0302 (0.91)	0.0201 (0.44)	0.0217 (0.46)	0.0268 (0.55)
Institutional - MF ownership		0.009 (0.84)	0.0118 (1.07)	0.0102 (0.77)	0.0093 (0.64)	0.0151 (0.84)
Insider ownership * (Institutional - MF ownership)				0.0456 (0.31)	-0.0029 (-0.02)	-0.0434 (-0.26)
Constant	0.0158*** (6.33)	0.0133*** (2.98)	0.0108** (2.17)	0.0113** (2.05)	-0.0047 (-0.88)	-0.0094 (-0.79)
N	3,524	3,524	3,524	3,524	3,524	3,412
R ²	0.0002	0.0002	0.0005	0.0005	0.0159	0.0208
Industry Fixed-effects	No	No	No	No	Yes	Yes
Controls	No	No	No	No	No	Yes

Table 3.6 **Insider Trading around the Event Period.** This table presents the comparison of insider trading patterns between special dividend paying firms and others. The difference-in-difference estimation compares the changes in the means of *insider sold ratio* for the special dividend paying firms and firms that did not pay a special dividend. *Insider sold ratio* is defined in Table 3.1. *Special* is an indicator of announcing a special dividend during the event period. *Post Election* is a dummy variable equal to one for the period November 2012 - December 2012, and zero for the period September 2012 - October 2012. In each column, we report estimated coefficients and their *t*-statistics, calculated using heteroscedasticity robust standard errors. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

<i>Dependent variable</i>	<i>Insider sold ratio</i> (1)
Special {0, 1}	0.0382 (0.81)
Post Election {0, 1}	-0.0003 (-0.02)
Special {0, 1} x Post Election {0, 1}	0.0691 (1.01)
Constant	0.2683*** (25.98)
<i>N</i>	6,726
<i>R</i> ²	0.0008

Table 3.7 **Special Dividend Announcement Day CAR.** This table presents the relation between special dividend announcement day CAR and stock ownership. Panel A reports estimates from OLS regressions with *special dividend announcement-date CAR* as the dependent variable. All variables are as defined in Table 3.1. Panel B reports estimates from a linear probability model with an indicator of CAR being negative as the dependent variable. In each column, we report estimated coefficients and their *t*-statistics, calculated using heteroscedasticity robust standard errors clustered by Fama-French 48 industry classifications. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)
Panel A: Announcement Day CAR			
Insider ownership	0.0025 (0.18)	0.0615*** (3.92)	0.0811*** (4.41)
Institutional - MF ownership		0.0085 (0.90)	0.0064 (0.50)
Insider ownership * (Institutional - MF ownership)		-0.2271*** (-3.34)	-0.2461*** (-3.32)
Constant	0.0172*** (7.16)	0.0152*** (3.93)	0.0407*** (9.65)
<i>N</i>	164	164	164
<i>R</i> ²	0.0002	0.0398	0.3274
Panel B: % of Announcements with Negative CAR			
Insider ownership	-0.078 (-0.24)	-1.4344*** (-3.21)	-1.9869*** (-3.79)
Institutional - MF ownership		-0.1519 (-0.70)	-0.3214 (-1.05)
Insider ownership * (Institutional - MF ownership)		5.2866** (2.67)	5.2147** (2.37)
Constant	0.2866*** (5.88)	0.3168*** (3.95)	0.1287 (1.36)
<i>N</i>	164	164	164
<i>R</i> ²	0.0003	0.0378	0.2725
Industry Fixed-effects	No	No	Yes

Table 3.8 **The Effect of Special Dividends on Future Outcome.** This table reports estimates from difference-in-difference regressions to examine the extent to which special dividends during the event period are related to changes in the following dependent variables: *dividends*, *share repurchases*, and *cash*. The observations are at the firm-quarter level. The sample covers firm-quarter observations between January 2010 and July 2013. All the dependent variables are normalized by the book value of lagged assets. *Special* is an indicator of announcing a special dividend during the event period. *Event Period* is a dummy variable equal to one for the fiscal quarter that includes November 2012, and zero otherwise. *Post Period* is a dummy variable equal to one for the two quarters immediately following the Event Period, and zero otherwise. In each column, we report estimated coefficients and their *t*-statistics, calculated using heteroscedasticity robust standard errors. Columns (2), (4), and (6) present the estimation results controlling for firm fixed effects. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Dependent variable:	Dividends (1)	Dividends (2)	Repurchases (3)	Repurchases (4)	Cash (5)	Cash (6)
Special	0.0031*** (19.56)		0.0003 (1.62)		0.0192*** (3.48)	
Event Period	0.0013*** (10.89)	0.0012*** (16.87)	0.0000 (0.21)	0.0000 (-0.19)	-0.0111*** (-2.68)	-0.0102*** (-7.15)
Post Period	0.0000 (0.11)	-0.0001 (-1.09)	-0.0001 (-0.77)	-0.0001* (-1.89)	-0.0153*** (-4.70)	-0.0152*** (-13.48)
Special x Event Period	0.0254*** (48.17)	0.0255*** (78.43)	-0.0005 (-0.99)	-0.0004 (-0.96)	-0.0299 (-1.63)	-0.0297*** (-4.69)
Special x Post Period	-0.0007* (-1.74)	-0.0005** (-2.03)	-0.0010** (-2.28)	-0.0007** (-2.10)	-0.0013 (-0.09)	0.0022 (0.45)
Constant	0.0022*** (61.06)	0.0024*** (109.91)	0.0015*** (41.25)	0.0016*** (55.18)	0.1955*** (155.85)	0.1964*** (465.00)
Firm FE	No	Yes	No	Yes	No	Yes
<i>N</i>	39,338	39,338	37,781	37,781	39,730	39,730
<i>R</i> ²	0.0953	0.6856	0.0002	0.4434	0.0011	0.8903

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