Essays in Corporate Finance

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ABSTRACT

This dissertation comprises two essays in financial economics. They study how firms finance and invest in innovative and intangible assets.

The first essay examines the impact of technology spillovers on corporate financing decisions for innovative firms. I find that greater technology spillovers lead to higher leverage in innovative firms. Furthermore, in firms with greater technology spillovers, equity is more costly relative to debt. I find that these financing effects are generated by at least three related mechanisms: information asymmetry, asset redeployability, and equity undervaluation. All three mechanisms lead firms to substitute away from equity and toward debt. The results are robust to exploiting variation in R&D tax credits to identify the causal effect of technology spillovers.

The second essay is coauthored with Ambrus Kecskés at York University and Sattar Mansi at Virginia Tech. My coauthors and I enter the long-lived debate about whether stakeholder capital investment increases shareholder value. We argue that long-term investors are natural monitors that can ensure that managers choose stakeholder capital investment to maximize shareholder value. We find that long-term investors increase the value to shareholders of stakeholder capital investment, not as a result of higher cash flow but rather of lower cash flow risk. Also following prior work, we use indexing by investors and the staggered adoption of state laws on stakeholder orientation for identification. Our findings suggest that firms can create value for shareholders by

investing in stakeholder capital as long as managers are properly monitored by long-term investors.

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Attribution

Chapter 2: Does corporate investment in stakeholder capital create value for shareholders? The importance of long-term investors

The second essay is coauthored with Ambrus Kecskés and Sattar Mansi. My coauthors both are finance professors, the former at York University and the latter at Virginia Tech. They both contributed to the theory and empirics of the paper.

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Chapter 1: Do Technology Spillovers Affect Corporate Financial Policies?

Technology spillovers on a firm from other firm's R&D spending are known to increase productivity and shareholder value, but the impact of technology spillovers on firm financial policies is an open question. This study examines the impact of technology spillovers on corporate financing decisions for innovative firms. I find that greater technology spillovers lead to higher leverage in innovative firms. Furthermore, in firms with greater technology spillovers, equity is more costly relative to debt. I find that these financing effects are generated by at least three related mechanisms: information asymmetry, asset redeployability, and relative mispricing. All three mechanisms lead firms to substitute away from equity and toward debt. The results are robust to exploiting variation in R&D tax credits to identify the causal effect of technology spillovers.

1. Introduction

Innovation is essential for growth. The manner in which innovative firms are financed is therefore of great importance to their investors and the economy as a whole. Innovative firms – firms with significant R&D spending – are well known to have a high cost of capital as a result of a number of problems, including information asymmetry, moral hazard, and asset redeployability (Hall and Lerner (2010)). The finance literature has focused on studying how such R&D intensive firms choose sources of external financing (debt versus equity) to maximize firm value. The general consensus is that these firms usually have low leverage (Titman and Wessels (1988), Opler and Titman (1993), Frank and Goyal (2009), etc.).

However, it is noteworthy that a firm's own R&D is not the only source of knowledge – or frictions – for an innovative firm. The growth of innovative firms also depends, in large part, on knowledge transfers from other firms, or so called "technology spillovers".[1] For several decades, technology spillovers have played a prominent role in the theoretical and empirical literature on economic growth and productivity (Arrow (1962), Jaffe (1986), Grossman and Helpman (1991), and many others). The literature has established that technology spillovers to a firm of the other firms' R&D activities have benefits that are large, even taking into account the costs of greater product market competition resulting from R&D spending by other firms.[2]

Despite the well-known positive value implications of technology spillovers, there is no evidence on their effect on the corporate financial policies of innovative firms. This is surprising

[1] These knowledge transfers can occur in a number of different ways. For the firms involved, some of these transfers are involuntary, such as patents, research papers, conferences, social networks, and employees changing firms. Others are voluntary, for instance, licensing agreements, technology transfer agreements, R&D joint ventures, and innovation driven mergers and acquisitions. Famous examples of these technology spillovers include lasers and microprocessors. (See Section 2.3 for more examples).

[2] Technology spillovers have significant implications for the economy. For example, at the industry level, Adams (1990) finds that they account for a quarter of total factor productivity growth in U.S. manufacturing. At the firm level, Bloom, Schankerman, and Van Reenen (2013) find that a 10% increase in technology spillovers from other firms' R&D is associated with an approximately 4% increase in firm value and a roughly 2% increase in its sales.

because knowledge transfers are considered to be an important input in the investment decisions of financial market participants (Hall, Jaffe, and Trajtenberg (2005)). In this paper, I follow the literature in defining technology spillovers to a firm as the R&D activities of other firms that operate in technology spaces similar to the firm in question. I examine the effect of technology spillovers on the firm's financial policies. In particular, I ask three related questions: (1) How do technology spillovers affect the external financing choices (debt versus. equity)? (2) How do they affect the cost of debt and equity? And (3) what are the underlying reasons for the capital structure decisions?

I hypothesize that a firm should have higher leverage when technology spillovers are greater. There are at least three reasons for this. First, technology spillovers can lead to higher leverage because they increase information asymmetry between the firm and its outsiders. The R&D of technologically similar firms is an input to a firm's innovation and production processes (Akcigit and Kerr (2015)), and managers of the firm generally understand the impact of technology spillovers on the value of their own firm. However, for the firm's outsiders, such intangible assets render the firm's operations more opaque and thus increase the information gap between insiders and outsiders. Moreover, there is considerable complexity involved in translating technology spillovers from other firms' R&D, as well as the firm's resulting new investment policy, into its impact on firm value. This complexity, alongside an increase in opacity, discourages investors from producing and trading on information, thereby increasing information asymmetry. Moreover, the firm may choose not to disclose information related to technology spillovers because the proprietary costs of such disclosure (of value relevant product market information) are especially high for innovative firms (Bhattacharya and Ritter (1983), and Thakor and Lo (2015)). This reduction in disclosure also increases information asymmetry.

From the standpoint of the pecking order theory of capital structure, firms with greater technology spillovers should use more debt relative to equity since the former is less sensitive to information than the latter.

Second, technology spillovers can increase leverage because they increase the redeployability of the firm's intangible as well as tangible technology assets. Such assets are more productive and hence more valuable to technologically similar firms if there are greater technology spillovers between them. Therefore, the firm's assets in place as well as the assets created by new investments are more redeployable due to greater demand for them in their alternative uses. Asset redeployability is important because it limits the downside to the firm's creditors in the event of bankruptcy (Aghion and Bolton (1992) and Hart and Moore (1994)). The literature also finds that the redeployability of technology assets is very important for borrowing in innovative firms (Loumioti (2012) and Mann (2015)).[3] Moreover, firms are more likely to undertake mergers with other firms with similar technologies (Bena and Li (2014)), which demonstrates that technological similarity enhances the liquidity of real asset markets. In the context of the static tradeoff theory of capital structure, firms with greater technology spillovers should have lower financial distress costs and thus higher leverage.

In the final channel, technology spillovers are undervalued by investors. Since mispricing tends to have a greater effect on equity than debt, the relative undervaluation of equity leads the firm to increase its leverage. There are a number of well known theoretical reasons for undervaluation of assets that are intangible and long-term. These reasons include limited investor attention (Hirshleifer and Teoh (2003)), and various cognitive limitations (Stein (1996) and

[3] For example, Loumioti (2012) finds that 21% of secured syndicated loans in the U.S. during 1996-2005 were collateralized by patents. For 2013, the figure is even higher, approximately 40%, according to Mann (2015).

Barberis, Shleifer, and Vishny (1998)).[4] The empirical evidence indicates that this undervaluation can be severe.[5] Therefore, the assets created by technology spillovers should be similarly undervalued by investors. Moreover, in contrast to owners' residual payoffs, creditors' promised payoffs are well defined, thus debt suffers less from undervaluation than equity (Hong and Sraer (2013)). To summarize, greater undervaluation of equity relative to debt leads firms to use less equity financing than debt, thus the firm increases its leverage (Baker and Wurgler (2002)).[6]

To examine the effect of technology spillovers on corporate financial policies, I use a sample of 694 publicly traded firms during the years 1981-2001. I capture technology spillovers to a given firm by taking into account both the extent of its technology overlap with other firms (based on patents in the same technology space) and the R&D spending of the other firms. In particular, the technology spillovers to a firm are the sum of the weighted R&D stocks of other firms where the weights are the technology proximities of the firm relative to the other firms. I use two measures of technology proximity: the Jaffe distance (Jaffe (1986)), which assumes that knowledge is transferred only within technology spaces common to a pair of firms, and the Mahalanobis distance as developed by Bloom, Schankerman, and Van Reenen (2013) ("BSV" hereafter), which additionally accounts for spillovers across technology spaces.

[4] As a behavioral example, consider the representative heuristic. In one of its manifestations, investors use the recent performance of an asset to infer its future performance. Additionally, intangible and long-term assets typically do not generate profits in the short run but rather do so in the long run. Taken together, these two tendencies mean that investors undervaluing the asset.

[5] For evidence on R&D spending, see Lev and Sougiannis (1996), Chan, Lakonishok, and Sougiannis (2001), and Eberhart, Maxwell, and Siddique (2004). For innovation, see Hirshleifer, Hsu, and Li (2013) and Cohen, Diether, and Malloy (2013).

[6] It is possible that investors overestimate the value implications of technology spillovers. For instance, investors have a tendency to overvalue growth stocks (Lakonishok, Shleifer, and Vishny (1994)) and stocks with intangible assets (Daniel and Titman (2006)). However, the literature as a whole finds that the assets like those created by technology spillovers are undervalued by investors (see Footnote 5).

Motivated by an extensive literature studying the tradeoff between the positive effect of technology spillovers and the negative effect of product market spillovers, I separate these two effects on the firm of other firms' R&D spending. To this end, I focus on the effect of technology spillovers while always controlling for product market spillovers. Following the econometric models in the prior literature, I control for firm or industry fixed effects, as well as year fixed effects. To identify the effect of technology spillovers on financial policies, I use state and federal R&D tax credits. In this widely used approach (Wilson (2009), BSV, etc.), a firm-year panel of observations is first used to regress R&D expenditures on tax credits. The fitted values are then used to construct the technology spillover measures used in the second and main stage of my analysis

I find that technology spillovers have a significant effect on capital structure. In particular, for a one-standard deviation increase in technology spillovers, the leverage ratio increases by 6 percentage points. Similarly, firms with greater technology spillovers issue more debt and less equity. In addition, I examine the effect of technology spillovers on the cost of debt and equity. I find that technology spillovers decrease the cost of debt. For a one-standard deviation increase in technology spillovers, bank loan spreads decrease by approximately 9 basis points and bond spreads decrease by roughly 6 basis points. By contrast, technology spillovers have a positive impact on abnormal stock returns. For a one-standard deviation increase in technology spillovers, abnormal stock returns increase by over 10 p.p. per year over the course of the next five years.

I next examine three channels through which technology spillovers can affect the cost of capital and consequently financing policies: information asymmetry, asset redeployability, and undervaluation of equity relative to debt. I first examine whether technology spillovers increase information asymmetry. I use five standard proxies for information asymmetry (e.g., Kelly and Ljungqvist (2012)) as well as analyst coverage and the dispersion of analysts' earnings estimates. I find that greater technology spillovers do indeed lead to greater information asymmetry. Across my seven proxies, the decrease in information asymmetry is statistically significant and economically large. The results are consistent with firms choosing to issue less information sensitive, and hence less costly, debt instead of equity, as predicted by the pecking order theory.

I next turn to the asset redeployability channel. Testing this channel directly is challenging because data on losses conditional upon bankruptcy are not widely available and actual bankruptcy filings are very rare. I am therefore obliged to tackle this challenge using indirect indicators of asset redeployability. In particular, I examine the extent of firms' technology assets that are used as collateral for borrowing as well as the liquidity of their technology assets. I find that firms with greater technology spillovers use more patents as collateral and also are able to sell more patents to other firms. The results are consistent technology spillovers impacting financial policies by increasing the redeployability of technology assets.

As the final channel, I examine the equity undervaluation channel. In particular, I examine whether technology spillovers affect the firms' earnings and whether the stock market predicts their earnings correctly. I find that earnings do not discernably change next year, but they do increase significantly over the course of the next five years. In particular, a one-standard deviation increase in technology spillovers causes a roughly 10 p.p. increase in the annual growth rate of earnings during the next five years. Importantly, while the effect of technology spillovers on the firm's long-term earnings growth is big, the stock market does not appear to be able to predict them. These results support the equity undervaluation channel, and they explain why firms with greater technology spillovers finance themselves with relative less equity (which is more costly than debt) and more debt.

In summary, I find that greater technology spillovers lead to higher leverage in innovative firms and that their cost of equity is higher while the cost debt is lower. My central contribution is to provide the first empirical evidence that technology spillovers have a significant causal impact on corporate financing policies. This is an important finding in light of the tremendous benefits of technology spillovers documented in the literature (Arrow (1962), Jaffe (1986), Grossman and Helpman (1991), and many others). To the best of my knowledge, there is only one other study examining the effects of technology spillovers on corporate policies and it only examines cash holdings (Qiu and Wan (2015)). My study broadly examines the effect of technology spillovers on capital structure and the cost of capital and provides evidence of the various channels at work.

My study lies at the intersection of two important strands of the literature, a classic one on the determinants of capital structure (e.g., Titman and Wessels (1988), Rajan and Zingales (1995), Frank and Goyal (2009), and many others), and an emerging strand on the peer effects of corporate policies (Dougal, Parsons, and Titman (2015), Bizjak, Lemon, and Naveen (2008), Foucault and Frésard (2014), and many others). Studies relating both of these strands are limited.[7] Moreover, such studies tend to examine the corporate policies of horizontally or vertically related firms, i.e., product market competitors or customers/suppliers. In contrast to these studies, I examine the effect of the innovation policies of technologically similar firms.

[7] These include Leary and Roberts (2014) about the effects of product market competitors' leverage, and Kale and Shahrur (2007) about the effects of suppliers' and customers' R&D intensities.

Finally, my study enhances our understanding of financial decision making in innovative firms (Hall (1992) and Kortum and Lerner (2000)).[8] The studies in this literature either focus on the firm's own R&D, or they do not distinguish between internal and external R&D. By contrast, I study the effect on a firm of other firms' R&D and show that it has an opposite effect to the firm's own R&D: the firm's own R&D decreases its leverage while technology spillovers from other firms' R&D increase the firm's leverage. Moreover, my study also contribute to the empirical literature on a number of the main channels through which financial policies are affected: information asymmetry (Bharath, Pasquariello, and Wu (2009)), asset redeployability (Benmelech, Garmaise, and Moskowitz (2005)), and mispricing (Huang and Ritter (2009)).

2. Spillover Measures, Data, and Summary Statistics

In this section, I describe the concepts and simple calculations of spillover measures established in the literature. I then describe how I construct the data, and provide summary statistics.

2.1. Measuring Technology Spillovers

2.1.1. General Procedure

The technology spillover measures that I use are motivated by the insight that a firm is more likely to benefit from the R&D of other firms if it is closer to these firms in terms of technology. More precisely, the extent of technology spillovers from firm j to firm i depends on the technological proximity between firm i and firm j as well as the R&D stock of firm j. Aggregating across all other firms, technology spillovers to firm i are the sum of technology spillovers from all other firms j to firm i.

[8] Also see recent studies: Thakor and Lo (2015) for financial policies; Chava, Nanda, and Xiao (2015) for bank financing; and Falato and Sim (2015) for cash policies; for more examples, see the survey of Hall and Lerner (2010).

The calculation of technology spillovers includes three general steps. The first step is to calculate the technological proximity between two firms. The literature uses two measure of technological proximity: the Jaffe measure (Jaffe (1986)) and the Mahalanobis measure (BSV). The Jaffe measure restricts technology spillovers to the same technology space whereas the Mahalanobis measure allows technology spillovers across different technology spaces. The second step is to calculate the R&D stocks of all other firms. The final step is to calculate the technology spillovers to a given firm from all other firms.

2.1.2. Jaffe Measure of Technology Spillovers

First, the Jaffe measure of technological proximity between two firms is constructed as follows. Each of the patents of a given firm is allocated by the USPTO to one or more of 426 possible technology classes. A firm's technology activity is then characterized by a vector $T_i=(T_{i1},T_{i2},\ldots,T_{i426})$, where $T_{i\tau}$ is the average share of patents of firm i in technology class τ over the period 1970-1999.[9] The Jaffe proximity between firm i and firm j is then defined as the uncentered correlation between the two firms' technology activities:

$$TECH_{ij}^{Jaffe} = T_i T_j' \Big/ \left(T_i T_i'\right)^{1/2} \left(T_j T_j'\right)^{1/2}$$

The Jaffe proximity measure ranges between zero and one. The higher is the measure, the closer are the technologies of the two firms.

Second, the R&D stocks of all other firms are calculated. The formula used to calculate a firm's R&D stock is $G_t = R_t + (1-\delta)G_{t-1}$, where R_t is the firm's R&D expenditures in year t and δ is the depreciation rate. Following the literature, δ=0.15.

[9] In calculating the proximity measure, one can either use all available data or only the data within a rolling window. The former approach benefits from greater precision, while the latter approach benefits from recent greater timeliness. Both approaches yield similar measures. The data on patents allocated to 426 technology classes is understandably sparse for most firms in any given year, so it is common to use all available data (e.g., BSV). I follow this approach as well.

Finally, the Jaffe measure of technology spillovers to firm i in year t are the sum of technology spillovers from all other firms j to firm i in year t:

$$TECHSPILL_{it}^{Jaffe} = \sum_{j \neq i} TECH_{ij}^{Jaffe} G_{jt}$$

2.1.3. Mahalanobis Measure of Technology Spillovers

The construction of the Mahalanobis measure of technology spillovers is somewhat more complicated than the Jaffe. This is because the measure of technological proximity between two firms takes as an input a measure of the proximity between technology spaces. The literature captures proximity between technology classes using the observed co-location of the technology classes within firms. The reasoning is that technology classes that tend to co-locate within firms are the result of related technologies and hence they reflect technology spillovers across technology classes.

To calculate the proximity of technology classes, the allocation of a technology class is determined by the vector $\Omega_\tau=(T_{1\tau},T_{2\tau},\ldots,T_{N\tau})$, where N is the number of firms and $T_{i\tau}$ is the average share of patents of firm i in technology class τ over the period 1970-1999. The proximity of the two technology classes, τ and ζ, is the uncentered correlation (the same as the Jaffe proximity measure) of the allocation vectors, Ω_τ and Ω_ζ:

$$\Omega_{\tau\zeta} = \Omega_\tau \Omega'_\zeta \Big/ \left(\Omega_\tau \Omega'_\tau\right)^{1/2} \left(\Omega_\zeta \Omega'_\zeta\right)^{1/2}$$

A 426×426 matrix Ω is then constructed such that its $(\tau,\zeta)^{\text{th}}$ element equals $\Omega_{\tau\zeta}$. This matrix captures the proximity of technology classes.

The measure of technological proximity between two firms i and firm j is a function of the technology activities of the two firms (as captured by the vectors T_i and T_j in the Jaffe measure) and the proximity of technology classes. It is defined as follows:

$$TECH_{ij}^{Mahal} = \left(T_i \Big/ \left(T_i T'_i\right)^{1/2}\right) \Omega \left(T'_j \Big/ \left(T_j T'_j\right)^{1/2}\right)$$

This measure of technological proximity between two firms weights the overlap in technology activities between the two firms by the proximity of their technology classes. (It is worth noting the special case of $\Omega=I$, which implies that $\Omega_{\tau\zeta}=0$ for all $\tau\neq\zeta$. That is, technology spillovers can only occur within the same technology class. In this case, the Mahalanobis technological proximity measure is identical to the Jaffe technological proximity measure.) This completes the Mahalanobis measure of technological proximity between two firms.

The R&D stocks of all other firms are then calculated exactly like for the Jaffe measure of technology spillovers. Finally, the Mahalanobis measure of technology spillovers to firm *i* in year *t* are the sum of technology spillovers from all other firms *j* to firm *i* in year *t*:

$$TECHSPILL_{it}^{Mahal} = \sum\nolimits_{j\neq i} TECH_{ij}^{Mahal} G_{jt}$$

2.2. Measuring Product Market Spillovers

The effect of technology spillovers on a firm can be contaminated by the effect of product market spillovers because other firms that adopt similar technologies may also produce competing products. Therefore, the R&D activities of other firms have two separate and opposite spillover effects on the firm: technology spillovers, which positively affect its productivity, and product market spillovers, which negatively affect its market share. To isolate the effect of technology spillovers, I control for product market spillovers.

The product market spillover measures that I use are motivated by the insight that a firm's market shares in its various product markets are negatively affected by the R&D activities of other firms with which it competes. As with technology spillovers, the extent of product market spillovers from firm *j* to firm *i* depends on the product market proximity between firm *i* and firm *j* as well as the R&D stock of firm *j*. Aggregating across all other firms, product market spillovers to firm *i* are the sum of product market spillovers from all other firms *j* to firm *i*.

Both the Jaffe and Mahalanobis measures of product market spillovers are calculated analogously to the corresponding technology spillover measures. By way of brief description, the Jaffe measure of product market proximity is constructed as follows. The sales of a given firm are allocated to one or more industry segments according to Compustat. The firms in the sample cover 597 industries. A firm's product market activity is characterized by a vector $S_i=(S_{i1},S_{i2,}\ldots,S_{i597})$, where S_{ik} is the average share of sales of firm *i* in industry *k* over the period 1993-2001 (because of data limitations). The Jaffe distance, R&D stocks of all other firms, and the product market spillover measure are all calculated as before.

2.3. Illustrative Examples

The technology spillovers to a firm, by construction, are the sum of the weighted R&D stocks of other firms where the weights are the technology proximities of the firm with the other firms. The critical component of technology spillovers is technology proximity, which I discuss further below.

One important observation is that two firms that are close in technology spaces are not necessarily close in product markets. Indeed, the correlation between technology proximities and product market proximities is only 0.47. One example (based on BSV) is that IBM is close to Apple, Intel, and Motorola in technology spaces (their technology proximities are 0.64, 0.76, and 0.46, respectively). However, only IBM is related to Apple in product market spaces (their product proximity is 0.65), reflecting the fact that they both produce personal computers (during the sample period). IBM is far from Intel and Motorola in product market spaces because Intel and Motorola produce semiconductors (their product proximities are 0.01), not personal computers, and IBM produces relatively few semiconductors.

Another observation is that two firms that are close in technology spaces can be vertically related in product markets. For example, Coca-Cola Co. is close to Liqui-Box Corp. and Tokheim Corp. in technology spaces (their technology proximities are 0.90 and 0.67, respectively). Coca-Cola and Liqui-Box are vertically related in product markets because Coca-Cola is a beverage manufacturer and Liqui-Box provides packaging solutions for liquid products. However, Coca-Cola and Tokheim are not vertically related in product markets because Tokheim is involved in manufacturing and providing services for electronic and mechanical petroleum dispensing systems.

By their nature, technology relationships are more easily understood by insiders than outsiders. These relationships can be explicit (as in the case of Apple and Samsung, for example) or implicit (for instance, the many software developers that benefit from technological advances in computer operating systems). Similarly, as the following examples illustrate, it can take a long time for technology spillovers to become noticeable to outsiders of the firms they affect.

One familiar example of technology spillovers is microprocessors. Invented concurrently in 1971 by three firms (Garrett AiResearch, Texas Instruments, and Intel), they revolutionized the computer industry. However, the technology also spilled over into unrelated industries such as communications (e.g., satellites and mobile phones), household appliances (e.g., washing machines, refrigerators, and microwave ovens), automobiles, entertainment equipment (e.g., televisions and sound systems), games and toys, and household accessories (e.g., light switches and smoke alarms). Another well known example is electricity generation, which has very low R&D but has grown surprisingly quickly in terms of technology and productivity. This industry benefits from R&D in the metallurgical and equipment industries as well as various federally supported research projects. See Rosenberg (1979) for additional examples.

2.4. Sample Construction and Data Sources

I construct my sample as follows. I begin with all publicly traded U.S. firms in Compustat that have available information of technology spillovers and product market spillovers over the period 1981-2001. Data pertaining to technology spillovers and product market spillovers are obtained from BSV. My sample is restricted to firms that were granted a patent at least once since 1963.[10] I keep U.S operating firms and drop utilities and financials firms. The final sample consists of 12,118 firm-year observations on 694 unique firms between 1981 and 2001.

I use accounting data from Compustat and stock trading data from CRSP. I obtain the cost of debt from two sources: syndicated loan data from Dealscan, which covers 1987 to 2001, and bond data from SDC Global New Issues, which covers my entire sample period. I use analyst data from I/B/E/S, which covers 1983 to 2001. Finally, I obtain the patent collateralizations and patent sales from the USPTO Patent Assignment database, which covers my entire sample period. I winsorize all continuous variables at the 1st and 99th percentiles. The definitions of all variables are provided in Appendix A.

2.5. Summary Statistics

[Insert Table 1.1 about here]

Table 1.1 describes the industry distribution and presents descriptive statistics for selected industries of my sample. I define all variables in Appendix A. Panel A presents the top ten two-digit industries that have the highest concentration of firms in the sample. Of my 700 or so firms, about three quarters is concentrated in these ten industries. Approximately half of the firms concentrate in four industries: electronic equipment (17%); machinery equipment and

[10] R&D expenditures of public firms account for a large proportion of the total R&D expenditures in the U.S. For example, in 1995, the sum of R&D expenditures in my sample covers about 62% of the total R&D in the U.S. (BSV).

computer equipment (15%); chemicals and allied products (10%); and measuring, analyzing, and controlling instruments (9%).

Panel B and Panel C present descriptive statistics for the top ten two-digit industries that experience the highest and lowest technology spillovers. About less than half of firms concentrate in the top ten industries that experience the highest technology spillovers, and more than 10% of firms concentrate in the top ten industries that experience the lowest technology spillovers. Firms in the highest technology spillover industries are bigger and have higher R&D than firms in the lowest technology spillover industries. There are no obvious differences in leverage, long-term growth rates, and market value between these two groups of firms.

[Insert Table 1.2 about here]

Table 1.2 reports descriptive statistics for the sample. Firm size has a mean of $2.5 billion; firm age has a mean of 26 years; and leverage has a mean of 22%. Thus, the average firm in the sample is larger and more mature than a typical Compustat firm, but its leverage is quite comparable (see Leary and Roberts (2014) for comparison). The firms are profitable (profitability has a mean of 15%). Their cost of debt is similar to that in the literature (e.g., see Valta (2013)): loan spreads have a mean of 127 basis points and bond spreads have a mean of 107 basis points. Firms are followed by a large number of analysts (11 analysts).

3. Identification Strategies and Model Specifications

3.1. Identification Strategy

In all firm-year panel regressions, I control for firm and year fixed effects. However, endogeneity is still a potential problem if, for instance, common shocks to investment opportunities affect all firms' R&D expenditures and capital structure. I follow the literature and use plausibly exogenous variation in state and federal R&D tax credits to identify the causal effects of technology spillovers. Below, I briefly discuss the construction of my exogenous technology spillover measures. For the details of this methodology, see Appendix B.3 in BSV (also see Wilson (2009) and Falato and Sim (2014)).

This identification strategy exploits the exogenous and heterogeneous effects of federal and state R&D tax credits on corporate R&D activities. The exogeneity of these tax policies with respect to corporate outcomes is thoroughly explored and convincingly demonstrated in the literature. For example, BSV provide strong evidence that changes in economic or political conditions cannot predict R&D tax policies (also see Cummins, Hassett, and Hubbard (1994)). The heterogeneous effects of the federal R&D tax rates come from the fact that the effective federal tax credit rate are based on the difference between actual R&D spending and a firm specific base amount, and the amount that a firm can claim depends on whether the credits exceed the firm's taxable profit. State R&D tax credits also vary across firms because they depend on the state in which the firm's R&D activities are located.

The exogenous technology spillovers measure is constructed as follows. First, the state and federal tax credit values are calculated using the Hall-Jorgenson user cost of capital approach (Hall and Jorgenson (1967)). Next, the exogenous component of a firm's R&D expenditures is calculated by projecting the reported R&D expenditure on the firm's state and federal tax credit values. The resulting predicted R&D expenditures are used as before to generate exogenous R&D stocks for each firm year. Finally, the plausibly exogenous technology spillover measure is then calculated analogously to the potential endogenous measure using the exogenous R&D stocks.

3.2. Main Regression Specifications

For each corporate outcome, I report four specifications using four different measures of technology spillovers (and corresponding product market spillovers). The measures in the first two specifications are the standard and exogenous Jaffe spillover measure, respectively. The measures in the last two specifications are the standard and exogenous Mahalanobis spillover measure, respectively.

The independent variables are lagged by one year in all regressions. Throughout my empirical analysis, I regress each outcome of interest on technology spillovers and control for product market spillovers. In addition, in all regressions, I control for the firm's own R&D (the stock of R&D divided by the stock of capital) and firm age (the logarithm of firm age). The latter variable accounts for the life cycle effects associated with innovation. I also include the firm's own federal and state R&D tax credits in the regressions that use exogenous spillover measures. Moreover, for each outcome, I include additional control variables that are standard in the literature. These control variables are discussed alongside the corresponding empirical analysis.

In all firm-year regressions, I use firm and year fixed effects to control for time-invariant firm characteristics and time trends, respectively. In the cost of debt regressions, which use observations on deals rather than firm-years, I control for two-digit industry fixed effects and year fixed effects because many firms appear only once. Finally, I cluster standard errors by industry-year. I multiply the dependent variables by 100 and standardize the independent variables. Coefficient estimates should thus be interpreted as the effect of a one-standard deviation change in the corresponding independent variables.

4. Results for Technology Spillovers and Financial Policies

4.1. Financial Policies

I begin my analysis by examining the effect of technology spillovers on capital structure. My main dependent variable is book leverage, which is measured as total debt scaled by total assets. In addition, I also examine debt and equity issuance (both scaled by total assets). I use the standard specification in the capital structure literature. I control for firm size (using the logarithm of sales), Tobin's Q, profitability (EBITDA scaled by total assets), asset tangibility (PPE scaled by total assets), and cash flow volatility (the standard deviation of the ratio of EBITDA scaled by total assets) (Leary and Roberts (2014) and Lemmon, Roberts and Zender (2008))

[Insert Table 1.3 about here]

Table 1.3 presents the results of regressions of financial policies on technology spillovers. Panel A present the results for leverage. Across all four specifications, technology spillovers are positively and significantly related to leverage. In particular, for a one-standard deviation increase in technology spillovers, leverage increases by approximately 6 percentage points. As a standard deviation of leverage is 16%, these estimates imply an increase of about one third of a standard deviation. The coefficients of product market spillovers are positive but not statistically significant across models.[11] It is also noteworthy that technology spillovers and firms' own R&D and have the opposite effects on firms' leverage. The negative effect of firms' own R&D on leverage is consistent with the literature (Titman and Wessels (1988) and Frank and Goyal (2009)).

Panel B and Panel C present the results of regressions of debt and equity issuance on technology spillovers. The results are consistent with those in the leverage regressions. Firms with greater technology spillovers issue more debt (by roughly 3 p.p.) and less equity (by

[11] If I exclude product market spillovers in the specifications, the coefficients of technology spillovers on leverage are larger, approximate 8 p.p. (results not tabulated). Consequently, controlling for product market spillovers is necessary to isolate the effect of technology spillovers.

approximately 1.5 p.p.). For debt and equity issuance, technology spillovers and firms' own R&D again have the opposite effect. In summary, the results suggest that technology spillovers increase leverage.

4.2. The Cost of Debt

To understand why leverage increases, I next examine the effect of technology spillovers on the cost of debt. I use two measures of the cost of debt: bank loan spreads and bond spreads. I follow the specifications in Graham, Li, and Qiu (2008) and Anderson, Mansi, and Reeb (2003). In particular, I control for firm characteristics, including firm size (using the logarithm of total assets), leverage (total debt scaled by total assets), Tobin's Q, profitability (EBITDA scaled by total assets), asset tangibility (PPE scaled by total assets), cash flow volatility (the standard deviation of the ratio of EBITDA scaled by total assets), and credit rating (S&P issuer rating). I control for loan or bond characteristics, including deal/facility amount (the logarithm of deal/facility amount), maturity (the logarithm of maturity), and a loan or bond type dummy variable.

[Insert Table 1.4 about here]

Table 1.4 presents the results of regressions of the cost of debt on technology spillovers. Panel A reports results for loan spreads. Across all four specifications, technology spillovers decrease loan spreads by approximately 9 basis points, or roughly one tenth of a standard deviation. [12] For comparison purposes, Valta (2012) finds a similar increase in the cost of debt (about 10 bps) for a comparable increase in product market competition. The product market spillovers and firms' own R&D both have positive effect on loan spreads, suggesting that creditors view these factors unfavorably. Panel B reports the results for bond spreads.

[12] The results capture the net effect of technology spillovers on the cost of debt, accounting for the increase in leverage. The gross effect of technology spillovers on the cost of debt would be even more negative if leverage did not increase.

Technology spillovers decrease bond spreads by approximately 6 basis points, or somewhat less than one tenth of a standard deviation. This magnitude is similar to the effect for loan spreads.

In addition, I also test whether the effect of technology spillovers on the cost of debt is different in the long run compared to the short run. To this end, I examine bank loan spreads and bond spreads as before but over horizons of two to five years. I find that the magnitude on the cost of debt in the long run is quite similar to that in the short run (results not tabulated). Overall, the results indicate that technology spillovers decrease the cost of debt.

4.3. The Cost of Equity

Next, I examine the effect of technology spillovers on the cost of equity. To this end, I examine the future stock returns. I adapt the methodology of Faulkender and Wang (2006) and Dittmar and Mahrt-Smith (2007), which takes into account both common risk factors and firm-specific characteristics in regressions of annual returns. I first use the market model to estimate annual abnormal returns, which is the dependent variable in the regressions. I regress stock returns on technology spillovers and control for market size (using the logarithm of market capitalization), market-to-book, profitability (EBITDA scaled by total assets), momentum (using past annual returns), and total return volatility (Brennan, Chordia, and Subrahmanyam (1998)). Since it may take some time for technology spillovers to be reflected in profits and stock returns, I examine stock returns over the horizons of one to five years.

[Insert Table 1.5 about here]

Panel A of Table 1.5 presents the results for stock returns during the next year. Technology spillovers increase stock returns by somewhat more than 10 p.p. per year, or approximately one third of their standard deviation. Panel B of Table 1.5 presents the results for stock returns during the next five years. The results are statistically significant and of similar magnitude to the results for stock returns during the next year. In untabulated results, I also find that technology spillovers increase stock returns over the course of the next two to four years. Collectively, the results indicate that technology spillovers result in higher stock returns for several years into the future.

5. Results for Potential Channels

The evidence thus far indicates that technology spillovers lead to higher leverage as a result of a decrease in the cost of debt and an increase in the cost of equity. I next examine three channels through which technology spillovers can affect financing policies and the costs of capital: information asymmetry, asset redeployability, and undervaluation of equity relative to debt.

5.1. Information Asymmetry

I examine whether technology spillovers lead to an increase in information asymmetry. I use five proxies for information asymmetry, similar to those in Kelly and Lungvist (2012). They are bid-ask spreads, the Amihud illiquidity measure, the returns ratio (the proportion of days with zero or missing stock returns), earnings announcement surprises (the mean absolute value of quarterly earnings surprises), and earnings announcement volatility (the annualized daily return volatility around earnings announcements). In addition, I also examine analyst coverage (the logarithm of the number of analysts) as a proxy for the amount of public information, and analysts' earnings estimate dispersion (the coefficient of variation of earnings estimates) as a proxy for valuation uncertainty. I control for market capitalization (in logarithm form), market-to-book, profitability (EBITDA scaled by total assets), stock returns, and total return volatility (Ferreira and Laux (2007) and Hong and Kacperczyk (2009)).

[Insert Table 1.6 about here]

Table 1.6 presents the results of regressions of these seven information asymmetry variables on technology spillovers. Only the results for technology spillovers are tabulated in this table. In particular, the results reported in row-column pairs correspond to the coefficient estimate on technology spillovers using the dependent variables in the rows (bid-ask spread, Amihud illiquidity, etc.) and the customary four technology spillover variables in the columns (Jaffe, exogenous Jaffe, Mahalanobis, and exogenous Mahalanobis). The coefficient estimates on technology spillovers are significant in most specifications and indicate that technology spillovers lead to an increase in information asymmetry. The economic magnitudes are also large. For instance, technology spillovers increase the Amihud illiquidity by more than one third of its standard deviation. They decrease the number of analysts by approximately 25%, equivalent to roughly three analysts. Technology spillovers also increase valuation uncertainty (higher analysts' earnings estimate dispersion). Overall, these results suggest that technology spillovers increase information asymmetry.

5.2. Asset Redeployability

Next, I study the asset redeployability channel. I perform two sets of empirical tests to this end. The first test is motivated by the fact that if technology spillovers increase the redeployability of assets, then the firm's technology assets are more valuable as collateral to the firm's creditors, and more of the firm's debt should be collateralized. The second test examines whether technology spillovers increase the redeployability of the firm's assets by examining the liquidity of technology assets. In particular, I examine collateralized debt, the extent to which the firm's patents are used as collateral for the firm's borrowing, and sales of patents issued to the firm. To capture the generalized collateralization of assets, I use collateralized debt divided by total assets from Compustat. To capture the collateralization and liquidity of technology assets specifically, I use patent collateralizations and patent sales from the USPTO Patent Assignment Database. I use specifications similar to those in the leverage regressions.

[Insert Table 1.7 about here]

Table 1.7 presents the results tabulating only for technology spillovers. The results reported in row-column pairs correspond to the coefficient estimate on technology spillovers using various dependent variables in the rows and the customary four technology spillover variables in the columns. The results broadly support the asset redeployability channel. In particular, technology spillovers increase collateralized debt by roughly 3 percentage points and increase the number of patents used to collateralize debt by roughly 20%-25%. In addition, technology spillovers also increase the number of patents sold by roughly 20%. Taken together, the results are consistent with technology spillovers impacting financial policies by increasing the redeployability of technology assets.

5.3. Equity Undervaluation

The following analyses have two goals: (1) to study the effect of technology spillovers on actual earnings; and (2) to examine whether shareholders fully anticipate the effect of technology spillovers on earnings. I examine actual earnings and earnings estimates, both in the short run (one year ahead) and the long run (five years ahead). In particular, for the short-term analysis, I use realized earnings (net income scaled by total assets) and estimated earnings (analysts' earnings estimates scaled by total assets). For the long-term analysis, I use the realized earnings growth rate (long-term earnings per share growth rate) and the estimated earnings growth rate (analysts' long-term earnings growth rates estimates). I follow the literature (e.g., Core, Guay, and Rusticus (2006)) and control for market capitalization and book-to-market (both in logarithm form).

[Insert Table 1.8 about here]

Table 1.8 presents the results of regressions of earnings, for both realizations and expectations, on technology spillovers. Only the results for technology spillovers are tabulated in this table. In particular, the results reported in row-column pairs correspond to the coefficient estimate on technology spillovers using the dependent variables in the rows and the customary four technology spillover variables in the columns. Panel A presents the results of regressions of earnings next year. The effect of technology spillovers on both realized earnings and estimated earnings is significant and positive in the Mahalanobis specifications but insignificant in the Jaffe specifications. Moreover, the magnitude on estimated earnings is similar to the magnitude on realized earnings. These results suggest that technology spillovers weakly affect earnings in the short run and the stock market seems to correctly predict short-term cash flows.

Panel B presents the results for long-term earnings growth rates. Technology spillovers significantly increase realized long-term earnings growth rates. A one-standard deviation increase in technology spillovers causes an increase in growth rates by more than 10 p.p. per year over the course of the next five years, or approximately a half of a standard deviation in magnitude. While the effect of technology spillovers on the firm's long-run growth rates is very large, the stock market does not appear to be able to predict them. Indeed, analysts expect a somewhat negative effect of technology spillovers on long-term earnings growth rates.

[Insert Table 1.9 about here]

Next, I test directly whether the market correctly anticipates short-term and long-term earnings. In particular, I use earnings forecast errors (the difference between actual earnings and earnings estimates), and examine the forecast errors both in the short run and long run. The results confirm the inferences about forecast errors from Table 1.8. Analysts correctly predict the short-term cash flow effect of technology spillovers but they underestimate long-term cash flows. By contrast, the coefficients on product market spillovers and the firms' own R&D are generally insignificant across specifications, suggesting that analysts correctly predict the cash flow effect of product market spillovers and the firms' own R&D both in the short run and long run. Collectively, the results indicate that technology spillovers significantly increase earnings but their effect is stronger in the long run than in short run, and the stock market underestimates long-term earnings.

6. Discussion and Conclusion

My main results suggest that technology spillovers increase leverage (Table 1.3) as a result of an increase in the cost of equity relative to the cost of debt (Table 1.4 and Table 1.5). My additional results suggest three channels for why this happens. First, shareholders of firms with greater technology spillover may not be able to obtain and process cash flow information easily because information asymmetry is high (Table 1.6). Shareholders discount this information risk, leading to a higher cost of equity (Myers and Majluf (1984), and Easley and O'Hara (2004)). In the context of the pecking order theory, equity of firms with greater technology spillovers is also relatively costlier than debt and thus firms use less equity than debt.

Another rational explanation is provided by the asset redeployability channel. Firms with greater technology spillovers may have higher leverage and a lower cost of debt because of greater asset redeployability. Technology spillovers increase the value of tangible and intangible technology assets (Table 1.7), thus limiting the downside to the firm's creditors in the event of bankruptcy (Aghion and Bolton (1992) and Hart and Moore (1994)). In the context of the static tradeoff theory, firms with greater technology spillovers should have lower financial distress costs and thus higher leverage.

The results for profitability (Table 1.8) however, suggest the relative mispricing channel as a third explanation. Realized profitability increases, and thus both debt and equity increase in value. However, creditors's promised payoffs are well defined whereas owners' residual payoffs are not, thus debt is likely to be relatively less undervalued than equity. Indeed, the market correctly anticipates the increase in profitability in the short run, but it dramatically underestimates profitability in the long run. The relative undervaluation of equity compared to debt explains both the increase in abnormal returns (Table 1.5) and the increase in profitability surprises (Table 1.8). Firms should therefore increase their leverage, according to the market timing theory.

Though not the focus of my study, I find that the firm's own R&D is negatively related to leverage (Table 1.3), consistent with the literature. R&D can affect leverage through a number of channels, including the three channels that I study in this paper. R&D increase information asymmetry and relative mispricing and decrease asset redeployability. My results (not tabulated) are broadly consistent with these predictions. However, the magnitudes of the effects of R&D on information asymmetry and equity undervaluation are smaller than those of technology spillovers. These results suggest that the various leverage decreasing effects of R&D (e.g., lower asset redeployability) dominate its various leverage increasing effects (e.g., higher information asymmetry and relative mispricing).

In conclusion, I provide evidence that firms with greater technology spillovers have higher leverage and issue more debt and less equity. Technology spillovers drive a wedge between their cost of debt and equity, inducing them to increase their leverage. Consistent with standard theories of capital structure, these financing effects for firms with greater technology spillovers can be explained by at least three related mechanisms: greater information asymmetry, greater asset redeployability, and undervaluation of equity relative to debt. I provide evidence that supports all three of these channels.

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Table 1.1
Descriptive Statistics for Selected Industries

This table describes the industry distribution and presents descriptive statistics for selected industries of the sample. The sample consists of 12,118 firm-year observations on 694 unique firms during the period 1981-2001. The firms in the sample are publicly traded U.S. firms excluding financials and utilities. Panel A presents the top ten two-digit industries that have the highest concentration of firms in the sample. Panel B and Panel C present descriptive statistics for the top ten two-digit industries that experience the highest and lowest technology spillovers, respectively. The definitions of all the variables are provided in Appendix A.

Panel A: Top ten industries that have the highest concentration of firms

Industries	No. of firms	% firms
Electronic and other electrical equipment and components	117	17%
Industrial and commercial machinery and computer equipment	103	15%
Chemicals and allied products	69	10%
Measuring, analyzing, and controlling instruments	61	9%
Transportation equipment	39	6%
Fabricated metal products	38	5%
Food and kindred products	26	4%
Paper and allied products	22	3%
Primary metal industries	21	3%
Miscellaneous manufacturing industries	17	2%

Panel B: Top ten industries that experience the highest technology spillovers										
Industries	No. of firms	Tech spill	SIC spill	Mah. tech spill	Mah. SIC spill	Total assets	Leverage	5 year growth rate	Market value	R&D
Communications	4	10.40	9.29	11.81	10.29	29,128	0.21	0.04	3.85	0.67
Transportation equipment	39	10.32	8.28	11.74	9.27	4,904	0.23	0.09	1.74	0.31
Chemicals and allied products	69	10.25	8.42	11.81	9.24	3,378	0.22	0.09	2.81	0.48
Automotive repair, services, and parking	1	10.15	3.82	11.73	7.47	4,548	0.42	0.03	1.05	0.00
Electronic and other electrical equipment and components	117	10.14	8.51	11.55	9.46	1,768	0.19	0.09	2.28	0.73
Stone, clay, glass, and concrete products	15	10.07	6.10	11.52	7.56	1,838	0.29	0.10	1.93	0.15
Transportation by air	1	10.06	3.73	11.66	6.64	12,328	0.34	0.19	1.02	0.00
Business services	13	10.05	7.99	11.47	9.10	1,657	0.17	0.17	3.79	0.95
Measuring, analyzing, and controlling instruments	61	10.00	8.17	11.47	9.09	1,677	0.16	0.11	2.62	1.00
Coal mining	1	9.98	6.21	11.59	8.32	1,414	0.46	0.11	1.31	0.05

Panel C: Top ten industries that experience the lowest technology spillovers										
Industries	No. of firms	Tech spill	SIC spill	Mah. tech spill	Mah. SIC spill	Total assets	Leverage	5 year growth rate	Market value	R&D
Water transportation	1	9.05	3.04	10.82	4.17	759	0.20	0.11	1.56	0.72
Motor freight transportation and warehousing	2	9.04	5.04	10.65	7.73	651	0.40	0.14	1.03	0.25
Furniture and fixtures	12	8.94	4.50	10.59	6.10	583	0.20	0.07	1.92	0.00
Printing, publishing, and allied industries	14	8.93	6.61	10.67	8.40	1,640	0.20	0.08	2.77	0.00
Health services	2	8.82	7.98	10.65	9.49	21	0.23	0.08	2.86	0.00
Apparel and other finished products	12	8.48	1.62	10.46	4.38	465	0.24	0.06	1.33	0.10
Miscellaneous manufacturing industries	17	8.46	6.96	10.30	8.13	327	0.23	0.06	1.91	0.00
Miscellaneous services	3	8.31	7.44	10.10	9.05	410	0.13	0.09	1.76	0.00
Wholesale trade-non-durable goods	7	7.66	4.88	9.74	7.27	809	0.22	0.17	3.19	0.00
Leather and leather products	7	7.33	0.69	9.56	4.45	419	0.18	0.10	1.60	0.04

Table 1.2
Descriptive Statistics for the Sample

This table reports descriptive statistics for the sample. The sample consists of 12,118 firm-year observations on 694 unique firms during the period 1981-2001. The firms in the sample are publicly traded U.S. firms excluding financials and utilities. The definitions of all the variables are provided in Appendix A.

	Obs	Mean	Standard deviation	25th percentile	Median	75th percentile
Spillover measures						
- Jaffe technology spillovers	12,118	9.72	1.05	9.23	9.88	10.45
- Jaffe product market spillovers	12,118	7.32	2.29	6.28	7.63	8.98
- Mahalanobis technology spillovers	12,118	11.31	0.85	10.84	11.41	11.91
- Mahalanobis product market spillovers	12,118	8.53	1.67	7.82	8.75	9.71
Main control variables						
- Total assets	12,118	2,508	6,366	91	339	1,649
- Firm age	12,118	26	18	13	21	32
- Sales	12,118	2,619	6,439	116	439	1,863
- Tobin's Q	12,099	1.63	0.98	1.04	1.32	1.83
- Profitability	12,102	0.15	0.09	0.10	0.15	0.20
- Tangible assets	12,107	0.31	0.16	0.19	0.29	0.40
- Cash flow volatility	11,954	0.04	0.03	0.01	0.02	0.05
- R&D	12,107	0.45	0.69	0.00	0.20	0.60
Financial policies						
- Leverage	12,113	0.22	0.16	0.09	0.21	0.31
- Debt issuance	12,086	0.06	0.10	0.00	0.01	0.07
- Equity issuance	12,086	0.01	0.04	0.00	0.00	0.01
- Collateralized debt	12,113	0.04	0.08	0.00	0.00	0.03
Stock returns						
- Annual abnormal returns	12,001	0.07	0.38	-0.14	0.06	0.26
Profitability variables						
- Realized earnings	8,667	0.07	0.08	0.03	0.07	0.10
- Estimated earnings	8,766	0.09	0.06	0.05	0.08	0.11
- Realized long-term growth rate	8,613	0.09	0.23	-0.03	0.08	0.18
- Estimated long term growth rate	7,233	0.15	0.06	0.11	0.13	0.17
Information Asymmetry						
- Bid ask spread	6,933	0.03	0.03	0.01	0.02	0.04
- Amihud illiquidity	11,631	1.07	3.61	0.00	0.03	0.36
- Return ratio	12,097	0.18	0.13	0.08	0.15	0.25
- Earning announcement surprise	8,468	0.01	0.03	0.00	0.00	0.01
- Earning announcement volatility	11,891	0.47	0.31	0.25	0.38	0.59
- Analyst coverage	11,184	11.31	11.95	2.00	7.00	17.00
Syndicated loan						
- Loan spreads	2,766	126.75	119.76	32.50	75.00	200.00
- Maturity	2,766	3.44	2.10	1.00	3.00	5.00
- Facility amount	2,766	443.05	713.19	45.00	175.00	500.00
Bond						
- Bond spreads	2,249	107.14	93.44	55.00	83.00	130.00
- Maturity	2,249	11.98	9.48	5.02	10.01	15.01
- Deal amount	2,249	296.55	447.52	98.65	150.00	299.20
Patent assignments						
- Number of patents collateralized	12,118	1.5	7.5	0.0	0.0	0.0
- Number of patents sold	12,118	2.1	10.1	0.0	0.0	0.0

Table 1.3
The Effect of Technology Spillovers on Financial Policies

The dependent variable in Panel A is book leverage; in Panel B is debt issuance; and in Panel C is equity issuance. Control variables are technology spillovers, product market spillovers, R&D, the natural logarithm of firm age, the natural logarithm of sales, Tobin's Q, profitability, tangible assets, and cash flow volatility. Firms' own federal and state R&D tax credits are included in the regressions that use exogenous spillover measures. The definitions of all the variables are reported in Appendix A. Only the results for technology spillovers, product market spillovers, and R&D are tabulated. The measures in the first two specifications are the standard and exogenous Jaffe spillover measure, respectively. The measures in the last two specifications are the standard and exogenous Mahalanobis spillover measure, respectively. The independent variables are lagged by one year and are standardized. The dependent variables are multiplied by 100. All regressions include firm fixed effects and year fixed effects. Standard errors are clustered by industry-year. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Leverage				
	Jaffe	Exogenous Jaffe	Mahalanobis	Exogenous Mahalanobis
Technology spillovers	6.30***	5.87**	5.38***	6.68***
	(3.51)	(2.22)	(3.17)	(3.17)
Product market spillovers	2.00**	2.66	1.12	1.07
	(2.51)	(1.48)	(1.07)	(0.47)
R&D	-2.15***	-2.08***	-2.10***	-2.05***
	(-6.25)	(-6.09)	(-6.09)	(-6.01)
Control variables?	Yes	Yes	Yes	Yes
Firm fixed effects?	Yes	Yes	Yes	Yes
Year fixed effects?	Yes	Yes	Yes	Yes
Observations	11,919	11,919	11,919	11,919
Adjusted R^2	0.597	0.597	0.597	0.597

Panel B: Debt Issuance				
	Jaffe	Exogenous Jaffe	Mahalanobis	Exogenous Mahalanobis
Technology spillovers	3.15**	4.11**	2.50*	2.67*
	(2.37)	(2.26)	(1.82)	(1.69)
Product market spillovers	1.15*	2.12*	0.82	1.50
	(1.73)	(1.85)	(0.94)	(0.95)
R&D	-0.31	-0.28	-0.28	-0.25
	(-1.36)	(-1.26)	(-1.24)	(-1.09)
Control variables?	Yes	Yes	Yes	Yes
Firm fixed effects?	Yes	Yes	Yes	Yes
Year fixed effects?	Yes	Yes	Yes	Yes
Observations	11,892	11,892	11,892	11,892
Adjusted R^2	0.228	0.228	0.228	0.228

Panel C: Equity Issuance				
	Jaffe	Exogenous Jaffe	Mahalanobis	Exogenous Mahalanobis
Technology spillovers	-1.38**	-1.69**	-1.60**	-0.91
	(-2.21)	(-2.00)	(-2.31)	(-1.14)
Product market spillovers	0.56**	0.74	0.38	-0.05
	(2.11)	(1.28)	(0.97)	(-0.06)
R&D	0.35**	0.35**	0.35**	0.34**
	(2.16)	(2.15)	(2.19)	(2.12)
Control variables?	Yes	Yes	Yes	Yes
Firm fixed effects?	Yes	Yes	Yes	Yes
Year fixed effects?	Yes	Yes	Yes	Yes
Observations	11,892	11,892	11,892	11,892
Adjusted R^2	0.183	0.182	0.183	0.182

Table 1.4
The Effect of Technology Spillovers on the Cost of Debt

The dependent variable in Panel A is loan spreads and in Panel B is bond spreads. Firm specific control variables are technology spillovers, product market spillovers, R&D, the natural logarithm of firm age, the natural logarithm of total assets, leverage, Tobin's Q, profitability, tangible assets, cash flow volatility and credit rating. Loan specific control variables are the natural logarithm of deal/facility amount, the natural logarithm of maturity, and a loan or bond type dummy variable. Firms' own federal and state R&D tax credits are included in the regressions that use exogenous spillover measures. The definitions of all the variables are reported in Appendix A. Only the results for technology spillovers, product market spillovers, and R&D are tabulated. The measures in the first two specifications are the standard and exogenous Jaffe spillover measure, respectively. The measures in the last two specifications are the standard and exogenous Mahalanobis spillover measure, respectively. The independent variables are lagged by one year and are standardized. The dependent variables are multiplied by 100. All regressions include two digit industry fixed effects and year fixed effects. Standard errors are clustered by industry-year. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Loan Spreads				
	Jaffe	Exogenous Jaffe	Mahalanobis	Exogenous Mahalanobis
Technology spillovers	-9.52***	-9.63***	-8.76***	-8.95***
	(-2.92)	(-3.08)	(-2.75)	(-2.85)
Product market spillovers	6.35**	8.17***	5.49*	5.50*
	(1.98)	(2.71)	(1.77)	(1.76)
R&D	10.57***	9.92***	10.71***	10.56***
	(2.90)	(2.77)	(2.99)	(2.99)
Loan specific variables?	Yes	Yes	Yes	Yes
Firm specific variables?	Yes	Yes	Yes	Yes
Firm fixed effects?	Yes	Yes	Yes	Yes
Year fixed effects?	Yes	Yes	Yes	Yes
Observations	2,728	2,728	2,728	2,728
Adjusted R^2	0.558	0.561	0.557	0.559
Panel B: Bond Spreads				
	Jaffe	Exogenous Jaffe	Mahalanobis	Exogenous Mahalanobis
Technology spillovers	-6.55**	-5.91**	-6.63**	-6.35**
	(-2.09)	(-2.21)	(-2.21)	(-2.10)
Product market spillovers	-0.36	-2.79	-1.49	-2.71
	(-0.17)	(-0.95)	(-0.56)	(-0.94)
R&D	10.26**	11.73**	10.63**	11.75**
	(2.08)	(2.43)	(2.17)	(2.44)
Loan specific variables?	Yes	Yes	Yes	Yes
Firm specific variables?	Yes	Yes	Yes	Yes
Firm fixed effects?	Yes	Yes	Yes	Yes
Year fixed effects?	Yes	Yes	Yes	Yes
Observations	2,206	2,206	2,206	2,206
Adjusted R^2	0.562	0.562	0.562	0.562

Table 1.5
The Effect of Technology Spillovers on Abnormal Stock Returns

The dependent variable is abnormal stock returns in Panel A and five-year average abnormal stock returns in Panel B. Control variables are technology spillovers, product market spillovers, R&D, the natural logarithm of firm age, the natural logarithm of market capitalization, market-to-book, profitability, annual returns, and return volatility. Firms' own federal and state R&D tax credits are included in the regressions that use exogenous spillover measures. The definitions of all the variables are reported in Appendix A. Only the results for technology spillovers, product market spillovers, and R&D are tabulated. The measures in the first two specifications are the standard and exogenous Jaffe spillover measure, respectively. The measures in the last two specifications are the standard and exogenous Mahalanobis spillover measure, respectively. The independent variables are lagged by one year and are standardized. The dependent variables are multiplied by 100. All regressions include firm fixed effects and year fixed effects. Standard errors are clustered by industry-year. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Abnormal Stock Returns

	Jaffe	Exogenous Jaffe	Mahalanobis	Exogenous Mahalanobis
Technology spillovers	11.57*	12.61	14.59**	17.73**
	(1.82)	(1.53)	(2.28)	(2.34)
Product market spillovers	4.63	-12.81*	8.35*	-15.26*
	(1.37)	(-1.81)	(1.83)	(-1.69)
R&D	2.60**	2.89**	2.50**	2.92**
	(2.20)	(2.45)	(2.12)	(2.47)
Control variables?	Yes	Yes	Yes	Yes
Firm fixed effects?	Yes	Yes	Yes	Yes
Year fixed effects?	Yes	Yes	Yes	Yes
Observations	11,817	11,817	11,817	11,817
Adjusted R^2	0.203	0.204	0.204	0.204

Panel B: Five-year Average Abnormal Stock Returns

	Jaffe	Exogenous Jaffe	Mahalanobis	Exogenous Mahalanobis
Technology spillovers	17.02***	10.74***	18.91***	16.41***
	(7.91)	(3.84)	(8.60)	(6.14)
Product market spillovers	2.57*	-4.30**	5.90***	-5.73**
	(1.80)	(-2.03)	(3.24)	(-2.16)
R&D	0.48	0.76*	0.44	0.75*
	(1.16)	(1.82)	(1.07)	(1.82)
Control variables?	Yes	Yes	Yes	Yes
Firm fixed effects?	Yes	Yes	Yes	Yes
Year fixed effects?	Yes	Yes	Yes	Yes
Observations	11,262	11,262	11,262	11,262
Adjusted R^2	0.559	0.555	0.561	0.556

Table 1.6
The Effect of Technology Spillovers on Information Asymmetry

The dependent variables are bid-ask spreads, Amihud illiquidity, returns ratio, earnings announcement surprises, earnings announcement volatility, analyst coverage, and earnings estimate dispersion. Control variables are technology spillovers, product market spillovers, R&D, the natural logarithm of market capitalization, market-to-book, profitability, stock returns, and return volatility. Firms' own federal and state R&D tax credits are included in the regressions that use exogenous spillover measures. The definitions of all the variables are reported in Appendix A. Only the results for technology spillovers are tabulated. The results reported in row-column pairs correspond to the coefficient estimate on technology spillovers using the dependent variables in the rows (bid-ask spread, Amihud illiquidity, etc.) and the customary four technology spillover variables in the columns (Jaffe, exogenous Jaffe, Mahalanobis, and exogenous Mahalanobis). The independent variables are lagged by one year and are standardized. The dependent variables are multiplied by 100. All regressions include firm fixed effects and year fixed effects. Standard errors are clustered by industry-year. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Dependent variable	Jaffe	Exogenous Jaffe	Mahalanobis	Exogenous Mahalanobis
Bid Ask spread	1.02***	1.31**	0.49	0.05
	(2.84)	(2.39)	(1.28)	(0.09)
Amihud illiquidity	214.71***	128.87***	145.04***	74.52
	(5.76)	(2.58)	(4.11)	(1.62)
Return ratio	8.66***	6.32***	6.87***	4.99***
	(6.15)	(3.28)	(4.67)	(2.83)
Earnings announcement surprises	2.04***	1.62**	2.16***	2.20***
	(4.54)	(2.01)	(4.67)	(3.27)
Earnings announcement volatility	13.92***	16.24***	12.68***	10.12**
	(4.07)	(3.80)	(3.63)	(2.42)
Analyst coverage	-26.81***	-24.23**	-23.93***	-26.41***
	(-4.13)	(-2.05)	(-3.48)	(-2.97)
Earnings estimates dispersion	8.98	16.73**	10.26*	16.51**
	(1.64)	(2.02)	(1.81)	(2.37)
All regressions				
Control variables?	Yes	Yes	Yes	Yes
Firm fixed effects?	Yes	Yes	Yes	Yes
Year fixed effects?	Yes	Yes	Yes	Yes

Table 1.7
The Effect of Technology Spillovers on Asset Redeployability

The dependent variables are collateralized debt, patent collateralizations, and patent sales. Control variables are technology spillovers, product market spillovers, R&D, the natural logarithm of firm age, the natural logarithm of sales, Tobin's Q, profitability, and cash flow volatility. Firms' own federal and state R&D tax credits are included in the regressions that use exogenous spillover measures. The definitions of all the variables are reported in Appendix A. Only the results for technology spillovers are tabulated. The results reported in row-column pairs correspond to the coefficient estimate on technology spillovers using the dependent variables in the rows (collateralized debt, tangible assets, and capital expenditures) and the customary four technology spillover variables in the columns (Jaffe, exogenous Jaffe, Mahalanobis, and exogenous Mahalanobis). The independent variables are lagged by one year and are standardized. The dependent variables are multiplied by 100. All regressions include firm fixed effects and year fixed effects. Standard errors are clustered by industry-year. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Dependent variable	Jaffe	Exogenous Jaffe	Mahalanobis	Exogenous Mahalanobis
Collateralized debt	3.20***	2.31**	2.67***	2.46**
	(4.12)	(2.19)	(3.19)	(2.45)
Patent collateralizations	22.30***	18.91**	20.00***	25.19***
	(2.74)	(2.06)	(2.59)	(2.95)
Patent sales	25.55***	16.94*	21.89***	26.08***
	(3.46)	(1.80)	(3.15)	(2.90)
All regressions				
Control variables?	Yes	Yes	Yes	Yes
Firm fixed effects?	Yes	Yes	Yes	Yes
Year fixed effects?	Yes	Yes	Yes	Yes

Table 1.8
The Effect of Technology Spillovers on Earnings

The dependent variables in Panel A are realized earnings and estimated earnings. The dependent variables in Panel B are realized long-term earnings growth rates and estimated long-term earnings growth rates. Control variables are technology spillovers, product market spillovers, R&D, the natural logarithm of firm age, the natural logarithm of market capitalization, and the natural logarithm of book-to-market. Firms' own federal and state R&D tax credits are included in the regressions that use exogenous spillover measures. The definitions of all the variables are reported in Appendix A. Only the results for technology spillovers are tabulated. The results reported in row-column pairs correspond to the coefficient estimate on technology spillovers using the dependent variables in the rows (realized earnings, estimated earnings, etc.) and the customary four technology spillover variables in the columns (Jaffe, exogenous Jaffe, Mahalanobis, and exogenous Mahalanobis). The independent variables are lagged by one year and are standardized. The dependent variables are multiplied by 100. All regressions include firm fixed effects and year fixed effects. Standard errors are clustered by industry-year. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Actual Earnings and Earnings Estimates One Year Ahead				
Dependent variable	Jaffe	Exogenous Jaffe	Mahalanobis	Exogenous Mahalanobis
Realized earnings	0.80	1.16	3.86***	3.37**
	(0.65)	(0.75)	(3.12)	(2.21)
Estimated earnings	0.07	0.95	2.80***	2.67***
	(0.10)	(0.82)	(3.70)	(2.78)
All regressions				
Control variables?	Yes	Yes	Yes	Yes
Firm fixed effects?	Yes	Yes	Yes	Yes
Year fixed effects?	Yes	Yes	Yes	Yes

Panel B: Actual Earnings and Earnings Estimates Five Year Ahead				
Dependent variable	Jaffe	Exogenous Jaffe	Mahalanobis	Exogenous Mahalanobis
Realized long-term growth rates	13.31***	10.35**	13.05***	13.48***
	(3.64)	(2.00)	(3.62)	(2.88)
Estimated long-term growth rates	-6.36***	-3.78***	-3.69***	-1.37
	(-5.57)	(-2.76)	(-2.86)	(-0.96)
All regressions				
Control variables?	Yes	Yes	Yes	Yes
Firm fixed effects?	Yes	Yes	Yes	Yes
Year fixed effects?	Yes	Yes	Yes	Yes

Table 1.9
The Effect of Technology Spillovers on Analysts' Earnings Forecast Errors

The dependent variable is analysts' earnings forecast errors. Control variables are technology spillovers, product market spillovers, R&D, the logarithm of firm age, the natural logarithm of market capitalization, and the natural logarithm of book-to-market. Firms' own federal and state R&D tax credits are included in the regressions that use exogenous spillover measures. The definitions of all the variables are reported in Appendix A. Only the results for technology spillovers, product market spillovers, and R&D are tabulated. The measures in the first two specifications are the standard and exogenous Jaffe spillover measure, respectively. The measures in the last two specifications are the standard and exogenous Mahalanobis spillover measure, respectively. The independent variables are lagged by one year and are standardized. The dependent variables are multiplied by 100. All regressions include firm fixed effects and year fixed effects. Standard errors are clustered by industry-year. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Dependent Variable is Analysts' Earnings Forecast Errors							
	One Year Ahead				Five Years Ahead			
	Jaffe	Exogenous Jaffe	Mahalanobis	Exogenous Mahalanobis	Jaffe	Exogenous Jaffe	Mahalanobis	Exogenous Mahalanobis
Technology spillovers	0.56	-0.48	0.97	0.97	20.75***	11.52	17.60***	16.39***
	(0.53)	(-0.34)	(0.87)	(0.66)	(3.81)	(1.56)	(3.48)	(2.69)
Product market spillovers	-0.55	-2.02	-0.33	-2.95	2.67	-11.19	7.48**	-8.36
	(-0.92)	(-1.04)	(-0.48)	(-1.40)	(0.92)	(-1.40)	(2.41)	(-0.94)
R&D	-0.01	0.01	-0.03	0.01	1.09	1.74*	1.13	1.66
	(-0.06)	(0.05)	(-0.11)	(0.03)	(1.05)	(1.67)	(1.10)	(1.58)
Control variables?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	8,562	8,562	8,562	8,562	5,504	5,504	5,504	5,504
Adjusted R^2	0.423	0.424	0.423	0.424	0.242	0.238	0.242	0.239

Appendix A
Variable Definitions

This table presents variable definitions. Variables are computed for each firm and each year. Spillovers data are from BSV; accounting data are from Compustat; stock trading data are from CRSP; syndicated loan data are from Dealscan; bond data are from SDC; and analyst data are from I/B/E/S.

Name	Definition
Proximity measures	
- Jaffe technology proximity/product market proximity	Uncentered correlation between two firms' technology activities/ product market activities
- Mahalanobis technology proximity/product market proximity	Extension of the Jaffe measure, which takes into account the closeness of technology classes/product markets
Spillover measures	
- Technology spillovers/product market spillovers	The weighted sum of R&D stocks of other firms where the weights are the Jaffe or Mahalanobis measure of technology proximity/product market proximity
- Exogenous technology spillovers/product market spillovers	The weighted sum of exogenous R&D stocks of other firms where the weights are the Jaffe or Mahalanobis measure of technology proximity/product market proximity
Financial policies	
- Leverage	(DLTT + DLC)/AT
- Debt issuance	DLTIS / AT
- Equity issuance	SSTK / AT
- Collateralized debt	DM /AT
The cost of debt	
- Loan spreads	The amount the borrower pays in basis points over LIBOR or LIBOR equivalent
- Bonds spreads	The difference in basis points between the corporate bond yield and the yield on a duration-equivalent risk-free bond
- Deal/Facility amount	Deal/facility amount measured in millions of dollars
- Maturity	Maturity measured in years
- Loan type dummies	Dummy variable for loan types, including term loans and lines of credit.
- Bond type dummies	Dummy variable for bond types, including public bonds and private bonds
Stock returns	
- Abnormal stock returns	Annualized abnormal returns using the market model for daily stock returns
- Five-year average abnormal stock returns	Annualized abnormal returns over the five year using the market model for daily stock returns
Profitability	
- Realized earnings	Net income scaled by total assets
- Estimated earnings	Analysts' earnings estimate scaled by total assets
- Realized long-term earnings growth rate	Earnings per share growth rate over the next five years
- Estimated long term earnings growth rate	Analysts' long term (five years) earnings growth rate estimates
- Earnings forecast errors	Realized earnings or long-term earnings growth rate minus estimated earnings or long-term earnings growth rate (all defined as above)
Information asymmetry	
- Bid-ask spread	(ask–bid)/((ask+bid)/2)
- Amihud illiquidity	The logarithm of one plus the ratio of the absolute stock return to the

	trading volume and divided by 10^6
- Return ratio	The proportion of days with zero or missing returns
- Earnings announcement surprise	The absolute value of realized quarterly earnings minus the latest earnings estimate before the earnings announcement, all scaled by the stock price
- Earnings announcement volatility	The annualized daily return volatility in a three-day window around earnings announcements
- Analyst coverage	The number of analysts
- Estimates dispersion	Coefficient of variation of analysts' earnings estimates
Patent assignments	
- Patent collateralizations	The logarithm of the number of patents issued to the firm and subsequently used as collateral for borrowing. See Mann (2015) for details.
- Patent sales	The logarithm of the number of patents issued to the firm and subsequently sold. See Serrano (2010) and Akcigit, Celik, and Greenwood (2015) for details.
Control variables	
- R&D stocks	$G_t = R_t + (1-\delta) G_{t-1}$ where R is the R&D expenditure in year t and δ is depreciation rate, which equal to 0.15
- R&D	R&D stock/Capital stock where capital stock is net plant, property and equipment, inventories, investments and intangibles other than R&D
- Firm age	Years from the listing date
- Federal R&D tax credit	Federal tax credit component of R&D user costs
- State R&D tax credit	State tax credit component of R&D user costs
- Tobin's Q	(AT-(TXDITC +CEQ)+ PRCC_F x CSHO)/AT
- Sales	SALE
- Profitability	OIBDP /AT
- Tangible assets	PPENT /AT
- Cash flow volatility	Standard deviation of EBITDA/AT over the prior five years
- Total assets	AT
- Credit rating	S&P's issuer ratings ranging between 21 (AAA) and one (C)
- Market capitalization	PRCC_F x CSHO
- Market-to-book	(PRCC_F x CSHO)/(TXDITC +CEQ)
- Annual returns	Annualized stock returns
- Return volatility	Annualized standard deviation of daily stock returns
- Capital expenditures	CAPX/AT

Chapter 2: Does corporate investment in stakeholder capital create value for shareholders? The importance of long-term investors

AMBRUS KECSKÉS, SATTAR MANSI, and ANH HA PHUONG NGUYEN

The effect of stakeholder capital on shareholder value is a matter of debate. We argue that long-term investors are natural monitors that can ensure that managers choose stakeholder capital investment to maximize shareholder value. We find that long-term investors increase the value to shareholders of stakeholder capital investment, not as a result of higher cash flow but rather of lower cash flow risk. Numerous recent papers show empirically that indexing by investors has a causal effect on financial and real corporate outcomes. We follow this identification strategy to establish causality for long-term investors. Also following prior work, we use the staggered adoption of state laws on stakeholder orientation for identification. Our findings suggest that firms can create value for shareholders by investing in stakeholder capital as long as managers are properly monitored by long-term investors.

"Economists traditionally emphasize the firm's responsibility vis-à-vis its shareholders. … Opponents of the shareholder value concept point at various externalities imposed by profit maximizing choices on other stakeholders: on … management and workers who have invested their human capital as well as off-work related capital (housing, spouse employment, schools, social relationships, etc.) … ; on suppliers and customers who also have sunk investments in the relationship and foregone alternative investment opportunities; on communities who suffer from the closure of a plant; and so forth. … In a nutshell, the firm should internalize the *externalities* on the various stakeholders." (Tirole (2001))

1. Introduction

During the past decade, the audience interested in "corporate social responsibility" (CSR) has grown from a small minority of academics to a large majority of investors, firms, and, indeed, the general public. According to a report from The Economist, CSR is an "important" or "central" consideration for 81% of investors and 86% of managers (Economist Intelligence Unit (2005)). In 2012, assets managed in accordance with "socially responsible investing" totaled over $3.7 trillion in the U.S. or over 11% of all assets under management (Social Investment Forum Foundation (2012)). Globally, this figure rises to $13.6 trillion (Global Sustainable Investment Alliance (2012)). GE has been publishing an annual report on its CSR since 2005, and many other firms have been doing likewise in recent years. With so much attention being paid to CSR, stakeholders – customers, employees and other suppliers, community residents, and the natural environment (Clarkson (1995)) – no doubt benefit tremendously.

It is entirely another matter whether shareholders gain or lose from CSR, or "stakeholder capital investment" as we refer to it hereafter. Despite several decades of research, this debate thunders ever louder today (see the comprehensive surveys by Margolis, Elfenbein, and Walsh

(2009) and Kitzmueller and Shimshack (2012)). In this paper, we hypothesize that firms can create value for their shareholders by investing in their stakeholders – in the presence of long-term investors. We argue based on Bénabou and Tirole (2010) that long-term investors are natural monitors that can ensure that managers choose stakeholder capital investment to maximize shareholder value.[1]

In particular, stakeholder capital is an asset that is intangible as well as long-term. As such, it is subject to three important problems between investors and managers: information asymmetry, incentive alignment, and investment myopia (e.g., Stein (1988)). These problems, in turn, affect the extent to which managers invest optimally in stakeholder capital (e.g., Edmans (2011)). Long-term investors solve these problems through monitoring. Different investors have shorter or longer horizons for a variety of reasons, and, as a result, they differ in their monitoring of managers. Many hedge funds and mutual funds, for example, have short horizons as a result of their trading strategies whereas pension funds and insurance companies usually have long horizons as a result of the maturity of their liabilities. As Gaspar, Massa, and Matos (2005) and Chen, Harford, and Li (2007) argue, long-term investors generally have lower costs and higher benefits of both information production and influence exertion than short-term investors. Consequently, long-term investors engage in more monitoring than short-term investors.

Moreover, managers tend to choose real investments that have short-term albeit small profits instead of long-term yet large profits (Graham, Harvey, and Rajgopal (2005)). This can be a serious problem for investment in intangible assets such as stakeholder capital.[2] Long-term investors counter this tendency because they make financial investments – and engage in

[1] The Economist (2013), a representative example from the media, also emphasizes the importance of long-term investors in choosing the optimal amount of stakeholder capital investment.
[2] For example, decreasing the relatively small costs of better employee treatment or environmental maintenance may lead to an increase in profits in the short run, even for several years, but it may lead to much larger costs and a correspondingly larger decrease in profits in the long run.

monitoring – to maximize long-term profits from their portfolio firms. Indeed, the empirical evidence, which we describe below, suggests that long-term investors affect investment. The famous example of Unilever illustrates the importance of convincing investors to look to the long run when it comes to such intangible and long-term investments as stakeholder capital (The Economist (2014)).

In monitoring managers, individual long-term investors may produce information and exert influence on their own or as a group. Their engagements with managers are sometimes public, as in the case of proxy contests, but they usually engage managers in private (Becht, Franks, Mayer, and Rossi (2009)). Indeed, using proprietary data, Doidge, Dyck, Mahmudi, and Virani (2015) show that institutional investors influence numerous corporate governance outcomes, and they operate through social networks of directors. Consequently, long-term investors can improve corporate governance in collaboration with other market participants, including not only activist hedge funds and private equity funds but also proxy advisors and equity research analysts. For instance, long-term investors can participate in the campaign of an activist hedge fund, an investor that by itself only has a small ownership stake in the firm. More generally, any coordinated attempt to nudge managers toward shareholder value maximization can be enhanced by the participation of long-term investors, as in the model of wolf pack activism proposed by Brav, Dasgupta, and Mathews (2014).

We study whether long-term investors affect the value to shareholders of investment in stakeholder capital. Since long-term investors maximize long-term shareholder value, their effect on stakeholder capital investment should be value increasing. Moreover, the source of this increase in shareholder value can be higher cash flow, lower cash flow risk, or both.[3] In the next section, we discuss how stakeholder capital investment can affect shareholder value.

We use a large sample of firm-year observations in our analysis. To measure stakeholder capital investment, we follow a large literature and use data from KLD, which scores firms annually on a wide range of CSR dimensions. We construct an overall stakeholder capital investment proxy that captures the firm's investment (pecuniary and non-pecuniary) in workforce diversity, employee relations, community support, and the natural environment.

We measure investor horizons, following the literature (e.g., see Gaspar, Massa, and Matos (2005) and Chen, Harford, and Li (2007)), using data on the portfolios of institutional investors. Specifically, we first measure the investment horizons of investors based on their portfolio turnover. We then classify investors as short-term or long-term based on their investment horizons (high or low turnover, respectively). Finally, we measure the investor horizons of firms as the ownership of their long-term investors. To establish causality, we again take a popular approach in the literature and use indexing by long-term investors. We explain this approach in detail below.

Our results are simple to summarize: long-term investors increase the value to shareholders of stakeholder capital investment, not as a result of higher cash flow but rather as a result of lower cash flow risk. In greater detail,[4] we find that firms with greater long-term investor ownership and stakeholder capital investment have higher stock valuations (market-to-book) by roughly 5%. Such firms do not have higher profitability (neither realized nor expected). Instead, their volatility of profitability (both realized and expected) is lower by roughly 5% (as is

[3] This is the case in the standard discounted cash flow valuation framework, but it need not be the case in the options valuation framework (e.g., Merton (1974)).

[4] We present economic magnitudes in terms of the effect on the dependent variable of a one-standard deviation change in the independent variable. Moreover, we focus on the overall stakeholder capital investment proxy.

their volatility of sales and volatility of costs). This is corroborated by their stock performance: their volatility of stock returns is lower (both in terms of systematic and idiosyncratic volatility), and their future stock returns are also lower, by roughly 1.5 percentage points per year.

To establish causality of our results, we follow numerous recent papers that use indexing by long-term investors to show empirically a causal effect on various corporate outcomes. These papers study the effect of the ownership of investors that are indexers and/or investors in index firms on securities prices and liquidity, profitability, investment, capital structure, payouts, governance, and innovation. Indexing by long-term investors is exogenous to corporate outcomes because investors that index their portfolio clearly cannot choose their portfolio firms, and it is relevant because indexers can affect corporate policies and thereby stock valuations (e.g., Matvos and Ostrovsky (2010) and Appel, Gormley, and Keim (2015)). We discuss the pertinent literature in a later section. Our empirical approach is to split long-term investor ownership into a plausibly exogenous component and a possibly endogenous one. In our first split, we use indexers and non-indexers, and in our second split, we use index firms and non-index firms. Overall, our results are similar for long-term indexer and non-indexer ownership as well as for long-term index firm and non-index firm ownership. This supports a causal interpretation of our findings.

Additionally, we follow prior work and identify exogenous variation in stakeholder capital investment using the staggered adoption of state laws on stakeholder orientation. These "constituency statutes" allow corporate managers to make business decisions that take into account not only the interests of shareholders but also stakeholders.[5] Using this approach, we confirm that the value to shareholders of stakeholder capital investment is increased by long-

[5] While long-term investors also affect how much firms spend on stakeholder capital, in this paper we focus on how efficiently firms invest in stakeholder capital from the perspective of maximizing shareholder value.

term investors. We also find similar results using the staggered adoption of state-level workforce diversity and wrongful discharge laws to identify exogenous variation in components of stakeholder capital investment.

Our paper contributes first to the literature on corporate social responsibility. This literature studies at great length whether CSR creates or destroys shareholder value (see the two aforementioned surveys). Our findings suggest that, as long as managers are properly monitored, ostensibly social objectives can further rational business objectives, which is consistent with Turban and Greening (1997) and Waddock and Graves (1997).

Moreover, Krüger (2015) finds that stock prices react in the same direction as corporate news about CSR activities. Flammer (2015) finds that shareholder proposals pertaining to CSR have a positive effect on shareholder value. Similarly, Kim and Ouimet (2014) find that employee stock ownership increases shareholder value. Hwang, Titman, and Wang (2012) find that the portfolios of institutional investors chosen based on stakeholder capital investment predict future stock returns. At the same time, Cheng, Hong, and Shue (2014) and Hong, Kubik, and Scheinkman (2012) find that financially constrained and better governed firms spend less on CSR, which they interpret to indicate that CSR spending decreases shareholder value. Our first incremental contribution is that this conclusion depends on whether managers are properly monitored by long-term investors. Second, we go further than these two papers and provide evidence about the value implications of this monitoring. Third and finally, we provide evidence about the source of these valuation implications (cash flow versus cash flow risk). Our study, then, complements these aforementioned contemporaneous studies.

Second, there is a large literature on managerial myopia and corporate investment (e.g., Stein (1988)) to which our paper also contributes. Some papers in this literature study investment in intangible assets as well as its value implications (e.g., Eberhart, Maxwell, and Siddique (2004) and Edmans (2011)). Others study its governance outcomes (Gao, Harford, and Li (2015)). There is also a closely related literature on investor horizons and corporate investment (e.g., Bushee (1998), Gaspar, Massa, and Matos (2005), Chen, Harford, and Li (2007), and Chen, Gao, Hsu, and Li (2015)). We add to these two literatures with our study of stakeholder capital, a particular type of intangible asset.

Third, our paper also contributes to the literature on corporate risk management. Several papers provide evidence that various hedging activities increase shareholder value (e.g., Allayannis and Weston (2001) and Graham and Rogers (2002)). More generally, Rountree, Allayannis, and Weston (2008) find that lower cash flow risk is associated with higher firm value. We find that, under certain circumstances, stakeholder capital investment serves as a hedging activity that decreases risk and increases firm value.

Finally, our paper contributes to the literature on the real effects of financial markets. Some recent papers in this literature study the effects of financial market prices on corporate policies (Khan, Kogan, and Serafeim (2012)) and Edmans, Goldstein, and Jiang (2012)). Others study the effects of financial crises (Campello, Graham, and Harvey (2010), Duchin, Ozbas, and Sensoy (2010), and Almeida, Campello, Laranjeira, and Weisbenner (2011)). Still others study the effects of information shocks (Sufi (2009) and Derrien and Kecskés (2013)). Our paper studies investor horizons shocks and their value implications.

The rest of this paper is organized as follows. Section 2 discusses the effect of stakeholder capital investment on shareholder value. Section 3 presents the sample and data. Section 4 presents the valuation results. Section 5 presents additional results. Section 6 concludes.

2. How Stakeholder Capital Can Affect Shareholder Value

We provide several examples of how investing in stakeholders can create value for shareholders. Hiring employees against which some firms discriminate can be profitable for those firms that do not discriminate (Becker (1957)). Moreover, greater employee satisfaction, whether through recruitment, retention, or motivation, can also increase profits (Edmans (2011) and Edmans, Li, and Zhang (2015)). Similarly, efficiency wage theory argues that generous compensation motivates greater employee productivity (Akerlof and Yellen (1990) and Hart and Moore (2008)). Corporate investment in reputation capital can also be profitable by attracting additional customers and suppliers (e.g., Klein and Leffler (1981)).

Alternatively, investing in stakeholders can decrease cash flow risk. Better relations between the firm and its various stakeholders can increase its operating flexibility, thus they can dampen real and financial shocks to cash flow and thereby decrease cash flow risk (Zhang (2005)). Moreover, they can decrease the likelihood and expense of legal action, regulation, or legislation against the firm (Thaler (2012), Chava (2014), and Hong and Liskovich (2015)). Similarly, greater customer loyalty can decrease firm risk (Albuquerque, Durnev, and Koskinen (2014)). To use the recent example of Starbucks in the U.K., a farsighted manager might have anticipated the coffee drinkers' outrage at the firm's low taxes. Instead of yielding to public pressure and paying more taxes than required by law after the fact, the firm could have incurred the same expense ahead of time and trumpeted its social conscience to its likeminded customers, as it does in many other areas of its business. In all of these examples, firms can accept small short-term costs in order to reap large long-term benefits. (For other similar examples, see Godfrey, Merrill, and Hansen (2009).)

In other instances, there can be both an increase in profitability and a decrease in risk. For example, shareholder orientation to the detriment of stakeholder orientation can destroy shareholder value in the long run (Popadak (2013)). Employee stock ownership can increase productivity as well as risk sharing between owners and employees (Kim and Ouimet (2014)). Finally, Allen, Carletti, and Marquez (2015) model firm value as a function of stakeholder versus shareholder orientation. They show that the former dominates the latter if input (supplier) uncertainty is greater than output (customer) uncertainty. Along all these avenues, long-term investors can create value for shareholders from investing in stakeholders.

3. Sample and Data

3.1. Sample Construction and Data Sources

We construct our sample as follows. We begin with all publicly traded U.S. firms in CRSP, Compustat, and KLD between 1991 and 2009. We use data from KLD because they are the most comprehensive and detailed data available, and consequently they are by far the most frequently used for research on corporate social responsibility (e.g., Landier, Nair, and Wolf (2009) and Bae, Kang, and Wang (2011)). We keep U.S. operating firms defined as firms with CRSP share codes of 10 or 11. We drop firms that are financials or utilities. Our resulting sample comprises 21,257 firm-year observations corresponding to 3,592 unique firms between 1991 and 2009.

Stakeholder capital investment data are from KLD, investor portfolio data are from Thomson's 13f filings, stock trading data are from CRSP, factor returns data are from Ken French's website, accounting data are from Compustat, and analyst data are from I/B/E/S. By "investors", we mean institutional investors in Thomson's 13f filings unless otherwise specified. We winsorize all continuous variables at the 1^{st} and 99^{th} percentiles.

3.2. Measuring Stakeholder Capital Investment

We use data from KLD to measure stakeholder capital investment. Each year, KLD uses public documents to rate firms on how well they meet the needs of their stakeholders. Specifically, their analysts score the firms that they cover on their corporate social performance along a wide range of dimensions (e.g., diversity, employee relations, community, environment, etc.). The ratings data comprise items each of which is a dummy variable that equals zero or one. Each data item measures the firm's performance along a particular dimension such as "retirement benefits". Good or bad performance is captured as a "strength" or "concern", respectively, for the dimension in question.

We use these dimensions to construct an "overall" stakeholder capital investment proxy that is our focus throughout the paper. We construct it as the aggregate of four other stakeholder capital investment proxies. We take this additive approach because we have no priors on the relative importance of the four proxies in capturing stakeholder capital investment. The four proxies, in turn, are constructed from the categories into which the KLD data items are organized: "diversity", "employee relations", "community", and "environment". As a validation of these proxies, Turban and Greening (1997) provide evidence that they have an economically and statistically significant relationship with the firm's reputation. We also include these four proxies alongside the overall proxy throughout the paper.

We explain the construction of each of these proxies in Appendix B. In our construction, we follow KLD as closely as possible, and we explain the necessary changes that we make in the Appendix B. Moreover, since some KLD data items are very similar (e.g., the strengths are the opposites of the concerns), we combine such components into a single component (e.g., "retirement benefits"). Doing so does not change our results, but it does make them easier to interpret.

3.3. Measuring Investor Horizons

To measure investor horizons, we use data from Thomson's 13f filings and we follow the methodology used in the literature (e.g., see Gaspar, Massa, and Matos (2005) and Chen, Harford, and Li (2007)). We begin by measuring the investment horizons of investors as their three-year portfolio turnover. Specifically, for each investor, each year, and each stock, we compare the stock held by that investor that year to the stock held by the investor three years before, and we compute the fraction of stock sold by the investor during those three years. This is the turnover of that stock, that year, for that investor, and it is ranges from zero to one. For each investor and each year, we then weight each stock's turnover by the stock's weight in the investor's portfolio three years before, and we compute the weighted average turnover of the investor's portfolio during the past three years. This is the portfolio turnover of that investor that year, and it also ranges from zero to one.

We then classify investors as short-term or long-term investors based on their investment horizons. Specifically, we classify investors with a portfolio turnover of 35% or less as "long-term investors" (see Froot, Perold, and Stein (1992)), and we classify all other investors as "short-term investors". We use a 35% cutoff because it roughly corresponds to the bottom quartile of investor turnover. By construction, short-term investors and long-term investors together comprise all institutional investors. Finally, we measure the investor horizons of firms as the ownership of their long-term investors, and it, too, ranges from zero to one.

Our measure of investor horizons has several desirable properties as documented in the literature (e.g., see Derrien, Kecskés, and Thesmar (2013)). Our measure is persistent. This is because the portfolio turnover of investors tends to be stable over time, and, consequently, short-term and long-term investor ownership of firms tends to be stable over time. Moreover, our measure is accurate in classifying short-term and long-term investors as such. For example, our measure classifies Warren Buffett (Berkshire Hathaway) as a long-term investor and György Soros (Soros Fund Management) as a short-term investor.

3.4. Identifying Investor Horizons

To establish that investor horizons affect the value to shareholders of stakeholder capital investment, we use long-term investors that are indexers and long-term investors in index firms. The literature shows empirically that indexing by investors causes a wide range of corporate outcomes. These outcomes include: stock prices (Chang, Hong, and Liskovich (2015)); the pricing of bank loans (Lu (2013)); disclosure (Bird and Karolyi (2015) and Boone and White (2015)); stock volatility and liquidity (Ben-David, Franzoni, and Moussawi (2014)); profitability (Denis, McConnell, Ovtchinnikov, and Yu (2003)); capital structure (Michaely and Vincent (2013)); payouts (Crane, Michenaud, and Weston (2014)); governance (Mullins (2014) and Appel, Gormley, and Keim (2015)); and investment and innovation (Aghion, Van Reenen, and Zingales (2013) and Bena, Ferreira, Matos, and Pires (2015)). In the literature, these outcomes are the consequence of ownership of investors that are indexers and/or investors in index firms.

Indexing by long-term investors is both exogenous and relevant. First, investors that index their portfolio cannot choose their portfolio firms based on, for example, their stakeholder capital investment or their stock valuations. Hence such investors are exogenous to our outcomes of interest.

Second, as several early papers argue, indexers can affect corporate policies and shareholder value (Carleton, Nelson, and Weisbach (1998), Del Guercio and Hawkins (1999), and Gillan and Starks (2000)).[6] They engage with firms, though most engagements are private rather than public (Becht, Franks, Mayer, and Rossi (2009)) and very few of them occur through proxy resolutions (Goldstein (2011)). As institutional investors, they have a fiduciary duty to vote their shares in the best interests of their clients, and they often vote as a block. Fund families usually vote together, investors frequently trade their votes (Christoffersen, Geczy, Musto, and Reed (2007)), and institutions typically vote as recommended by proxy advisors such as ISS (Alexander, Chan, Seppi, and Spatt (2010), Matvos and Ostrovsky (2010), and Iliev, Lins, Miller, and Roth (2015)). This is the case even for low cost index ETFs (Fenn and Robinson (2009)) and indexers in general (Appel, Gormley, and Keim (2015)). These approaches minimize the costs of information production and influence exertion, which is especially important for indexers with a large number of firms in their portfolio. Finally, some indexers increase liquidity and thereby facilitate governance through trading (Ben-David, Franzoni, and Moussawi (2014)). These insights apply to both indexer ownership and index firm ownership.

Our approach is to split long-term investor ownership at each point in time into two components: one that is plausibly exogenous and another that is possibly endogenous. In our first split, we classify investors into indexers and non-indexers based on Cremers and Petajisto (2009)'s active share measure. Since we do not have returns data for our investors, we cannot classify them as indexers using a time-series approach, so we use a cross-sectional approach instead. Active share is the distance between the weights on each firm in the investor's portfolio and the weights in the relevant index. For the index, we use the CRSP value weighted index. We use the most general stock market index possible because the holdings of institutional investors combine holdings across many businesses (e.g., mutual funds, hedge funds, proprietary trading, etc.) and thus are best benchmarked against a diversified portfolio of stocks. We classify

[6] The media regularly make this argument as well (e.g., The Economist (2012)).

investors with active share of up to 25% as "indexers" (similar to Harford, Jenter, and Li (2011)), and we classify all other investors as "non-indexers".

In our second split, we classify firms into index and non-index firms based on whether they are in the S&P 500. However, we obtain similar results if we use a classification based on whether firms are in the Russell 1000 rather than the Russell 2000. We do not use a regression discontinuity design based on index reconstitutions because the best implementation of this methodology is still being explored (Appel, Gormley, and Keim (2015)). Moreover, the validity of this methodology is local to the firms that are close to the discontinuity, rather than global. Finally, after the two splits, we compute the ownership of firms by long-term indexers and non-indexers as well as the long-term investor ownership of index firms and non-index firms.

3.5. Descriptive Statistics

[Insert Table 2.1 about here]

Table 2.1 presents descriptive statistics for investor ownership variables, stakeholder capital investment variables, and dependent variables. We define all stakeholder capital investment variables in Appendix B and all other variables in Appendix C. We multiply all variables by 100.

The firms in our sample are big: their mean market capitalization is $6.1 billion and the median is $1.2 billion. Therefore, it is not surprising that institutional ownership is a substantial 65.6% on average. Similarly, long-term investor ownership is substantial at 27.5% on average. In terms of indexer and non-indexer ownership, long-term investor ownership breaks down into 10.3% and 17.2%, respectively. In terms of index firm and non-index firm ownership, the breakdown is similar at 9.3% and 18.1%, respectively.

[Insert Figure 1 about here]

Our stakeholder capital investment variables are roughly centered upon zero. In addition to the descriptive statistics for these variables in Table 2.1, Figure 1 presents histograms for them. These variables are concentrated around zero, especially the community and environment proxies. Finally, in our analyses, we use our dependent variables in natural logarithm form and thus they are all approximately symmetric.

4. Valuation Results

We begin by examining the value implications of the effect of long-term investors on investment in stakeholder capital. Our prediction is that long-term investors increase the value to shareholders of stakeholder capital investment.

In our empirical analysis, for each stakeholder capital investment proxy, we regress market-to-book on long-term investor ownership, the stakeholder capital investment proxy, and their interaction. The interaction term is the focus of our analysis. We measure long-term investor ownership at the end of year t-1 (December 31st), stakeholder capital investment proxies in year t, and market-to-book at the end of year t (December 31st). We take this approach for our analysis of valuation to ensure that value relevant information about investor horizons and stakeholder capital investment is available to market participations at the time at which we measure valuation. Our specification includes institutional ownership as well as its interaction with the stakeholder capital investment proxy.[7,8]

We also include other controls used in the literature (e.g., see Allayannis and Weston (2001) and Shive (2012)): size (natural logarithm of total assets); market-to-book; cash flow (scaled by total assets); other types of tangible and intangible investment (capital expenditures,

[7] Institutional ownership equals short-term institutional ownership plus long-term investor ownership. Since we include both long-term institutional ownership and total institutional ownership in our regressions, long-term investor ownership isolates the effect of investor horizons.
[8] If we account for investor concentration, we obtain similar results.

research and development expenditures, and advertising expenditures all scaled by total assets); asset intensity and asset tangibility (property, plant, and equipment scaled by total assets); leverage; and dividend payer status (dummy variable). Finally, we control for unobserved heterogeneity at the industry-year level using industry-year fixed effects. This latter choice is motivated by the literature.[9] We note that industry-year fixed effects capture mechanical changes over time in our stakeholder capital investment variables.[10]

We cluster standard errors by industry-year to capture clustering across industries and years at the same time. We multiply the dependent variables by 100 and measure them in natural logarithms. We standardize the independent variables. Consequently, the coefficient estimate for the interaction term captures the percentage change in market-to-book of a one-standard deviation increase in both long-term investor ownership and the stakeholder capital investment proxy.

[Insert Table about here]

Table presents the results. For expositional simplicity, we only tabulate selected results. The results are both economically and statistically significant. Panel A shows that, for the overall stakeholder capital investment proxy, a one-standard deviation increase in the interaction term is associated with an increase in market-to-book of 4.7%. For the diversity, employee relations, and community proxies, the increase in market-to-book is similar: 4.5%, 1.8%, and 3.2%, respectively. For the environment proxy, the results are not statistically significant. We are

[9] Giroud and Mueller (2011) use industry fixed effects because one of their variables of interest, the governance index, does not have sufficient variation across time at the firm level to allow the use of firm fixed effects. Our stakeholder capital investment variables likewise do not vary sufficiently across time at the firm level. However, rather than only using industry fixed effects, we use industry-year fixed effects to capture unobserved heterogeneity for similar businesses (industries) and at similar times (years). Gormley and Matsa (2014) show that using industry-year fixed effects is preferable on econometric grounds to adjusting by the industry-year mean. For an example of this approach, see Heider and Ljungqvist (2014).

[10] Our objective is to use a specification that is both standard (i.e., it includes the control variables motivated by the literature) and stable (i.e., it is similar across applications thereby eliminating data mining concerns).

careful to interpret only the interaction effect rather than its two constituent direct effects because these may be endogenous.[11]

We also find that our stock valuation results are similar in economic and statistical significance for the next several years (not tabulated). The persistence of our results suggests that the stock market reacts quickly and correctly to the value relevant information contained in investor horizons and stakeholder capital investment. We explore this further in our subsequent analyses.

Panel B and Panel C show that the results are similar for long-term indexer and non-indexer ownership (Panel B) as well as for long-term index firm and non-index firm ownership (Panel C). The effect of the interaction term is usually positive and significant: for example, their effect is +2.5% and +3.3% for indexers and index firms, respectively, for the overall proxy. This evidence allows us to establish causality. Our results suggest that long-term investors cause a significant increase in the value to shareholders of stakeholder capital investment.

We are also mindful of the possible endogeneity of stakeholder capital investment. Accordingly, we use the staggered adoption of state laws on stakeholder orientation to identify exogenous variation in stakeholder capital investment. However, given the limitations of this approach, we defer this analysis to a later section.

5. Additional Results

We now examine the source of the increase in stock valuations. In the standard discounted cash flow valuation framework, higher stock valuations may arise from higher cash flow, lower cash flow risk, or both. We first examine this explanation and then we examine the alternative explanation of mispricing.

[11] Although both direct effects are significant in our valuation results, neither is significant in our asset pricing results below. The latter results are the least subject to endogeneity concerns even without using indexers/index firms and/or stakeholder orientation laws for identification.

5.1. Cash Flow Channel

We begin by examining the implications for profitability of the effect of long-term investors on stakeholder capital investment. For each stakeholder capital investment proxy, we regress profitability on long-term investor ownership, the stakeholder capital investment proxy, and their interaction. The interaction term is the focus of our analysis. In this analysis as well as in subsequent analyses of the sources of higher stock valuations, we measure realizations (e.g., profitability) in year t+1 and expectations (e.g., earnings estimates) at the end of year t (December 31st). Our specification follows the literature (e.g., see Core, Guay, and Rusticus (2006) and Becker, Cronqvist, and Fahlenbrach (2011)) and is similar to that of Table .

[Insert Table about here]

Table presents the results. None of them are economically or statistically significant for all long-term investor ownership, long-term indexer ownership, and long-term index firm ownership. Moreover, they persist for the next several years (not tabulated). These non-results suggest that the source of the increase in stock valuations is not an increase in realized profitability, but it may be an increase in expected profitability.

To examine whether this is the case, for each stakeholder capital investment proxy, we regress analysts' earnings estimates on long-term investor ownership, the stakeholder capital investment proxy, and their interaction. The interaction term is the focus of our analysis. For our specification, we follow the literature (see Core, Guay, and Rusticus (2006), Edmans (2011), and Giroud and Mueller (2011)). We control for institutional ownership and its interaction with the stakeholder capital investment proxy as well as market capitalization and book-to-market (both in natural logarithms). We also include industry-year fixed effects.

[Insert Table about here]

Table presents the results in the first set of regressions in each of the three panels. The interaction term is generally neither economically nor statistically significant. (The community proxy is statistically significant for long-term indexer ownership in Panel B and long-term index and non-firm ownership in Panel C, but it is economically insignificant.) To examine whether realizations of profitability are consistent with investors' expectations, we also examine stock returns around earnings announcements. The results are presented in the second set of regressions in each of the three panels in Table . The interaction term is never statistically or economically significant.

Taken together, the results in Table and Table suggest that the source of the increase in stock valuations is not an increase, whether in realizations or expectations, of profitability. In other words, profitability does not appear to change as a result of the effect of investor horizons on stakeholder capital investment, and investors appear to correctly anticipate this.

5.2. Cash Flow Risk Channel

Since an increase in cash flow is not the source of the increase in stock valuations, the source must be a decrease in cash flow risk. To examine whether this is indeed the case, we perform three analyses. In our first analysis, we examine whether there is a decrease in future stock returns. In our second and third analyses, we examine whether there is a decrease in two measures of cash flow risk: the volatility of stock returns and the volatility of profitability, respectively. We draw conclusions from the collective results of all three analyses.

5.2.1. Stock Returns

We first examine the implications for stock returns of the effect of long-term investors on stakeholder capital investment. The premise of this analysis is that a decrease in cash flow risk is captured by a decrease in future stock returns (holding cash flow fixed). To this end, we perform both a cross-sectional and a time-series analysis. In our cross-sectional analysis, we follow the literature and use a Fama-MacBeth approach (e.g., see Gompers, Ishii, and Metrick (2003), Edmans (2011), and Giroud and Mueller (2011)). We run cross-sectional regressions for each month between January 1992 and December 2010, and then we compute the means and t-statistics of the resulting time-series of 228 monthly coefficient estimates. For each stakeholder capital investment proxy, we regress excess stock returns on long-term investor ownership, the stakeholder capital investment proxy, and their interaction. The interaction term is the focus of our analysis. We measure excess stock returns as raw returns minus industry returns. Our specification includes institutional ownership and its interaction with the stakeholder capital investment proxy. We also control for market capitalization, book-to-market, lagged returns, volume, the dividend yield, and the stock price, following Brennan, Chordia, and Subrahmanyam (1998). Insofar as these control variables capture the effect of investor horizons and/or stakeholder capital investment on stock valuations (i.e., the interaction term), we underestimate the magnitude of the interaction term.

We multiply the dependent variables by 100. We standardize the investor ownership variables and the stakeholder capital investment variables. Consequently, the coefficient estimate for the interaction term captures the change in excess stock returns in percentage points of a one-standard deviation increase in both long-term investor ownership and the stakeholder capital investment proxy.

[Insert Table 2.5 about here]

Table 2.5 presents the results. Once again, we only tabulate selected results for expositional simplicity. The results are both economically and statistically significant for the overall stakeholder capital investment proxy: for all long-term investor ownership, long-term indexer ownership, and long-term index firm ownership. A one-standard deviation increase in the interaction term is associated with a decrease in excess returns of 12 basis points per month or about 1.5 percentage points per year. This evidence allows us to establish causality. For the other proxies, the results are similar but both economically and statistically less significant.

We continue with our time-series analysis. For each stakeholder capital investment proxy, we run monthly time-series regressions for portfolios that we form based on investor horizons and stakeholder capital investment and construct so as to capture their interaction. Our approach follows the literature (e.g., Giroud and Mueller (2011)). However, our objective is to capture not just the net effect of investor horizons (i.e., long horizons minus short horizons) or just the net effect of stakeholder capital investment (i.e., high stakeholder capital investment minus low stakeholder capital investment) but rather both (i.e., the net-net effect).

We sort firm-year observations into three groups based on investor horizons and also into three groups based on stakeholder capital investment.[12] Since we need a single investor horizons variable based upon which to sort, we measure investor horizons as the difference between long-term investor ownership and short-term investor ownership, and we sort observations into terciles. For stakeholder capital investment, we create three groups for each of our proxies. We choose cutoffs based on the histograms in Figure 1, which show that the distribution of the overall proxy is concentrated between -1 and +1 and the distributions of the other proxies tend to be concentrated at 0. For the overall proxy, we sort observations with two or more net negative points into the bottom (first) group, observations with two or more net positive points into the top (third) group, and the remaining observations in between into the middle (second) group.[13]

[12] We use independent sorts because our stakeholder capital investment proxies take on a small number of integer values (see Figure 1), so they do not lend themselves to the usual cutoffs based on quantiles.
[13] As a result, about 15% of our observations are in each of the bottom and top groups, and the rest are in the middle group.

For the other four proxies, we follow the same procedure but we use one net negative point, zero points, and one net positive point as the corresponding cutoffs, respectively.[14]

Each month during the year after portfolio formation, i.e., between January 1992 and December 2010, we compute mean raw returns for each of the resulting portfolios formed based on both investor horizons group and stakeholder capital investment group. Moreover, each month, we compute mean raw returns for the portfolio that is long the top stakeholder capital investment group and short the bottom stakeholder capital investment group, and we do this for both the top investor horizons group and the bottom investor horizons group. Finally, each month, we compute mean raw returns for the portfolio that is long the long-short stakeholder capital investment group in the top investor horizons group and is short the long-short stakeholder capital investment group in the bottom investor horizons group.

We run a time-series regression of the excess stock returns of this portfolio on the returns of the four factors. We do this for each stakeholder capital investment proxy. We measure excess stock returns as raw returns minus the risk-free rate. We measure all returns variables in percentages. We only examine long-term investor ownership because it is not practical to form portfolios based on long-term investor ownership split into indexer and non-indexer ownership or index firm and non-index firm ownership.

[Insert Table 2.6 about here]

Table 2.6 presents the results.[15] For the overall stakeholder capital investment proxy, the net-net portfolio (net investor horizons and net stakeholder capital investment) has abnormal

[14] The result for the diversity proxy is that about 30% of our observations are in each of the bottom and top groups; for the employee relations proxy, there are about 25% and 15% of our observations in the bottom and top groups, respectively; for the community proxy, about 5% and 10%, respectively; and for the environment proxy, about 10% and 5%, respectively. The remaining observations are in the middle group.

[15] It is possible that long-term investor ownership lowers liquidity. In this case, our abnormal returns would merely be the premium that investors are paid for bearing liquidity risk. However, when we control for Pastor and Stambaugh (2003)'s traded liquidity factor, our results are similar.

returns of -74 basis points per month. For the diversity proxy, the results are not statistically significant, and for the other three proxies, the results are also economically and statistically significant (ranging from -39 basis points to -94 basis points). Moreover, the factor loadings are generally not statistically significant except for the size factor, which suggests that our net-net portfolio is generally hedged with respect to the other three factors. (The results are similar if we use the one-factor model or the three-factor model.) Using monthly returns, the information ratio is roughly 0.19 for the overall stakeholder capital investment proxy and it ranges from 0.12 to 0.17 for the other three proxies that are statistically significant. This captures the return-risk tradeoff of this investor horizons-stakeholder capital investment trading strategy.

It is not surprising that our time-series returns results (Table 2.6) are substantially bigger than our cross-sectional returns results (Table 2.5). In the former, we examine the abnormal returns of portfolios formed based on opposite extremes of investor horizons and opposite extremes of stakeholder capital investment; in the latter, we examine the effect of a one-standard deviation change in the interaction of investor horizons and stakeholder capital investment on excess returns. Moreover, the firm characteristics in the cross-sectional returns regressions may capture systematic or idiosyncratic risk that is not captured by the risk factors in the time-series returns regressions (e.g., see Brennan, Chordia, and Subrahmanyam (1998)). In this case, the magnitude of the abnormal returns in the time-series returns regressions may be overestimated relative to magnitude of the effect of the interaction term in the cross-sectional returns regressions on excess returns.

Overall, our results in Table 2.5 and Table 2.6 suggest that the effect of longer investor horizons on stakeholder capital investment causes a significant decrease in future stock returns.[16]

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[16] In our cross-sectional returns regressions, neither investor horizons nor stakeholder capital investment on their own spread returns (see Table 2.5). This is also the case in our time-series returns regressions (not tabulated).

Together with our results in Table (an increase in stock valuations), our findings are consistent with a decrease in cash flow risk, which is reflected in a decrease in future stock returns.

Since no standard stakeholder capital risk factor exists, we cannot be more precise in attributing our negative abnormal returns to systematic or idiosyncratic risk. On the one hand, it is also possible that the standard asset pricing models completely capture systematic stakeholder capital risk (e.g., as in Fama and French (1996), the three-factor model may completely capture human capital risk). Consequently, our negative abnormal returns only capture a decrease in idiosyncratic stakeholder capital risk and not systematic stakeholder capital risk. This is consistent with the literature on the pricing of idiosyncratic risk (e.g., Merton (1987) and Goyal and Santa-Clara (2003)). On the other hand, it is possible that the standard asset pricing models do not completely capture systematic stakeholder capital risk because the standard risk factors do not span stakeholder capital risk and/or the quantity of this risk (i.e., covariance) is overestimated. Consequently, our negative abnormal returns capture systematic stakeholder capital risk that is not captured by the model and possibly also some idiosyncratic stakeholder capital risk. In summary, we cannot attribute our returns results to systematic versus idiosyncratic risk.

5.2.2. Volatility of Stock Returns

Next, we examine whether there is a decrease in the volatility of stock returns. The premise of this second analysis is that the volatility of stock returns at least partly captures cash flow risk. For each stakeholder capital investment proxy, we regress the volatility of stock returns on long-term investor ownership, the stakeholder capital investment proxy, and their interaction. The interaction term is the focus of our analysis. We follow the literature for our

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Therefore, in our sample, stock returns do not change because of either investor horizons or stakeholder capital investment alone but rather because of the two.

specification (e.g., see Brown and Kapadia (2007) and Low (2009)). The theory is unclear about whether the decrease in total risk should be driven by systematic risk, idiosyncratic risk, or both. For example, a record of better employee safety and environmental measures can help a petroleum producer to soften the blow of a firm-specific oil spill as well as an industry-wide consumer backlash from higher oil prices triggered by a war abroad. Therefore, we examine total, systematic, and idiosyncratic volatility. We decompose total volatility into its systematic and idiosyncratic components using the four-factor model. We estimate this model for each firm-year using daily returns. Our specification is similar to that of Table .

We multiply the dependent variables by 100 and measure them in natural logarithms. We standardize the independent variables. Consequently, the coefficient estimate for the interaction term captures the percentage change in the volatility of stock returns of a one-standard deviation increase in both long-term investor ownership and the stakeholder capital investment proxy.

[Insert Table 2.7 about here]

Table 2.7 presents the results for total volatility. We again only tabulate selected results for expositional simplicity. The results are both economically and statistically significant for the overall stakeholder capital investment proxy: for all long-term investor ownership, long-term indexer ownership, and long-term index firm ownership. For example, Panel A shows that a one-standard deviation increase in the interaction term is associated with a decrease in the total volatility of 1.3%. Panel B and Panel C show that the corresponding figures are roughly 0.9% and 1.1% for indexers and index firms, respectively. This evidence allows us to establish causality. (For long-term non-indexer ownership and long-term non-index firm ownership, the results are somewhat less and more significant, respectively.) For the other proxies, the results are similar, although they are generally concentrated in the diversity and community proxies in terms of both economic and statistical significance.

The results for systematic volatility and idiosyncratic volatility are presented in Appendix D. They are similar to the results for total volatility and significant both economically and statistically. However, they are generally somewhat stronger for systematic volatility and somewhat weaker for idiosyncratic volatility. Given the lack of theoretical clarity about which type of risk should dominate, we simply conclude that the decrease in risk is driven by both systematic and idiosyncratic risk. In summary, our results suggest that the effect of longer investor horizons on stakeholder capital investment causes a significant decrease in the volatility of stock returns.

5.2.3. Volatility of Profitability

Finally, we examine whether there is a decrease in the volatility of profitability. The premise of this final analysis is that the volatility of profitability captures cash flow risk. For each stakeholder capital investment proxy, we regress the volatility of profitability on long-term investor ownership, the stakeholder capital investment proxy, and their interaction. The interaction term is the focus of our analysis. Our specification here for examining the volatility of profitability is similar to the specification that we use to examine profitability (Table), and it follows the literature (e.g., see Minton and Schrand (1999) and Rountree, Weston, and Allayannis (2008)).

We also follow the literature for our definition of the volatility of profitability. Specifically, we measure the volatility of profitability as the coefficient of variation of quarterly earnings per share and we compute it using three years of forward looking quarterly data.[17] Being a coefficient of variation, it is a unitless measure. As in Table 2.7, we multiply the dependent variables by 100 and measure them in natural logarithms. We standardize the independent variables.

[Insert Table 2.8 about here]

Table 2.8 presents the results.[18] They are both economically and statistically significant in Panel A. For example, for the overall stakeholder capital investment proxy, a one-standard deviation increase in the interaction term is associated with a decrease in the volatility of profitability of 4.5%; for the diversity and community proxies, the results are similarly economically and statistically significant; and for the other two proxies, the results are negative but smaller and not statistically significant. Panel B and Panel C show that the results are similar for long-term indexer ownership (Panel B) as well as for long-term index firm ownership (Panel C).

To strengthen our evidence, we also examine whether there is a decrease in the volatility of sales and the volatility of costs. While it is the distribution of profitability – cash flow to shareholders – that determines stock valuations, profitability is, by definition, the difference between sales and costs – cash flow from customers and to suppliers. These customers and suppliers are important stakeholders that determine the residual claim of shareholders, and they are also important beneficiaries of stakeholder capital investment. Therefore, if the volatility of profitability decreases, it must be because there is a decrease in the volatility of sales and/or the

[17] We choose three years as a compromise. With too few years, our measure would be much less precise. However, with too many years, our sample size would greatly decrease because roughly 10% of publicly traded firms disappear each year. For the same reason, we would create a significant survivorship bias.

[18] The results are similar if we run regressions using every third year to avoid overlapping observations, although the sample size decreases by roughly two-thirds for these regressions.

volatility of costs (e.g., because the firm's customers buy more loyally or its employees work more dependably). We measure volatility for sales and costs like we do for profitability.

The results are presented in Appendix E. They are economically and statistically significant for the overall proxy as well as the other proxies, for sales as well as costs. The evidence in Appendix E strongly supports the evidence in Table 2.8. The results suggest that the source of the increase in stock valuations is a decrease in the volatility of profitability. We now examine whether this is the case not only for realizations but also for expectations.

[Insert Table 2.9 about here]

To this end, we redo Table 2.8 using the volatility of analysts' earnings estimates as the dependent variable. Once again, the focus of our analysis is the interaction between investor horizons and stakeholder capital investment. Table 2.9 presents the results. They are similar to the corresponding results in Table 2.8 in terms of both economic and statistical significance. In other words, investors appear to roughly correctly anticipate the decrease in the volatility of profitability. Taken together, the results suggest that the effect of longer investor horizons on stakeholder capital investment causes a significant decrease in the volatility of profitability, both in realizations and expectations.

5.3. Mispricing as an Alternative Explanation

An alternative explanation for the increase in stock valuations may be mispricing. Specifically, the effect of long-term investors on stakeholder capital investment may be overvalued by investors. Our finding that realized profitability does not change (Table) does support the mispricing explanation as does our finding that future stock returns decrease (Table 2.5 and Table 2.6). However, we also find that realized profitability materializes as expected by investors (Table), which does not support mispricing. Moreover, we find that risk does decrease:

the volatility of stock returns (Table 2.7) is lower, and the volatility of profitability, both realized and expected (Table 2.8 and Table 2.9), is also lower. These findings similarly do not support the mispricing explanation.

5.4. Stakeholder Orientation Laws

Finally, we examine exogenous variation in stakeholder capital investment. Long-term investors can affect the amount of stakeholder capital investment, increasing or decreasing it depending on whether managers would otherwise underinvest or overinvest. However, our focus in this paper is not on the amount but rather the efficiency of stakeholder capital investment from the perspective of shareholder value maximization. Consequently, it is natural to examine the effect on shareholder value of exogenous variation in investor horizons conditional upon exogenous variation in stakeholder capital investment.

To this end, we use the staggered adoption of state laws on stakeholder orientation. Our analysis here is limited by a small sample size, a short sample period, and a simple (binary) stakeholder capital investment variable. Historically, directors and officers had a fiduciary duty only to the firm's shareholders, so they could only consider the interests of shareholders when making business decisions. Between 1984 and 2007, however, some 35 states passed legislation allowing (in some cases requiring) managers to consider the interests of both shareholders and stakeholders. (See Flammer and Kacperczyk (2015) for details.)

These constituency statutes are well suited for our analysis because they were enacted to encourage stakeholder orientation and not as a result of any subsequent increase in shareholder value or any anticipation thereof. Indeed, these laws were passed contemporaneously with, and as a complement to, the business combination laws of the 1980s and early 1990s, which were not motivated by lobbying from a broad range of economic interests within the states that passed them (Bertrand and Mullainathan (2003)). Indeed, since such legislation transfers wealth from shareholders to stakeholders, any endogeneity in its adoption works against us finding a positive effect of long-term investors on shareholder value through stakeholder capital investment.

We obtain data on constituency statutes from Barzuza (2009). Although a number of these laws predate our sample period (having been passed in the 1980s), six of them were passed in the 1990s (the last in 1999) and two at the end of our sample period. Given the large time gap and the small number of firms affected by the last two laws, we end our sample period in 2000, and our sample shrinks to about a quarter of its former size as a result. We redo Table , but instead of the stakeholder capital investment proxies, we use a dummy variable for whether a given firm in a given year is incorporated in a state that had enacted a constituency statute by that year.

This new analysis (not tabulated) confirms our earlier results. The coefficient estimate on the interaction term indicates a 2.3% increase in market-to-book caused by all long-term investors (p-value < 0.05); for long-term indexers and long-term index firms, the corresponding figures are 2.0% (p-value < 0.10) and 3.4% (p-value < 0.05), respectively. We also redo Table 2.5, running cross-sectional returns regressions, and find that the interaction term causes a decrease in excess returns of 6-10 basis points per month, depending on whether we examine all long-term investors or focus on indexers or index firms.

To strengthen our results, we also exploit the staggered adoption of state-level workforce diversity and wrongful discharge laws. These two types of laws focus on specific important stakeholders of firms (their employees), and they allow us to cleanly identify shocks to their component of stakeholder capital investment. Workforce diversity laws were passed by state legislatures to prohibit discrimination against employees based on sexual orientation and gender identity. Wrongful discharge laws are common law exemptions to the employment at will doctrine that limit the ability of the firm to terminate its workers. They were created by court rulings in various states. Both types of laws were adopted to protect employees in spite of the potentially adverse effects on employers. As such, they constitute relevant and exogenous increases in stakeholder capital investment. (For details about workforce diversity laws, see Gao and Zhang (2015). For wrongful discharge laws, see Autor, Donohue, and Schwab (2006), Bird and Knopf (2009), and Acharya, Baghai, and Subramanian (2014).)

Our data on workforce diversity laws are from the Human Rights Campaign. The vast majority of workforce diversity laws were passed during our sample period (at roughly evenly spaced intervals), so we use our full sample for this analysis. Once again, we redo Table , but instead of the stakeholder capital investment proxies, we use a dummy variable for whether a given firm in a given year is headquartered in a state that had adopted a law by that year. As before, we focus on the interaction term. The results (not tabulated) indicate a 1.5% increase in market-to-book caused by all long-term investors (p-value < 0.05). Using long-term indexers and long-term index firms, the increase is 1.4% (p-value < 0.05) and 3.4% (p-value < 0.01), respectively. In the cross-sectional returns regressions in Table 2.5, excess returns are 4-6 basis points per month lower.

For wrongful discharge laws, our data are from Autor, Donohue, and Schwab (2006). Many of these judgments were passed before our sample period, but several occurred in the early 1990s; a few of them were ultimately reversed. All of the data end in 1999. Therefore, we end our sample period in 2000, shrinking our sample to roughly a quarter of its former size. We again redo Table , but instead of the stakeholder capital investment proxies, we use a categorical variable that counts for a given firm in a given year the number of exemptions to employment at will in effect in the state in which the firm is headquartered (possible values between 0 and 3). Focusing on the interaction term, market-to-book increases by 1.9% (p-value < 0.05) for all long-term investors and by 1.0% and 2.8% (p-value < 0.05) for long-term indexers and long-term index firms (not tabulated). (However, excess returns in the cross-sectional returns regressions in Table 2.5 are not significant.)

Overall, using exogenous variation in both investor horizons and stakeholder capital investment, we find that long-term investors increase the value to shareholders of stakeholder capital investment.

6. Conclusion

In this paper, we examine whether corporate social responsibility creates or destroys shareholder value. We argue that long-term investors, on their own or in concert with other market participants, are natural monitors that can ensure that managers choose stakeholder capital investment to maximize shareholder value.

We find that firms that have longer investor horizons and invest more in stakeholder capital have significantly higher stock valuations: by about 5%. Such firms do not have higher realized or expected profitability, but their volatility of profitability, both realized and expected, is lower by roughly 5% (which is also the case for their volatility of sales and costs). Corroborating these findings, their stock returns volatility (both systematic and idiosyncratic) is lower as are their future stock returns. We establish causality of our results using long-term investor that are indexers and long-term investors in index firms as well as using changes across states in stakeholder orientation laws. We conclude that firms can create value for shareholders by investing in stakeholders as long as managers are properly monitored by long-term investors.

Appendix A: Changes to KLD Data

- Diversity: We do not make any changes.
- Employee relations: We make two small changes. First, we exclude the "no layoff policy" strength because the data are available only during the first three years of our sample. Second, we exclude the "workforce reductions" concern because it is related to corporate investment policy and simply captures big decreases in the firm's workforce.
- Community: We do not make any changes. The "investment controversies" concern is excluded because it only applies to financial firms, which are excluded from our sample.
- Environment: We exclude the "property, plant, and equipment" and "management systems" strengths because the data are only available during the first four years and the last four years, respectively, of our sample. We also drop three concerns that are determined by the firm's industry: "ozone depleting chemicals", "agricultural chemicals", and "coal or oil products". We do so because a firm cannot change the industry in which it operates, and industry is anyway captured by our industry-year fixed effects.
- Corporate governance: We exclude all components because corporate governance is the very cause that we study, so we cannot also study its effect on itself. Moreover, the data are only available for many components during the last five years of our sample.
- Human rights: We exclude all components because none of them have data available each year. This is because most components are based on current events (e.g., South Africa in the early 1990s and Sudan in the late 2000s). It is impossible to aggregate these components to be even somewhat stable over time.
- Product: We exclude all components because they relate to shareholder value maximizing product market behavior and are unrelated to maximizing value for other stakeholders.

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Table 2.1
Descriptive Statistics

This table presents descriptive statistics for investor ownership variables, stakeholder capital investment variables, and dependent variables. The sample comprises 21,257 firm-year observations corresponding to 3,592 unique firms between 1991 and 2009. The firms in the sample are publicly traded U.S. operating firms excluding financials and utilities. With the exception of excess stock returns, all variables are defined in Appendix B and Appendix C. Excess stock returns are raw returns minus market returns, and they are annualized. All variables except market-to-book are multiplied by 100.

	Mean	Standard deviation	25th percentile	Median	75th percentile
Investor ownership variables					
- Long-term investor ownership	27.5	13.0	17.9	27.0	36.3
- Long-term indexer ownership	10.3	5.4	6.3	9.8	14.1
- Long-term non-indexer ownership	17.2	10.1	9.4	15.9	23.2
- Long-term index firm ownership	9.3	14.9	0.0	0.0	19.7
- Long-term non-index firm ownership	18.1	16.7	0.0	16.9	31.2
- Institutional ownership	65.6	23.1	50.7	67.8	82.2
Stakeholder capital investment variables					
- Overall	18.1	189.7	-100.0	0.0	100.0
- Diversity	23.8	116.3	-100.0	0.0	100.0
- Employee relations	-9.3	82.3	-100.0	0.0	0.0
- Community	11.2	46.5	0.0	0.0	0.0
- Environment	-9.1	59.0	0.0	0.0	0.0
Dependent variables					
- Market-to-book	3.3	3.4	1.5	2.3	3.8
- Profitability	1.9	15.0	0.7	4.7	8.6
- Earnings estimates	5.8	10.1	3.3	6.2	10.0
- Earnings announcement returns	0.2	4.1	-1.9	0.3	2.5
- Excess stock returns	4.5	41.0	-18.2	3.4	26.1
- Total volatility of stock returns	45.8	23.4	29.8	39.8	54.9
- Systematic volatility of stock returns	23.3	14.7	13.0	19.3	28.8
- Idiosyncratic volatility of stock returns	38.3	20.1	24.9	33.3	45.5
- Volatility of profitability	270.5	669.0	34.3	75.8	218.2
- Volatility of sales	19.4	18.9	9.4	14.1	21.7
- Volatility of costs	18.0	15.7	8.9	13.5	21.1
- Volatility of earnings estimates	50.8	100.2	11.4	20.6	43.0

Table 2.2
Investor Horizons, Stakeholder Capital Investment, and Stock Valuations

This table presents the results of regressions of market-to-book on long-term investor ownership, stakeholder capital investment proxies, and their interaction. The sample comprises 21,257 firm-year observations corresponding to 3,592 unique firms between 1991 and 2009. The firms in the sample are publicly traded U.S. operating firms excluding financials and utilities. All variables are defined in Appendix B and Appendix C. The dependent variables are multiplied by 100. The independent variables are standardized. The regressions include control variables described in the text and industry-year fixed effects. Standard errors are clustered by industry-year. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. In Panel A, all results are tabulated, whereas in Panel B and Panel C, only selected results are tabulated.

Panel A: All Long-Term Investor Ownership

	Dependent variable is ln(market-to-book) (t)				
	Stakeholder capital investment proxy				
	Overall	Diversity	Employee relations	Community	Environment
Long-term investor ownership (t-1) × Stakeholder capital investment proxy (t)	4.69***	4.47***	1.75**	3.20***	0.03
	(6.11)	(6.11)	(2.58)	(4.20)	(0.05)
Long-term investor ownership (t-1)	-7.30***	-7.32***	-7.22***	-7.02***	-7.22***
	(-8.58)	(-8.62)	(-8.51)	(-8.31)	(-8.56)
Stakeholder capital investment proxy (t)	5.06***	4.85***	2.41***	2.35***	1.02*
	(8.76)	(8.21)	(4.45)	(4.12)	(1.91)
Observations	20,388	20,388	20,388	20,388	20,388
Adjusted R^2	0.317	0.317	0.311	0.312	0.310

Panel B: Long-Term Investor Ownership Split into Indexer Ownership and Non-Indexer Ownership

	Dependent variable is ln(market-to-book) (t)				
	Stakeholder capital investment proxy				
	Overall	Diversity	Employee relations	Community	Environment
Long-term indexer ownership (t-1) × Stakeholder capital investment proxy (t)	2.45***	3.28***	0.86	0.57	-0.36
	(3.81)	(5.04)	(1.50)	(0.93)	(-0.61)
Long-term non-indexer ownership (t-1) × Stakeholder capital investment proxy (t)	3.49***	2.85***	1.33**	3.05***	0.25
	(5.33)	(4.68)	(2.21)	(4.50)	(0.44)
Observations	20,388	20,388	20,388	20,388	20,388
Adjusted R^2	0.317	0.317	0.311	0.313	0.310

Panel C: Long-Term Investor Ownership Split into Index Firm Ownership and Non-Index Firm Ownership

	Dependent variable is ln(market-to-book) (t)				
	Stakeholder capital investment proxy				
	Overall	Diversity	Employee relations	Community	Environment
Long-term index firm ownership (t-1) × Stakeholder capital investment proxy (t)	3.25***	2.57***	1.26	2.27**	1.72**
	(3.59)	(3.07)	(1.57)	(2.56)	(2.16)
Long-term non-index firm ownership (t-1) × Stakeholder capital investment proxy (t)	3.19***	1.36	1.03	4.39***	1.75*
	(2.87)	(1.28)	(1.04)	(3.79)	(1.89)
Observations	20,388	20,388	20,388	20,388	20,388
Adjusted R^2	0.339	0.339	0.337	0.338	0.336

Table 2.3
Investor Horizons, Stakeholder Capital Investment, and Profitability

This table presents the results of regressions of profitability on long-term investor ownership, stakeholder capital investment proxies, and their interaction. The sample comprises 21,257 firm-year observations corresponding to 3,592 unique firms between 1991 and 2009. The firms in the sample are publicly traded U.S. operating firms excluding financials and utilities. All variables are defined in Appendix B and Appendix C. The dependent variables are multiplied by 100. The independent variables are standardized. The regressions include control variables described in the text and industry-year fixed effects. Standard errors are clustered by industry-year. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. In Panel A, all results are tabulated, whereas in Panel B and Panel C, only selected results are tabulated.

Panel A: All Long-Term Investor Ownership

	Dependent variable is ln(1+profitability) (t+1)				
	Stakeholder capital investment proxy				
	Overall	Diversity	Employee relations	Community	Environment
Long-term investor ownership (t-1)	-0.00	0.03	-0.08	0.05	0.06
× Stakeholder capital investment proxy (t)	(-0.02)	(0.18)	(-0.44)	(0.45)	(0.49)
Long-term investor ownership (t-1)	-0.10	-0.01	-0.07	-0.00	0.01
	(-0.35)	(-0.03)	(-0.25)	(-0.01)	(0.05)
Stakeholder capital investment proxy (t)	1.02***	0.52***	1.04***	0.52***	0.31***
	(5.51)	(2.81)	(6.13)	(4.94)	(2.67)
Observations	20,019	20,019	20,019	20,019	20,019
Adjusted R^2	0.270	0.269	0.270	0.268	0.269

Panel B: Long-Term Investor Ownership Split into Indexer Ownership and Non-Indexer Ownership

	Dependent variable is ln(1+profitability) (t+1)				
	Stakeholder capital investment proxy				
	Overall	Diversity	Employee relations	Community	Environment
Long-term indexer ownership (t-1)	0.05	0.06	-0.04	0.14	0.08
× Stakeholder capital investment proxy (t)	(0.29)	(0.32)	(-0.24)	(1.44)	(0.73)
Long-term non-indexer ownership (t-1)	0.01	0.04	-0.04	-0.01	0.04
× Stakeholder capital investment proxy (t)	(0.09)	(0.24)	(-0.27)	(-0.14)	(0.38)
Observations	20,019	20,019	20,019	20,019	20,019
Adjusted R^2	0.271	0.270	0.271	0.270	0.270

Panel C: Long-Term Investor Ownership Split into Index Firm Ownership and Non-Index Firm Ownership

	Dependent variable is ln(1+profitability) (t+1)				
	Stakeholder capital investment proxy				
	Overall	Diversity	Employee relations	Community	Environment
Long-term index firm ownership (t-1)	0.01	0.02	-0.06	0.03	0.12
× Stakeholder capital investment proxy (t)	(0.04)	(0.08)	(-0.26)	(0.21)	(0.79)
Long-term non-index firm ownership (t-1)	-0.20	-0.16	-0.33	0.32*	-0.01
× Stakeholder capital investment proxy (t)	(-0.80)	(-0.57)	(-1.30)	(1.79)	(-0.03)
Observations	20,019	20,019	20,019	20,019	20,019
Adjusted R^2	0.270	0.269	0.270	0.269	0.269

Table 2.4
Investor Horizons, Stakeholder Capital Investment, and Expected Profitability

This table presents the results of regressions of expected profitability on long-term investor ownership, stakeholder capital investment proxies, and their interaction. The sample comprises 21,257 firm-year observations corresponding to 3,592 unique firms between 1991 and 2009. The firms in the sample are publicly traded U.S. operating firms excluding financials and utilities. In the first set of regressions in each panel, expected profitability is earnings estimates, and in the second set, it is earnings announcement returns. The regressions include control variables described in the text and industry-year fixed effects. All variables are defined in Appendix B and Appendix C. The dependent variables are multiplied by 100. The independent variables are standardized. Standard errors are clustered by industry-year. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Only selected results are tabulated.

Panel A: All Long-Term Investor Ownership					
	Stakeholder capital investment proxy				
	Overall	Diversity	Employee relations	Community	Environment
Dependent variable is ln(1+earnings estimates) (t)					
Long-term investor ownership (t-1) × Stakeholder capital investment proxy (t)	0.02 (0.13)	-0.00 (-0.00)	-0.03 (-0.37)	0.11 (1.25)	0.02 (0.19)
Dependent variable is ln(1+earnings announcement returns) (t+1)					
Long-term investor ownership (t-1) × Stakeholder capital investment proxy (t)	-0.02 (-0.31)	-0.03 (-0.50)	0.00 (0.08)	-0.02 (-0.65)	0.04 (1.08)

Panel B: Long-Term Investor Ownership Split into Indexer Ownership and Non-Indexer Ownership					
	Stakeholder capital investment proxy				
	Overall	Diversity	Employee relations	Community	Environment
Dependent variable is ln(1+earnings estimates) (t)					
Long-term indexer ownership (t-1) × Stakeholder capital investment proxy (t)	0.01 (0.07)	-0.02 (-0.18)	-0.01 (-0.13)	0.14** (2.10)	-0.06 (-1.04)
Long-term non-indexer ownership (t-1) × Stakeholder capital investment proxy (t)	0.02 (0.22)	0.02 (0.17)	-0.03 (-0.41)	0.03 (0.53)	0.07 (0.82)
Dependent variable is ln(1+earnings announcement returns) (t+1)					
Long-term indexer ownership (t-1) × Stakeholder capital investment proxy (t)	-0.03 (-0.86)	-0.02 (-0.60)	-0.01 (-0.33)	-0.04 (-1.38)	0.02 (0.49)
Long-term non-indexer ownership (t-1) × Stakeholder capital investment proxy (t)	-0.00 (-0.09)	-0.02 (-0.44)	0.01 (0.14)	0.00 (0.09)	0.04 (1.09)

Panel C: Long-Term Investor Ownership Split into Index Firm Ownership and Non-Index Firm Ownership					
	Stakeholder capital investment proxy				
	Overall	Diversity	Employee relations	Community	Environment
Dependent variable is ln(1+earnings estimates) (t)					
Long-term index firm ownership (t-1) × Stakeholder capital investment proxy (t)	0.21 (1.51)	0.23 (1.26)	0.05 (0.59)	0.18* (1.83)	-0.05 (-0.43)
Long-term non-index firm ownership (t-1) × Stakeholder capital investment proxy (t)	-0.01 (-0.04)	0.02 (0.12)	-0.03 (-0.29)	0.49*** (4.03)	-0.23 (-1.49)
Dependent variable is ln(1+earnings announcement returns) (t+1)					
Long-term index firm ownership (t-1) × Stakeholder capital investment proxy (t)	0.01 (0.11)	-0.01 (-0.13)	0.02 (0.35)	-0.02 (-0.46)	0.04 (0.87)
Long-term non-index firm ownership (t-1) × Stakeholder capital investment proxy (t)	-0.02 (-0.29)	-0.02 (-0.26)	0.01 (0.23)	-0.02 (-0.26)	0.03 (0.46)

Table 2.5
Investor Horizons, Stakeholder Capital Investment, and Stock Returns: Cross-Sectional Analysis

This table presents the results of Fama-MacBeth regressions of excess stock returns on long-term investor ownership, stakeholder capital investment proxies, and their interaction. Cross-sectional regressions are run for each month, and the means and t-statistics of the resulting time-series of monthly coefficient estimates are computed. The sample comprises 248,819 firm-month observations corresponding to 3,592 unique firms between January 1992 and December 2010. The firms in the sample are publicly traded U.S. operating firms excluding financials and utilities. Excess stock returns are raw returns minus industry returns, and they are measured during month t. Industry is defined using two-digit SIC codes. Stakeholder capital investment variables are defined in Appendix B, and investor ownership variables are defined in Appendix C. They are measured as of the calendar year before the current year. The control variables are institutional ownership and its interaction with the stakeholder capital investment proxy as well as market capitalization, book-to-market, lagged returns, volume, the dividend yield, and the stock price. Market capitalization is the natural logarithm of market capitalization, and it is measured at the end of month t-2. Book-to-market is the natural logarithm of book-to-market. Returns 2-3, returns 4-6, and returns 7-12 are the natural logarithm of cumulative raw stock returns from month t-3 to month t-2, month t-6 to month t-4, and month t-12 to month t-7, respectively. Volume is the natural logarithm of the dollar value of trading during month t-2. Dividend yield is the ratio of dividends paid during the fiscal year to market capitalization at the end of the fiscal year. Stock price is the natural logarithm of the stock price, and it is measured at the end of month t-2. Both book-to-market and dividend yield are measured as of the most recent fiscal year. The dependent variables are multiplied by 100. Investor ownership variables and stakeholder capital investment variables are standardized. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. In Panel A, all results are tabulated, whereas in Panel B and Panel C, only selected results are tabulated.

Panel A: All Long-Term Investor Ownership

	Dependent variable is excess stock returns				
	Stakeholder capital investment proxy				
	Overall	Diversity	Employee relations	Community	Environment
Long-term investor ownership × Stakeholder capital investment proxy	-0.12**	-0.05	-0.04	-0.10**	-0.05
	(-2.43)	(-0.87)	(-0.88)	(-2.33)	(-1.34)
Long-term investor ownership	0.06	0.04	0.06	0.05	0.04
	(1.02)	(0.73)	(0.96)	(0.74)	(0.67)
Stakeholder capital investment proxy	0.05	0.06	0.03	0.04	-0.02
	(1.49)	(1.36)	(0.91)	(1.43)	(-0.47)
Observations	239,100	239,100	239,100	239,100	239,100
Number of groups	228	228	228	228	228

Panel B: Long-Term Investor Ownership Split into Indexer Ownership and Non-Indexer Ownership

	Dependent variable is excess stock returns				
	Stakeholder capital investment proxy				
	Overall	Diversity	Employee relations	Community	Environment
Long-term indexer ownership × Stakeholder capital investment proxy	-0.12*	-0.10	-0.07	-0.16***	0.02
	(-1.77)	(-1.10)	(-1.12)	(-3.22)	(0.40)
Long-term non-indexer ownership × Stakeholder capital investment proxy	-0.06	-0.02	-0.01	-0.02	-0.04
	(-1.38)	(-0.35)	(-0.31)	(-0.67)	(-1.19)
Observations	239,100	239,100	239,100	239,100	239,100
Number of groups	228	228	228	228	228

Panel C: Long-Term Investor Ownership Split into Index Firm Ownership and Non-Index Firm Ownership

	Dependent variable is excess stock returns				
	Stakeholder capital investment proxy				
	Overall	Diversity	Employee relations	Community	Environment
Long-term index firm ownership × Stakeholder capital investment proxy	-0.13**	-0.06	-0.04	-0.11**	-0.06
	(-2.15)	(-0.85)	(-0.69)	(-2.24)	(-1.22)
Long-term non-index firm ownership × Stakeholder capital investment proxy	-0.15	-0.10	-0.01	-0.10	-0.14*
	(-1.54)	(-0.58)	(-0.14)	(-1.24)	(-1.69)
Observations	239,100	239,100	239,100	239,100	239,100
Number of groups	228	228	228	228	228

Table 2.6
Investor Horizons, Stakeholder Capital Investment, and Stock Returns: Time-Series Analysis

This table presents the results of four-factor model regressions. Monthly time-series regressions are run for portfolios formed based on investor horizons and stakeholder capital investment and constructed to capture their interaction. The sample comprises 21,257 firm-year observations corresponding to 3,592 unique firms between 1991 and 2009. The firms in the sample are publicly traded U.S. operating firms excluding financials and utilities. Observations are sorted into three groups based on investor horizons and into three groups based on stakeholder capital investment. Investor horizons are measured as the difference between long-term investor ownership and short-term investor ownership. Observations are sorted into investor horizon terciles. Three groups are created for each stakeholder capital investment proxy. For the overall proxy, observations with two or more net negative points are sorted into the bottom group, observations with two or more net positive points are sorted into the top group, and the remaining observations are sorted into the middle group. For the other four proxies, the same procedure is followed but one net negative point, zero points, and one net positive point are used as the corresponding cutoffs, respectively. Stakeholder capital investment variables are defined in Appendix B, and investor ownership variables are defined in Appendix C. Each month during the year after portfolio formation, mean raw returns are computed for each of the resulting portfolios formed based on both investor horizons group and stakeholder capital investment group. Moreover, each month, mean raw returns are computed for the portfolio that is long the top stakeholder capital investment group and short the bottom stakeholder capital investment group, and this is done for both the top investor horizons group and the bottom investor horizons group. Finally, each month, mean raw returns are computed for the portfolio that is long the long-short stakeholder capital investment group in the top investor horizons group and is short the long-short stakeholder capital investment group in the bottom investor horizons group. A time-series regression is run of the excess stock returns of this portfolio on the returns of the four factors, and the results are presented. Excess stock returns are raw returns minus the risk-free rate. All returns variables are measured in percentages. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Dependent variable is excess stock returns				
	Stakeholder capital investment proxy				
	Overall	Diversity	Employee relations	Community	Environment
α	-0.74***	0.35	-0.39*	-0.94*	-0.74**
	(-2.86)	(1.23)	(-1.82)	(-1.97)	(-2.44)
β(MKT)	-0.05	-0.03	-0.01	0.15	0.19***
	(-0.81)	(-0.54)	(-0.16)	(1.29)	(2.94)
β(SMB)	-0.31***	-0.36***	-0.25***	-0.38***	-0.02
	(-3.32)	(-3.27)	(-3.45)	(-2.73)	(-0.24)
β(HML)	0.04	-0.18	-0.07	-0.09	0.13
	(0.51)	(-1.61)	(-0.92)	(-0.59)	(1.44)
β(UMD)	0.05	-0.05	-0.09*	-0.10	0.02
	(0.91)	(-0.75)	(-1.88)	(-1.03)	(0.31)
Observations	228	228	228	227	228

Table 2.7
Investor Horizons, Stakeholder Capital Investment, and the Total Volatility of Stock Returns

This table presents regressions of the total volatility of stock returns on long-term investor ownership, stakeholder capital investment proxies, and their interaction. The sample comprises 21,257 firm-year observations corresponding to 3,592 unique firms between 1991 and 2009. The firms in the sample are publicly traded U.S. operating firms excluding financials and utilities. All variables are defined in Appendix B and Appendix C. The dependent variables are multiplied by 100. The independent variables are standardized. The regressions include control variables described in the text and industry-year fixed effects. Standard errors are clustered by industry-year. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. In Panel A, all results are tabulated, whereas in Panel B and Panel C, only selected results are tabulated.

Panel A: All Long-Term Investor Ownership					
	Dependent variable is ln(total volatility of stock returns) (t+1)				
	Stakeholder capital investment proxy				
	Overall	Diversity	Employee relations	Community	Environment
Long-term investor ownership (t-1)	-1.26***	-1.64***	-0.08	-1.04***	0.35
× Stakeholder capital investment proxy (t)	(-3.59)	(-4.87)	(-0.27)	(-3.45)	(1.06)
Long-term investor ownership (t-1)	-3.17***	-3.24***	-3.15***	-3.20***	-3.11***
	(-8.34)	(-8.46)	(-8.20)	(-8.37)	(-8.15)
Stakeholder capital investment proxy (t)	-0.56**	-0.03	0.07	-0.27	-1.56***
	(-1.98)	(-0.12)	(0.29)	(-1.11)	(-4.87)
Observations	20,018	20,018	20,018	20,018	20,018
Adjusted R^2	0.652	0.652	0.651	0.651	0.652

Panel B: Long-Term Investor Ownership Split into Indexer Ownership and Non-Indexer Ownership					
	Dependent variable is ln(total volatility of stock returns) (t+1)				
	Stakeholder capital investment proxy				
	Overall	Diversity	Employee relations	Community	Environment
Long-term indexer ownership (t-1)	-0.92***	-1.27***	-0.07	-0.40	0.12
× Stakeholder capital investment proxy (t)	(-3.13)	(-4.56)	(-0.28)	(-1.62)	(0.53)
Long-term non-indexer ownership (t-1)	-0.81***	-1.01***	-0.03	-0.88***	0.27
× Stakeholder capital investment proxy (t)	(-2.68)	(-3.44)	(-0.13)	(-3.25)	(0.92)
Observations	20,018	20,018	20,018	20,018	20,018
Adjusted R^2	0.652	0.652	0.652	0.652	0.653

Panel C: Long-Term Investor Ownership Split into Index Firm Ownership and Non-Index Firm Ownership					
	Dependent variable is ln(total volatility of stock returns) (t+1)				
	Stakeholder capital investment proxy				
	Overall	Diversity	Employee relations	Community	Environment
Long-term index firm ownership (t-1)	-1.09***	-1.60***	0.27	-1.04***	0.41
× Stakeholder capital investment proxy (t)	(-2.73)	(-4.12)	(0.81)	(-3.01)	(1.08)
Long-term non-index firm ownership (t-1)	-3.08***	-2.70***	-1.41***	-2.37***	-0.79*
× Stakeholder capital investment proxy (t)	(-6.01)	(-5.20)	(-3.52)	(-5.09)	(-1.86)
Observations	20,018	20,018	20,018	20,018	20,018
Adjusted R^2	0.653	0.653	0.653	0.652	0.653

Table 2.8
Investor Horizons, Stakeholder Capital Investment, and the Volatility of Profitability

This table presents regressions of the volatility of profitability on long-term investor ownership, stakeholder capital investment proxies, and their interaction. The sample comprises 21,257 firm-year observations corresponding to 3,592 unique firms between 1991 and 2009. The firms in the sample are publicly traded U.S. operating firms excluding financials and utilities. All variables are defined in Appendix B and Appendix C. The dependent variables are multiplied by 100. The independent variables are standardized. The regressions include control variables described in the text and industry-year fixed effects. Standard errors are clustered by industry-year. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. In Panel A, all results are tabulated, whereas in Panel B and Panel C, only selected results are tabulated.

Panel A: All Long-Term Investor Ownership

	Dependent variable is ln(volatility of profitability) (t+1)				
	Stakeholder capital investment proxy				
	Overall	Diversity	Employee relations	Community	Environment
Long-term investor ownership (t-1)	-4.54***	-4.85***	-0.74	-3.26**	-1.60
× Stakeholder capital investment proxy (t)	(-3.01)	(-3.49)	(-0.55)	(-2.26)	(-1.08)
Long-term investor ownership (t-1)	-1.93	-2.64	-1.73	-2.25	-1.79
	(-1.01)	(-1.37)	(-0.90)	(-1.17)	(-0.93)
Stakeholder capital investment proxy (t)	-4.76***	1.68	-5.00***	-3.92***	-8.41***
	(-3.91)	(1.33)	(-4.63)	(-3.21)	(-6.90)
Observations	17,581	17,581	17,581	17,581	17,581
Adjusted R^2	0.109	0.108	0.108	0.109	0.111

Panel B: Long-Term Investor Ownership Split into Indexer Ownership and Non-Indexer Ownership

	Dependent variable is ln(volatility of profitability) (t+1)				
	Stakeholder capital investment proxy				
	Overall	Diversity	Employee relations	Community	Environment
Long-term indexer ownership (t-1)	-3.72***	-2.98**	-2.57**	-1.66	-1.14
× Stakeholder capital investment proxy (t)	(-2.87)	(-2.51)	(-2.14)	(-1.26)	(-0.86)
Long-term non-indexer ownership (t-1)	-1.77	-3.41***	2.76**	-2.96**	-0.78
× Stakeholder capital investment proxy (t)	(-1.34)	(-2.59)	(2.41)	(-2.31)	(-0.65)
Observations	17,581	17,581	17,581	17,581	17,581
Adjusted R^2	0.109	0.108	0.109	0.109	0.111

Panel C: Long-Term Investor Ownership Split into Index Firm Ownership and Non-Index Firm Ownership

	Dependent variable is ln(volatility of profitability) (t+1)				
	Stakeholder capital investment proxy				
	Overall	Diversity	Employee relations	Community	Environment
Long-term index firm ownership (t-1)	-3.68**	-4.01**	0.40	-2.95*	-2.48
× Stakeholder capital investment proxy (t)	(-2.07)	(-2.40)	(0.25)	(-1.75)	(-1.44)
Long-term non-index firm ownership (t-1)	-5.09**	-2.84	-3.50*	-7.38***	-4.18*
× Stakeholder capital investment proxy (t)	(-2.30)	(-1.34)	(-1.77)	(-3.46)	(-1.93)
Observations	17,581	17,581	17,581	17,581	17,581
Adjusted R^2	0.112	0.111	0.113	0.113	0.115

Table 2.9
Investor Horizons, Stakeholder Capital Investment, and the Expected Volatility of Profitability

This table presents regressions of the expected volatility of profitability on long-term investor ownership, stakeholder capital investment proxies, and their interaction. The sample comprises 21,257 firm-year observations corresponding to 3,592 unique firms between 1991 and 2009. The firms in the sample are publicly traded U.S. operating firms excluding financials and utilities. All variables are defined in Appendix B and Appendix C. The dependent variables are multiplied by 100. The independent variables are standardized. The regressions include control variables described in the text and industry-year fixed effects. Standard errors are clustered by industry-year. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Only selected results are tabulated.

Panel A: All Long-Term Investor Ownership

	Dependent variable is ln(volatility of earnings estimates) (t)				
	Stakeholder capital investment proxy				
	Overall	Diversity	Employee relations	Community	Environment
Long-term investor ownership (t-1)	-3.49***	-3.73***	0.12	-4.18***	0.18
× Stakeholder capital investment proxy (t)	(-3.54)	(-3.92)	(0.12)	(-4.02)	(0.16)
Long-term investor ownership (t-1)	1.07	0.79	1.69	1.00	1.49
	(0.68)	(0.51)	(1.07)	(0.65)	(0.96)
Stakeholder capital investment proxy (t)	-0.04	4.69***	-3.28***	-0.53	-4.16***
	(-0.05)	(5.81)	(-4.19)	(-0.59)	(-4.17)
Observations	17,720	17,720	17,720	17,720	17,720
Adjusted R^2	0.197	0.198	0.197	0.197	0.198

Panel B: Long-Term Investor Ownership Split into Indexer Ownership and Non-Indexer Ownership

	Dependent variable is ln(volatility of earnings estimates) (t)				
	Stakeholder capital investment proxy				
	Overall	Diversity	Employee relations	Community	Environment
Long-term indexer ownership (t-1)	-3.52***	-2.97***	-1.33	-3.62***	-0.22
× Stakeholder capital investment proxy (t)	(-3.94)	(-3.48)	(-1.51)	(-3.84)	(-0.21)
Long-term non-indexer ownership (t-1)	-0.60	-2.00**	2.59***	-1.84**	0.51
× Stakeholder capital investment proxy (t)	(-0.61)	(-2.16)	(3.00)	(-2.01)	(0.59)
Observations	17,720	17,720	17,720	17,720	17,720
Adjusted R^2	0.198	0.200	0.199	0.199	0.199

Panel C: Long-Term Investor Ownership Split into Index Firm Ownership and Non-Index Firm Ownership

	Dependent variable is ln(volatility of earnings estimates) (t)				
	Stakeholder capital investment proxy				
	Overall	Diversity	Employee relations	Community	Environment
Long-term index firm ownership (t-1)	-3.17***	-3.47***	0.86	-4.45***	-0.36
× Stakeholder capital investment proxy (t)	(-2.83)	(-3.18)	(0.74)	(-3.68)	(-0.27)
Long-term non-index firm ownership (t-1)	-3.72**	-1.62	-1.80	-6.04***	-3.33**
× Stakeholder capital investment proxy (t)	(-2.29)	(-1.05)	(-1.15)	(-3.38)	(-1.99)
Observations	17,720	17,720	17,720	17,720	17,720
Adjusted R^2	0.199	0.201	0.200	0.199	0.200

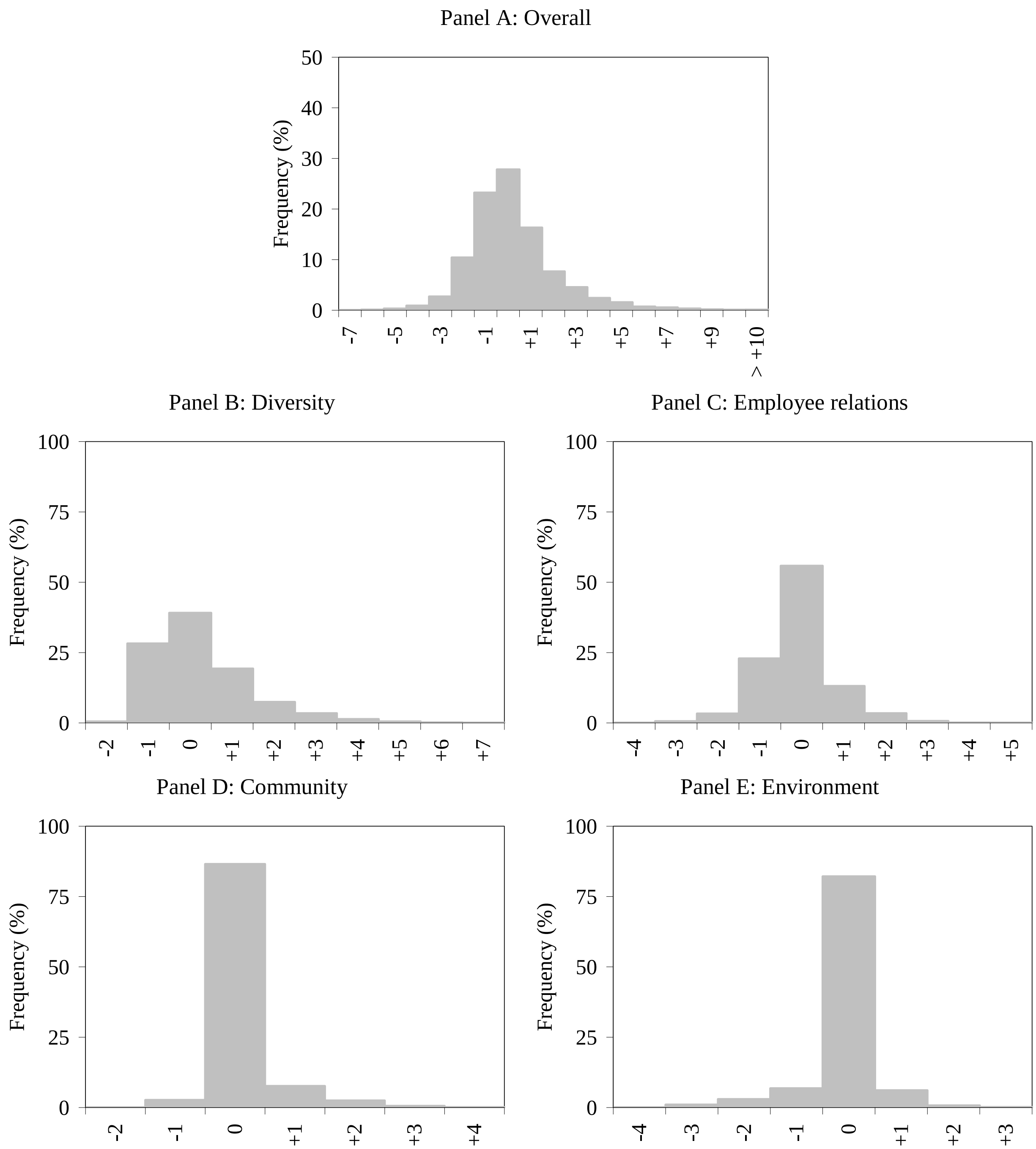

Figure 1. The distributions of stakeholder capital investment variables. This figure presents the distributions of stakeholder capital investment variables. The sample comprises 21,257 firm-year observations corresponding to 3,592 unique firms between 1991 and 2009. The firms in the sample are publicly traded U.S. operating firms excluding financials and utilities. Stakeholder capital investment variables are defined in Appendix B.

Appendix B
Definitions of Stakeholder Capital Investment Variables

This table presents the definitions of stakeholder capital investment variables. Variables are defined using KLD data items. Each KLD data item is a dummy variable that equals one or zero. Descriptions are from KLD. The overall stakeholder capital investment proxy is constructed as the sum of the diversity, employee relations, community, and environment proxies. The latter proxies are constructed as the sum of their components. Strengths components and strengths minus concerns components both enter the sum with a positive sign, and concerns components enter the sum with a negative sign.

Name	Definition	Description
Overall	"diversity"+"employee relations" +"community"+"environment"	n/a
Diversity		
- Strength: Women and minorities	(DIV_STR_A+DIV_STR_B +DIV_STR_C+DIV_STR_E -DIV_CON_A-DIV_CON_B)	Women and/or minorities are well represented among the firm's management officers and/or directors as well as other firms with which it does substantial business, and the firm is not involved in affirmative action controversies
- Strength: Work-life balance	DIV_STR_D	The firm supports employee work-like balance, e.g., with child care, elder care, flex time, etc.
- Strength: Disabled people	DIV_STR_F	The firm supports disabled employees, e.g., through innovative in hiring and retention of disable people
- Strength: Gays and lesbians	DIV_STR_G	The firm supports gays and lesbian employees by providing benefits to their partners
- Other strengths minus other concerns	(DIV_STR_X-DIV_CON_X)	Strengths minus concerns where both not elsewhere classified
Employee relations		
- Strength: Union relations	(EMP_STR_A-EMP_CON_A)	The firm has good relations with its unions
- Strength: Employee profit sharing	(EMP_STR_C+EMP_STR_D)	The firm offers cash profit sharing, stock ownership, or stock options to a majority of its employees, or workers participate in management decision making
- Strength: Retirement benefits	(EMP_STR_F-EMP_CON_D)	The firm offers generous retirement benefits
- Strength: Health and safety	(EMP_STR_G-EMP_CON_B)	The firm offers generous health benefits and/or maintains high safety standards
- Other strengths minus other concerns	(EMP_STR_X-EMP_CON_X)	Strengths minus concerns where both not elsewhere classified

Community		
- Strength: Charity	(COM_STR_A+COM_STR_B +COM_STR_F+COM_STR_G)	The firm gives generously to charities, it gives in innovative ways, it gives abroad, and it has an exceptionally strong volunteer program
- Strength: Support for housing	COM_STR_C	The firm supports housing for the poor
- Strength: Support for education	COM_STR_D	The firm supports primary and/or secondary education, and/or it supports job training for youth
- Other strengths minus other concerns	(COM_STR_X-COM_CON_X)	Strengths minus concerns where both not elsewhere classified
- Concern: Negative economic impact	COM_CON_B	The firm's is involved in controversies, financial or otherwise, in the communities in which it operates
Environment		
- Strength: Products and services	ENV_STR_A	The firm is an innovator in products and services that benefit the environment
- Strength: Pollution prevention	ENV_STR_B	The firm has strong pollution prevention programs
- Strength: Recycling	ENV_STR_C	The firm has strong recycling programs
- Strength: Clean energy usage	ENV_STR_D	The firm uses clean energy for a significant amount of its energy needs
- Other strengths minus other concerns	(ENV_STR_X-ENV_CON_X)	Strengths minus concerns where both not elsewhere classified
- Concern: Legal and regulatory problems	ENV_CON_A+ENV_CON_B	The firm has pollution problems, legal or regulatory, financial or otherwise
- Concern: Excessive pollution	ENV_CON_D	The firm's emission of toxic chemicals is excessive

Appendix C
Definitions of All Other Variables

This table presents the definitions of all other variables. Variables are computed for each firm and each year. Industry is defined using two-digit SIC codes. * indicates that the variable is defined using Compustat data items.

Name	Definition
Dependent variables	
- Market-to-book	(PRCC_C×CSHO)/(TXDITC+CEQ) *
- Profitability	IB/AT *
- Earnings estimates	Mean of analysts' earnings estimates divided by total assets. For each firm, year, and analyst, the estimate used is the last one issued in the current calendar year for the first fiscal year ending in the next calendar year.
- Earnings announcement returns	Mean of quarterly earnings announcement returns. Earnings announcement returns are measured as raw returns minus market returns during the three days centered on the earnings announcement date.
- Volatility of stock returns	Estimated using the four-factor model with daily returns. Estimates of total, systematic, and idiosyncratic volatility are measured as the annualized standard deviations of daily returns.
- Volatility of profitability	Coefficient of variation of quarterly earnings per share computed using three years of quarterly data. Quarterly earnings per share is measured as EPSPXQ/AJEXQ. *
- Volatility of sales	Coefficient of variation of quarterly sales per share computed using three years of quarterly data. Quarterly sales per share is measured as (SALEQ/CSHOQ)/AJEXQ. *
- Volatility of costs	Coefficient of variation of quarterly costs per share computed using three years of quarterly data. Quarterly costs per share is measured as ((COGSQ+XSGAQ)/CSHOQ)/AJEXQ. *
- Volatility of earnings estimates	Mean of the coefficient of variation of analysts' earnings estimates for each firm-year. This is computed using three years of data on quarterly earnings per share estimates. For each firm, year, and analyst, the estimates used are the last ones issued in the current calendar year for the fiscal quarters ending in the next three calendar years.
Investor ownership variables	
- Long-term investor ownership	Fraction of shares owned by institutional investors that are long-term investors. Investors with three-year portfolio turnover of 35% or less are classified as "long-term investors". See Gaspar, Massa, and Matos (2005) and Chen, Harford, and Li (2007) for computing investor portfolio turnover.
- Long-term indexer ownership	Fraction of shares owned by institutional investors that are both long-term investors and indexers. Investors with active share of 25% or less are classified as "indexers". See Cremers and Petajisto (2009) for computing active share.
- Long-term non-indexer ownership	Fraction of shares owned by institutional investors that are both long-term investors and non-indexers
- Long-term index firm ownership	Fraction of shares owned by institutional investors that are long-term investors for S&P 500 firms, and zero for non-S&P 500 firms
- Long-term non-index firm ownership	Fraction of shares owned by institutional investors that are long-term investors for non-S&P 500 firms, and zero for S&P 500 firms
- Institutional ownership	Fraction of shares owned by institutional investors

Control variables	
- Total assets	AT *
- Market-to-book	(PRCC_F×CSHO)/(TXDITC+CEQ) *
- Cash flow-to-total assets	(IB+DP)/AT *
- Capital expenditures-to-total assets	CAPX/AT *
- Res. and dev. exp.-to-total assets	XRD/AT *
- Advertising expenditures-to-total assets	XAD/AT *
- Prop., plant, and equip.-to-total assets	PPENT/AT *
- Leverage	(DLC+DLTT)/AT *
- Dividend payer dummy variable	0<DVC *

Appendix D
Investor Horizons, Stakeholder Capital Investment, and the Systematic and Idiosyncratic Volatility of Stock Returns

This table presents the same regressions as Table 2.7 except that in the first set of regressions in each panel, volatility is systematic volatility, and in the second set, it is idiosyncratic volatility. Only selected results are tabulated.

Panel A: All Long-Term Investor Ownership

	Stakeholder capital investment proxy				
	Overall	Diversity	Employee relations	Community	Environment
Dependent variable is ln(systematic volatility of stock returns) (t+1)					
Long-term investor ownership (t-1)	-2.25***	-3.15***	-0.11	-2.13***	1.36***
× Stakeholder capital investment proxy (t)	(-4.66)	(-7.45)	(-0.26)	(-5.36)	(3.42)
Dependent variable is ln(idiosyncratic volatility of stock returns) (t+1)					
Long-term investor ownership (t-1)	-0.81**	-1.07***	-0.08	-0.70**	0.26
× Stakeholder capital investment proxy (t)	(-2.21)	(-3.01)	(-0.27)	(-2.09)	(0.73)

Panel B: Long-Term Investor Ownership Split into Indexer Ownership and Non-Indexer Ownership

	Stakeholder capital investment proxy				
	Overall	Diversity	Employee relations	Community	Environment
Dependent variable is ln(systematic volatility of stock returns) (t+1)					
Long-term indexer ownership (t-1)	-2.13***	-2.87***	-0.33	-1.62***	0.81***
× Stakeholder capital investment proxy (t)	(-5.60)	(-7.97)	(-1.03)	(-4.90)	(2.85)
Long-term non-indexer ownership (t-1)	-1.13***	-1.69***	0.07	-1.25***	0.97**
× Stakeholder capital investment proxy (t)	(-2.65)	(-4.51)	(0.18)	(-3.45)	(2.57)
Dependent variable is ln(idiosyncratic volatility of stock returns) (t+1)					
Long-term indexer ownership (t-1)	-0.40	-0.78***	-0.00	-0.06	0.35
× Stakeholder capital investment proxy (t)	(-1.34)	(-2.74)	(-0.00)	(-0.22)	(1.41)
Long-term non-indexer ownership (t-1)	-0.64**	-0.69**	-0.07	-0.74**	0.01
× Stakeholder capital investment proxy (t)	(-2.04)	(-2.24)	(-0.27)	(-2.51)	(0.03)

Panel C: Long-Term Investor Ownership Split into Index Firm Ownership and Non-Index Firm Ownership

	Stakeholder capital investment proxy				
	Overall	Diversity	Employee relations	Community	Environment
Dependent variable is ln(systematic volatility of stock returns) (t+1)					
Long-term index firm ownership (t-1)	-1.88***	-3.02***	0.38	-2.16***	1.34***
× Stakeholder capital investment proxy (t)	(-3.41)	(-6.10)	(0.80)	(-4.82)	(2.96)
Long-term non-index firm ownership (t-1)	-3.88***	-3.66***	-1.36**	-3.74***	0.06
× Stakeholder capital investment proxy (t)	(-5.30)	(-5.72)	(-2.22)	(-5.42)	(0.10)
Dependent variable is ln(idiosyncratic volatility of stock returns) (t+1)					
Long-term index firm ownership (t-1)	-0.58	-0.97**	0.27	-0.64*	0.40
× Stakeholder capital investment proxy (t)	(-1.41)	(-2.38)	(0.78)	(-1.67)	(0.98)
Long-term non-index firm ownership (t-1)	-2.82***	-2.29***	-1.56***	-2.19***	-0.92*

× Stakeholder capital investment proxy (t)	(-5.29)	(-4.19)	(-3.77)	(-4.44)	(-1.95)

Appendix E
Investor Horizons, Stakeholder Capital Investment, and the Volatility of Sales and Costs

This table presents the same regressions as Table 2.8 except that in the first set of regressions in each panel, volatility is the volatility of sales, and in the second set, it is the volatility of costs. Only selected results are tabulated.

Panel A: All Long-Term Investor Ownership

	Stakeholder capital investment proxy				
	Overall	Diversity	Employee relations	Community	Environment
Dependent variable is ln(volatility of sales) (t+1)					
Long-term investor ownership (t-1) × Stakeholder capital investment proxy (t)	-3.91*** (-5.08)	-2.60*** (-3.38)	-1.90*** (-2.75)	-2.40*** (-3.36)	-1.85*** (-2.65)
Dependent variable is ln(volatility of costs) (t+1)					
Long-term investor ownership (t-1) × Stakeholder capital investment proxy (t)	-3.72*** (-5.03)	-3.23*** (-4.40)	-1.61** (-2.22)	-1.53** (-2.12)	-1.34* (-1.92)

Panel B: Long-Term Investor Ownership Split into Indexer Ownership and Non-Indexer Ownership

	Stakeholder capital investment proxy				
	Overall	Diversity	Employee relations	Community	Environment
Dependent variable is ln(volatility of sales) (t+1)					
Long-term indexer ownership (t-1) × Stakeholder capital investment proxy (t)	-2.95*** (-4.51)	-1.20* (-1.78)	-1.74*** (-2.76)	-2.49*** (-4.13)	-2.08*** (-3.35)
Long-term non-indexer ownership (t-1) × Stakeholder capital investment proxy (t)	-1.88*** (-2.89)	-2.36*** (-3.79)	-0.51 (-0.82)	-0.15 (-0.25)	-0.01 (-0.01)
Dependent variable is ln(volatility of costs) (t+1)					
Long-term indexer ownership (t-1) × Stakeholder capital investment proxy (t)	-2.67*** (-4.16)	-1.41** (-2.13)	-1.47** (-2.28)	-1.92*** (-2.96)	-1.74*** (-2.73)
Long-term non-indexer ownership (t-1) × Stakeholder capital investment proxy (t)	-1.98*** (-3.08)	-3.10*** (-5.07)	-0.48 (-0.73)	0.41 (0.65)	0.38 (0.62)

Panel C: Long-Term Investor Ownership Split into Index Firm Ownership and Non-Index Firm Ownership

	Stakeholder capital investment proxy				
	Overall	Diversity	Employee relations	Community	Environment
Dependent variable is ln(volatility of sales) (t+1)					
Long-term index firm ownership (t-1) × Stakeholder capital investment proxy (t)	-4.54*** (-5.10)	-3.14*** (-3.51)	-2.11*** (-2.59)	-2.70*** (-3.23)	-2.17*** (-2.62)
Long-term non-index firm ownership (t-1) × Stakeholder capital investment proxy (t)	-3.99*** (-3.47)	-1.73 (-1.50)	-2.36** (-2.33)	-4.40*** (-3.87)	-2.60** (-2.47)
Dependent variable is ln(volatility of costs) (t+1)					
Long-term index firm ownership (t-1) × Stakeholder capital investment proxy (t)	-4.17*** (-4.79)	-3.76*** (-4.28)	-1.74** (-2.01)	-1.61* (-1.90)	-1.53* (-1.86)
Long-term non-index firm ownership (t-1) × Stakeholder capital investment proxy (t)	-4.37*** (-3.93)	-2.92*** (-2.66)	-1.98* (-1.88)	-4.50*** (-3.99)	-2.63** (-2.39)