# Strategic Incongruence and the Lemons Problem in Public Markets

Three Essays on Information Asymmetry,
Public Market Pressures and Corporate Strategies

A Dissertation

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## Overview

The three essays in my dissertation (Figure 1) investigate the firm-level strategic drivers of a decreasing number of publicly-traded firms in the United States (Figure 2). I focus on three questions to shed light on the phenomenon: understanding why public firms decide to go private, why fewer private firms are going public (Figure 3), and the drivers of a source of pressure from public equity markets, proactive investors who seek involvement in firms' strategies, and the attributes of firms' strategies. Proactive investors purchase a significant share of a company's stocks and can exert influence on companies' strategies. I draw on the theoretical framework of a lemons problem in strategies that arises when capital market participants (such as investors and securities analysts) have difficulty understanding and valuing strategies due to information asymmetry. Firms might be further driven to avoid novel, unique, or complex strategies, even when those strategies are of high quality (Benner and Zenger, 2016). I view the phenomenon of decreasing publicly-traded firms as a function of firms' responses to these pressures from capital markets. Since public market pressures and investors' involvement are likely spurred by firms' strategies, understanding the strategic drivers of such outcomes becomes a critical topic to examine in strategy.

In my dissertation, I explore how strategic incongruence arises from attributes of firms' strategies that make it hard for outside investors to understand and evaluate, i.e., strategies that are not aligned with what investors expect to see. This stems further from the information asymmetries in public equity markets that make it hard for investors to fully grasp the intent and potential effect of firms' strategies. Consequently, investors often use historical and social referents to evaluate companies, generally comparing them

with peer companies in the same industry (Zuckerman, 1999; Zuckerman, 2004), and creating expectations that similar companies within the same industry will pursue familiar strategies. Companies that deviate from these expectations of market participants, i.e., that have greater levels of strategic incongruence, are subject to valuation discounts and pressures from investors, even if they have high-quality strategies. Specifically, I explore the investment aspect that may accentuate the effect. Focusing on the idea of strategic incongruence, I propose that it arises from particular types of strategies that misalign with market anticipation due to information asymmetry, and further, that it drives increasing attention from proactive investors (Essay 1), firms' decisions to become private (Essay 2), and decisions not to go public (Essay 3).

In the first essay, I study the sources of public market pressure, specifically the types of strategies that attract proactive investors who seek to influence firms' strategies. Investor activism has become more critical in recent years, particularly with the rise of hedge fund investors, who may purchase a block of a firm's stock with the intent of direct involvement in a firm's strategies. Although there has been a growing body of research on these investors in the finance and accounting fields that examines the financial characteristics of firms that appeal to such investors, there has been very little work to understand the strategies that attract attention from these investors. Often, these investors' involvement is likely spurred by firms' strategies, particularly strategies that may be high quality and valuable long-term but that are difficult for market participants to understand and evaluate. Thus, it is important to understand the characteristics of strategies that trigger involvement by these investors, who are often seeking to engage directly in influencing firms' strategies. I posit that companies with greater strategic

incongruence are likely to attract (more) proactive investors and thus experience higher public market pressures. To test the ideas in this study, I use a unique and proprietary hand-collected database of official Securities Exchange Commission (SEC ) filings (mandatory forms of disclosure related to publicly-traded companies), providing detailed information on investors who have acquired 5% or more of a firm's stock and expressed an intention to intervene in management activities at the time of purchase. This database allows me to assess how firm-level attributes attract different levels of activism and the potential influence that these investors may exert on target companies. It is also rare and valuable since, from the best of my knowledge, there is no commercial database vendor that provides such information at this level of comprehensiveness for an extended period. Using this rich database of hand-collected SEC filings (13D filings), I find some evidence that companies with greater levels of strategic incongruence gain the attention of proactive investors.

The second essay in my dissertation examines privatizations. Privatizations refer to de-lists of publicly-traded companies via mergers and acquisitions by private acquirers (Doidge, Karolyi, and Stulz, 2017). These transactions include acquisitions by private equity investors or by private corporate (strategic) investors. In this study, I seek to understand how differences in firms' strategies may be associated with their choice to go private, considering it as the outcome of a possible lemons problem in strategies (Benner and Zenger, 2016). In situations where a firm's strategies are valuable but difficult for market participants to understand and value (e.g., Litov, Moreton, and Zenger, 2012), going private may offer a solution. The underlying logic of going private is that it may alleviate information asymmetry by allowing sophisticated investors to have access to

private information that previously was only known by managers and not easily shared in public equity markets. Companies with more difficult strategies for investors to evaluate may find private markets more attractive and suitable than public equity markets. I posit that to the extent a firm's strategic incongruence is greater than its industry peers, it will have a higher likelihood of going private. This effect is expected to be mediated by the elevated level of public market pressure from investors that intend to intervene. Public market pressure indicates that companies' strategies are not well-understood in the market due to information asymmetry. I find that public market pressures are linked to companies' heterogeneous strategies and subsequently correlated with with privatizations while lacking support for a direct link from strategic incongruence to the privatization event, which leaves room for further investigation in other forms of strategic incongruence that may be directly related to the privatization event.

In the third essay, I provide further insight into the phenomenon of fewer publicly-traded firms in the U.S., in this case seeking to understand strategic reasons why there has been a drop in IPOs over the last 20 years. I examine underlying reasons why firms do not go public in the first place, considering how the innovation strategies that Venture Capital (VC)-backed firms pursue are related to the decision to go public or stay private. I rely on the lemons market logic and the adverse selection issue, arguing that innovation strategies that are more difficult to understand or value by public market participants may have firms seek acquisitions instead of IPOs due to concerns that the public equity market will not fully value its shares. On the other hand, investors in private markets have an advantage in understanding more complicated innovation strategies since they are often provided with private insider information in the due diligence process

that may not be accessible to public market participants. Building on the notion of strategic incongruence from the first essay, I investigate the potential market incongruence in technology and innovation strategies, such as technological breadth. A novel element in the essay is that I examine these questions in the context of heterogeneous patenting activities in VC-backed firms and observe how these differences in innovative strategies may impact firms' decisions to go public. Preliminary findings do not support technological breadth having a positive association with the decision to be acquired rather than going public. However, I do find that among those going public, greater levels of technological breadth or strategic incongruence are related to a longer time-to-IPO in the technology-related industries.

How capital market pressures influence firms' strategies and their public/private decisions are essential questions for strategy. Answers to these questions have various implications for managers in public markets and managers at private companies. Also, answers to the phenomenon become increasingly relevant and vital as the US economy shifts towards a more intangible asset-based structure from a previous tangible asset business structure (Lev and Gu, 2016; Doidge et al., 2018). The change is expected to pose higher levels of public equity market pressure on companies and their strategies with rising levels of information asymmetry. Despite significant implications for the firms, very little work has been done on these topics in strategy. By pursuing answers to these questions, the three essays in my dissertation aim to contribute to a growing body of strategy literature on public market pressures in various forms, such as analysts, short-termism and valuation discounts (Benner and Ranganathan, 2012; Litov, Moreton, and Zenger, 2012; Sampson and Shi, 2017; Kaul, Nary, and Singh, 2018) and to the IPO

literature in entrepreneurship. In addition, highlighting strategic incongruence and how these interact with capital market participants provide strong managerial implications.

## Essay 1: The Strategic Drivers of Proactive Investor Attention


### Abstract

Publicly-listed companies increasingly face pressures from the public equity market. Recently these market pressures have arisen from activist hedge funds who buy blocks of shares in a firm's stock with the intent to intervene in the firm's management. Despite the growing presence of activist investors, the nature of strategies that garner attention from these investors is not well known. This study uses the theoretical lens of a lemons problem in strategies, arising from information asymmetry and adverse selection issues in public equity markets, to argue that as companies' strategies are incongruent with the expectations of market participants and therefore more difficult to understand, they are prone to public market dissent and likely to garner more attention from investors seeking involvement in management. Using a hand-collected proprietary database of SEC 13D filings, I find that some forms of companies' increasing levels of strategic incongruence tend to be positively associated with attracting proactive investor attention.



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## Introduction

Publicly-listed companies face pressures from equity markets, and research has documented how these pressures influence firms' strategies. For example, firms respond to short-term pressures by reducing longer-term investments (Bushee, 1998; Zhang and Gimeno, 2010; Benner and Ranganathan, 2012; Sampson and Shi, 2020) or by increasing cash payouts to investors in the form of dividends or announcing share buybacks (Benner and Ranganathan, 2012; Lazonick, 2014). Activist investors have become increasingly prominent as an important source of equity market pressure on firms in recent years. These investors, often hedge funds, can influence significant changes in firms' strategies, sometimes even pressuring firms to be acquired or spurring them to go private. Such investors typically seek out firms with lower than anticipated stock prices (Brav et al., 2008) and purchase a large block of a firm's stock, often with the intent to engage in actions that will quickly increase the firm's stock price. While research has explored the outcomes that result from involvement by activist investors (Chen and Feldman, 2018; DesJardine and Durand, 2020; Ahn and Wiersema, 2021), we know less about the nature of firms' strategies that spur activist investor attention in the first place. Research in fields outside of strategy has examined the financial drivers of activist investor attention (Brav et al., 2008; Bebchuk, Brav, and Jiang, 2015), but strategy research has not explored the nature of firms' strategic choices that spark attention from these investors. In this paper, I seek to fill that gap by studying the characteristics of firms' strategies that drive attention from activist investors.

It is important to highlight that dampened stock prices do not necessarily indicate that firms are pursuing low-value strategies. Stock price discounts can also arise from

increased information asymmetries (Sanders and Boivie, 2004; Litov, Moreton, and Zenger, 2012; Benner and Zenger, 2016). Managers may pursue strategies that are potentially value-creating longer term, but if these strategies are difficult for equity market participants to understand and evaluate, stock prices are dampened in the shorter term. Litov, Moreton, and Zenger (2012) showed that when firms pursued unique corporate strategies that were high quality but difficult for analysts to evaluate, they received stock price discounts. Researchers have proposed that strategies that are novel, unique, or complex increase information asymmetries and are likely to suffer stock price discounts, even though novelty, uniqueness, and complexity are also characteristics of costly-to-imitate strategies that can lead to longer-term value creation and capture (Benner and Zenger, 2016). Conversely, common and readily observable strategies may be better understood and less costly to evaluate by outside investors, but such strategies are also less likely to create sustainable value in the long term. Pressures from equity market participants on firms to abandon costly to evaluate strategies have been highlighted as a potential "lemons problem" (Benner and Zenger, 2016).

I use the theoretical lens of a lemons problem to study the strategic drivers of attention from activist investors, an important source of pressure from public equity markets. I broaden the study to understand "proactive" investors[1]. Proactive investors include the "activist" investors that have been studied in prior research, the subset of investors who have indicated their intent to intervene in firms' strategies and governance

[1] By definition, proactive investors are those that purchase a significant stake (5% or more) in a company and express a potential intent to intervene in the company's management by submitting 13D filings to the SEC. Prior studies have considered the 13D filings that express no or little intention to intervene in the management as non-threatening and often do not incorporate them as activist campaigns in the analyses. This study incorporates all investors that are known as hedge funds and have submitted 13D filings, and consider them as viable candidates to make potential interventions in company's strategies. These investors generally have stronger incentives to outperform given their compensation structures and the absence of stringent governmental regulations (Brav, Jiang, and Kim, 2015).

or have shown activist behavior through proxy fights or hostile endeavors. In addition, proactive investors include investors who have purchased a block of stock in a firm (5% stake or more and filed a 13D with the SEC) and are in a position to become more active in the future but may not have yet engaged in activist behavior or indicated their activist intentions.

I focus on "strategic incongruence," the extent to which a firm's strategies are misaligned with investors' expectations that are often shaped by historical and social comparisons. Prior research has highlighted the role of industry categories and peer comparisons in evaluations of firms by equity market participants, such as investors and analysts (Zuckerman, 1999; Zuckerman, 2004; Litov, Moreton, and Zenger, 2012; Benner & Ranganathan, 2013; Benner & Ranganathan, 2017). Market participants tend to evaluate a firm's actions using historical and social referents, such as comparing a firm's strategy with peers in the same industry category (Zuckerman, 1999; Zuckerman, 2004). Benner and Ranganathan (2017) showed that analysts apply the same schemas and heuristics to evaluate companies within the same industry category. Categories often shape expectations for the appropriate and desirable strategies for firms within an industry. Managers spur greater strategic incongruence and associated information asymmetries as they choose strategies that deviate from these categorical expectations and are therefore more difficult to evaluate. Thus, I argue that firms with greater strategic incongruence in their longer-term strategic investments or diversification are more likely to attract activist investor attention.

I use a unique hand-collected dataset including 4,765 firms and 34,698 firm-year observations, covering the period from 1997 to 2015. The data include a unique set of

data on the details of 13D filings that provide information on the events and the intention of the investor engagement. I use the degree of proactiveness derived from text analysis of the 13D filings as a measure for supplementary analysis. Using a hazard model, I find some evidence of strategic incongruence in association with the dependent variable, proactive investor attention, and the degree of proactiveness. In addition, I provide a supplementary mediation analysis to show how valuation serves as a mechanism for the relationship between strategic incongruence to proactive investor attention.

## Theory and Hypotheses

### *Strategic Incongruence, Information Asymmetry, and Proactive Investors*

In recent years, it is clear that activist investors such as hedge funds have played an important role in shaping the equity market pressures faced by public firms. A significant rise in dividend payouts to investors and share repurchases provides evidence. The aggregate level of payout ratios in the U.S. has risen to over 40% recently, a sharp contrast to the mid-20% levels observed a few decades ago (Bates, Kahle, and Stulz, 2009; Doidge, Karolyi, and Stulz, 2017; Doidge et al., 2018). Also, most of the profits of S&P 500 companies have been returned to shareholders via share repurchases in recent years (Lazonick, 2014; Lazonick, 2015; Gutierrez and Philippon, 2016). These pressures are often spurred by the strategies pursued by these firms and often have critical implications for firms in that they may influence future investments and strategic directions. Here, I explore the nature of strategies that give rise to this attention by activist investors. Specifically, I hypothesize that to the extent that firms pursue incongruent strategies, i.e., that are misaligned with equity market participants' expectations, they are more likely to attract activist investors.

Firms' strategies often involve longer-horizon investments (i.e., research and development or capital expenditures) or diversification (i.e., the scope of the firm and which businesses it will engage in). However, as these choices become novel, unique, or complex and thus more difficult for market participants to assess and value, companies may face a lack of analyst coverage and stock price discounts (Benner and Zenger, 2016). This tendency applies to even those strategies that may be high quality, value-creating, and difficult to imitate, the aspects of the strategy that are likely to lead to competitive advantage (Barney, 1986; Litov, Moreton, and Zenger, 2012; Kaul, 2013; Benner and Zenger, 2016). Thus, as managers pursue such strategies to differentiate their firms from competitors and create and capture value, information asymmetries between managers and investors also are heightened, giving rise to adverse selection and a possible "lemons market". That is, pressures from equity markets that arise in response to such strategies might encourage firms to abandon or avoid them despite their potential value. For example, a 13D document filed by hedge fund investor, Daniel Loeb[2], exemplifies the misalignment in expectations between a company's strategic plans and the immediate demands from public market investors:

> *As a result, [the Investors] believe that the best outcome for the company's shareholders would be for management and the company's board of directors (the "Board") to immediately abandon their strategy to build the company through acquisitions and a "digital business plan" and to promptly commence an auction to sell the company...Our fears were significantly enhanced by our April 11 meeting with Messrs.Caparro and Behrent, in which it became clear that the company is more focused on a big-picture strategic vision than what is economically best for the owners of the company.*

[2] Text excerpt from Item 4 in 13D filing for Glenayre Technologies on April 23, 2007. Link to the original 13D filing from SEC EDGAR database: https://www.sec.gov/Archives/edgar/data/808918/000089914007000879/g3727409b.txt

While managers may have a clear vision or "theory" of how value will be created (Felin and Zenger, 2009; Zenger, Felin, and Bigelow, 2011), it may be difficult for them to fully disclose the potential value and logic of future-oriented investments or potential synergies to equity market participants. Managers may be reluctant to communicate such information given the potential for imitation by competitors, or it may simply be difficult to communicate the potential value of a strategy with market participants who lack knowledge of the industry or firm. Here, I propose further that it is not the level of investment or diversification per se that invites this attention, but the extent to which there is strategic incongruence, i.e., a misalignment between a firm's investment or diversification strategies and the expectations of market participants. These expectations can be built on various heuristics (Benner and Ranganathan, 2017), such as familiarity based on comparison with industry peers (Zuckerman, 1999; 2000).

As prior work suggests, equity market participants, such as investors and analysts, evaluate firms' actions and performance in comparison to similar firms. Zuckerman (1999; 2000) studies the ways in which industry categories that structure analyst coverage in the U.S. further influence how firms within the same industry are evaluated and the categorical expectations that arise for their strategies and activities. This work shows that firms whose strategies and actions are aligned with the expectations of the industry category receive analyst coverage, while firms that straddle categories or whose actions deviate from the expectations of a category suffer a lack of coverage, stock price discounts, and pressures for change. Litov, Moreton, and Zenger (2012) similarly show that when firms pursue corporate strategies that are value-creating but unique relative to industry peers, they garner less analyst coverage and suffer stock price discounts. Theeke,

Polidoro, and Fredrickson (2018) also found that firms pursuing novelty received less analyst coverage.

Thus, as firms pursue strategies that are different from peer firms in the same industry, they may face greater challenges in the equity market. I introduce the notion of "strategic incongruence" to capture this idea, i.e., the extent to which firms' strategies in the form of future-oriented strategic investments or diversification strategies differ markedly from their industry peers. As market participants gain expertise in evaluating firms pursuing similar types of strategies within the same industry, greater strategic incongruence makes a firm more difficult to understand and evaluate (Litov, Moreton, and Zenger, 2012). For example, analysts covering firms in the utilities industry may be accustomed to seeing and evaluating periodic large investments in capital equipment like generators and power plants. Conversely, in an industry that has been stable and characterized by undifferentiated products, there may be a heavier emphasis on cost reduction efforts. In the event that a firm pursues a less familiar strategy, such as long-horizon capital investments, it will be more challenging to evaluate.

Therefore, the severity of strategic incongruence is related to the extent that the strategies a firm is undertaking are misaligned with the expectations of market participants, and the magnitude of such strategic incongruence is likely to exacerbate information asymmetries. When a firm's strategies are misaligned with the expectations of its industry category, it is likely to elicit negative reactions from stock market participants such as current investors and analysts. As this further dampens a firm's stock price as a result of investors exiting their position, the firm is more likely to attract the attention of proactive investors, i.e., those who seek to increase stock price by buying a

block of shares in the firm and engaging in pressures to convince the firm to reverse or abandon particular strategies. In fact, most often, investors cite "undervaluation" or "price decline" in the filings as their initial rationale for the acquisition of the shares. Therefore, I hypothesize that greater levels of a firm's strategic incongruence may be positively associated with the likelihood of receiving proactive investor attention.

*H1. The greater the firm's strategic incongruence, the greater the likelihood the firm will receive proactive investor attention.*

I further explore how strategic incongruence may relate to a firm's chances of attracting more aggressive proactive investor attention. Although firms do not often experience multiple campaigns in a short period, some firms go through multiple campaigns in a given year. This may happen where investors follow other investors' campaigns in a relatively short period. In these cases, investors follow one another in succession as one approaches a target and exits. For example, in 2014, activist investor Carl Icahn invested in Family Dollar and exited briefly after. This was followed by a line-up of investors, such as Trian Fund, Elliott Management, and Corvex Management. Investors sometimes even stage a campaign against companies in a group, namely 'wolf packs' (Brav et al., 2008). Since strategic incongruence is likely to attract the initial attention of investors, the magnitude of such conflicting forces may form a higher number of investors that do not agree with them.

Companies also have varying experiences in the type of demands and the level of aggressiveness presented by proactive investors (Figure 7), exhibiting a wide range from almost no explicit demands to extreme hostile takeovers. Investors may ask for share repurchases, board representation to better voice their demands or oppose a pending

acquisition plan of a firm. Often, investors also express their intentions to engage in discussions with the management or board of directors. Even for investors who do not have immediate and explicit demands for a firm, they often state "investment purposes" as their motivation for the share purchases. In most cases, they retain the right to future interventions in major changes for the company. For example, investors often include the following or similar clauses in their filings:

> *The [Investor] currently has no other plans or proposals, though he retains the right, to subsequently devise or implement plans or proposals, which relate to or would result in: (a) the acquisition by any person of additional securities of the Issuer, or the disposition of securities of the Issuer; (b) an extraordinary corporate transaction, such as a merger, reorganization or liquidation, involving the Issuer or any of its subsidiaries; (c) a sale or transfer of a material amount of assets of the Issuer or any of its subsidiaries; (d) any change in the present board of directors or management of the Issuer, including any plans or proposals to change the number or term of directors or to fill any existing vacancies on the board; (e) any material change in the present capitalization or dividend policy of the Issuer; (1) any other material change in the Issuer's business or corporate structure; (g) changes in the Issuer's charter, bylaws or instruments corresponding thereto or other actions which may impede the acquisition of control of the Issuer by any person; (h) causing a class of securities of the Issuer to be delisted from a national securities exchange or to cease to be authorized to be quoted in an inter-dealer quotation system of a registered national securities association; (i) a class of equity securities of the Issuer becoming eligible for termination of registration pursuant to Section 12(g)(4) of the Securities Exchange Act of 1934 (the "Exchange Act"); or (j) any action similar to any of those enumerated above.*

Notably, proactive investors themselves exhibit varying levels of aggressiveness. For example, Carl Icahn is mostly known for his aggressive tactics as a corporate raider, while GAMCO has many campaigns via 13D filings but usually does not make explicit or aggressive demands publicly. Elliott is also known for its hostility and remains active in activism campaigns on target firms, even expanding to firms outside the U.S. Although very extreme and hostile activist involvement can be costly for the investors and, therefore, rarer in frequency, companies may experience varying magnitudes of

aggressiveness shown through the degree of hostility (tactics) and involvement (demands). As strategic incongruence increases, companies are likely to elicit more proactive responses from these investors. Thus, strategies that are even harder to understand, i.e., greater strategic incongruence, will trigger more significant levels of aggressiveness from investors. In a supplementary analysis, I examine this relationship.

## Empirical strategy

### Data

This study uses an unbalanced panel dataset focusing on firms in non-financial industries[3] from 1997 to 2015. The dataset includes 4,765 firms and 34,698 firm-year observations. I collected financial data for the public companies from the CRSP-Compustat Merged database (CCM). All financial measures are calendarized to adjust for differences for those companies whose fiscal years do not end in December. This ensures consistency and comparability with other variables across firms. I also use the text analysis-based industry product similarity measure from a shared database available at the Hoberg-Philips Library[4]. All analyst-related information used in the analyses (e.g., analyst coverage number and analyst's average recommendation for each stock) is drawn from the Institutional Brokers' Estimate System (I/B/E/S), and the information on companies' governance issues comes from the ISS - Governance Legacy combined database.

For information on proactive investors' activities, I created a proprietary database (Figure 5), involving hand-collected 13D filings by using web-crawling techniques and

[3] This is following prior studies that exclude financial companies in their analyses (e.g., Litov, Moreton, and Zenger, 2012).
[4] Hoberg and Philips (2016) shares industry concentration and product market similarity database generated by using text analyses. This information is available at Hoberg and Philips Data Library (http://hobergphillips.tuck.dartmouth.edu/).

scraping algorithms to collect the filings from the Securities and Exchange Commission (SEC)'s Electronic Data Gathering, Analysis, and Retrieval (EDGAR) database, which is the online database of official filings. 13D filings, along with 13G filings, are posted on EDGAR when investors acquire at least 5% of the stake in a publicly-listed firm. These filings show the name of the investors, timing, and the amount of stake purchased. While 13G filings only require investors to report the details of their transaction when they purchase a 5% or greater stake in a public firm, 13D filings further require investors to indicate their rationale for the purchase of the stake and the intentions to intervene in management decisions (e.g., to campaign and proxy-fight for board representation, to vote to remove director, and others). These are in "Item 4" of the document. Investors' filings in this item range from generally passive stances, such as no response or "for investment purposes," to more activist demands for board representation or stock repurchases, or in extreme cases, the intent to force the firm acquisitions, divestitures, and liquidation.

Additional work after data collection involved careful matching with names of the hedge funds or other activist investors and coding the text data from the filings. This process involved matching with multiple investor lists (See Appendix). Next, based on the collected data matched with the relevant investor list, I performed a text analysis of the Item 4 contents and coded them according to the *Investor Threat Score*[5] (Figure 5). This framework is based on the degree of aggressiveness, as expressed via various forms of tactics (e.g., no plans, past relationships, letters to the board members, proposals, litigation (threats) and demands for sale or liquidation of an entity) and the type of

[5]I followed the categories from prior literature (Brav et al., 2008) and added an order of intensity to the investors' involvement and hostility.

demands asked of target management (e.g., demands for special dividends, share repurchases, board seats, etc.). As shown in Figure 6, I created a dictionary of keywords (e.g., "for investment purposes only," "to maximize shareholder value," "expressing (serious) concerns for (poor communication)," "to take an active role in the management," "encourage other shareholders to do likewise" and others) and ran an algorithm to allocate responses to each of the categories. I also followed up with a manual check on all of the filings to ensure that the text was correctly coded.

The 13D filings allow me to capture not only activist investors (i.e., those already actively intervening in a firm's governance or strategy) but also "proactive" investors, i.e., investors who have purchased at least a 5% stake, and so, therefore, have the potential to become more active in the future. Even if investors do not indicate a specific plan to intervene in the company's management, acquiring a stake and filing a 13D suggests these investors' potential to engage in more activism in the future. Thus, I go beyond observing only the investors who are already engaged in visible activism by including those who have taken initial steps (in purchasing at least a 5% stake and filing a 13D) and have the potential for greater activism in the future.

**Key measures**

Dependent variable

*Proactive investor attention.* I use two measures to test H1 that capture multiple facets of greater proactive investor attention by firm-year. First, I use a binary (1/0) variable, the event of a 13D filing by an investor in a year, indicating whether the company experiences proactive investor attention in that year. An alternative measure for testing H1 captures the level of *aggressiveness* a company faces in a given year, measured using

the *Investor Threat Score* (Figure 5) that codifies the textual information from Item 4 (purposes of stake acquisition) of the 13D filings. Here I use the text data extracted from 13D filings to generate the level of *hostility* (based on investors' tactics) and the level of *involvement* (based on the type of demands made to companies). *Aggressiveness* is the average of the two factors. *Investor Threat Score* builds on prior literature, relying on the categories used by Brav et al. (2008).

Independent variable

Strategic incongruence (Figure 4) is the key explanatory variable for H1. I use three different measures to capture strategic incongruence: relative R&D spending, relative capital expenditures, and relative diversification. These measures focus on comparisons of firms' strategies with peers in the same industry. I use a firm's R&D investments relative to its industry peers, a firm's capital expenditures relative to its peers, and a firm's extent of diversification (the number of different businesses a firm operates in) relative to its industry peers. I use two-digit SIC codes for assessing a firm's peers in calculations of the industry-relative measures. Two-digit level analyses are commonly seen in prior literature exploring stock market measures (Litov, Moreton, and Zenger, 2012; Fang, Tian, and Tice, 2014). When calculating the industry-relative measures, I removed the focal firm from the industry averages.

- *Relative R&D spending* measures firms' research and development investments compared to their industry averages. *Relative R&D spending*, therefore, captures how a firm's investment in internally developed assets compares to other firms in its industry. Information asymmetry is further heightened when a firm's investments in R&D depart from market

participants' expectations that are formed from comparisons with industry peers. For each firm/year, I use R&D intensity (R&D expense/revenue) and subtract it from the industry average R&D intensity. I also use normalized levels of R&D intensity by limiting R&D intensity levels to those values under one to exclude extreme outliers[6] (the cases where R&D expense exceeds annual revenue). Finally, as a supplementary analysis, I use spline variables (Eggers and Kaul, 2018) that separate the positive and negative values (above and below zero values) to examine the direction of the main effect. In the years that companies did not report R&D values, I replaced them with a zero and then marked them with a dummy variable.

- *Relative capital expenditures* measure the level of capital expenditures of a firm in comparison with industry peers. Like R&D spending, capital expenditures are the investments that firms undertake to pursue future growth (Souder and Shaver, 2010). Capital expenditures are often executed in capital-intensive projects that involve significant investments. Deviance in such investments compared with the industry average or market anticipation is apparent to outside investors; therefore, it is helpful to examine how strategic incongruence arising from a firm's industry-relative capital expenditure relates to proactive investor attention. Here, I scale the value of a firm's capital expenditures by individual firms' total asset values and compare them with industry peers. There were very few outliers (capital intensity exceeding

[6] Examples include small pharmaceuticals, biotechnology related companies (bioscience, therapeutics/vaccines/stell cells and other natural sciences laboratories) that are less likely to fund their R&D activities with internally generated cash flows, such as revenue. Counting from 1996, there are around 2,500 observations that account for a very small fraction of the entire database.

1) that I excluded for normalization purposes. Consistent with *relative R&D spending*, I use spline variables to explore the direction of investment on the dependent variable in the supplementary analysis.

- *Relative diversification* is another form of strategic incongruence that measures the extent of firms' diversification compared with that of industry peers. A firm's relative diversification may reflect its uniqueness (Litov, Moreton, and Zenger, 2012). I use firms' segment information provided by the Compustat Segments database (Litov, Moreton, and Zenger, 2012). This measure captures a firm's relative diversification and allows us to examine its role in attracting proactive investor attention.

*Relative valuation* indicates whether the stock is trading at a discount or a premium compared to industry peers in the previous year, to the extent that firms are pursuing strategies that create information asymmetries based on the P/B ratios[7]. This is an important attribute that investors closely follow as it relates to the price of a given stock, which then is the mechanism that motivates their potential trade in a stock, and a discounted valuation level is often a trigger that garners proactive investor attention. Valuation is also an industry-relative measure that compares a company's valuation levels with its industry peer average in this study.

Control Variables

[7] I calculated the P/B ratios by using the year-end closing prices scaled by the firm's calendarized book value per share. I excluded extreme values (P/B values that exceed 50 multiples) that appear as outliers and do not give much information to the investors and can be misleading especially when calculating industry average levels.

*Analyst coverage* is the number of analysts covering a company in the previous year. Analyst coverage provides legitimacy for publicly traded companies (Zuckerman 1999; 2000; Benner and Zenger, 2016) because it reduces information asymmetries, lowering the burden of information costs for outside investors such as hedge funds. Conversely, prolonged strategic incongruence may motivate analysts to drop coverage of a company, rendering it less accessible to equity market participants. Analyst coverage for a firm is often an indicator of investor interest in a stock.

*Average analyst recommendation* is the average recommendation (e.g., "buy," "hold," "sell") of the analysts covering a firm in the previous year. This measure controls for analysts' views on a stock, which influences investor buying and selling behaviors. I/B/E/S provides the scoring system (from 1 = "strong-buy" to 5 = "sell"). I calculate the average for all the analysts covering a firm in a given year.

*Annual trading volume* reflects the relative liquidity of the company's stock in a given year by calculating the log value of its annual trading volume.

*Industry product similarity* measures a firm's product similarity compared to its competitors in the industry. This measure was produced by using text analysis methods to identify pairwise product similarity with competitors and is shared by the authors Hoberg and Philips (2010, 2016). Greater levels indicate higher similarity among companies in the peer group. This variable measures the extent to which there are more substantial market expectations for conformance because firms are more similar.

*Financial slack resources* are the levels of individual firms' available financial slack resources by measuring the cash proportion out of a firm's total asset base.

*Firm size* is measured with the log value of firms' revenue in the previous year. Generally, campaigns in larger companies are more costly for investors as they try to acquire more than 5% of a company's shares. Thus, *firm size* may impact investors' decisions to build a significant position in a company's shares.

*Governance issues (1/0)* indicate whether the company had controversial governance-related topics such as dual-class structure or classified boards.

*Share repurchases* indicate whether a company announced a share buyback in the previous year.

*Performance* is measured using return on assets (ROA) in the previous year. This measure is used to control any performance-related impact associated with investors' attention in a firm.

*Industry* dummy variables that use SIC 2-digit level are included in the analysis.

*Year* dummy variables are included to account for possible effects that are specific to a particular year.

**Estimation models**

I rely on maximum likelihood estimation by using a parametric hazard model (exponential) (stata command: *streg* with *exponential*) to test the likelihood of companies attracting proactive investor attention. This hypothesis invokes the variation of different levels of strategic incongruence among companies. For the supplementary analysis that investigates different forms of proactive investor attention (i.e., the type of aggressiveness exhibited by proactive investors), I use an OLS regression model to test

how firms' differing levels of strategic incongruence are associated with the level of aggressiveness among investors. I lag explanatory variables one year (i.e., previous years' data) to address potential simultaneity issues. In addition, dummy variables have been used to indicate where key missing values among financial matrices (e.g., R&D, capex, etc.) have been converted to zero for the analyses.

**Results**

In the main analysis for testing H1, I explore the relationship between firms' *strategic incongruence* and the likelihood of receiving attention from proactive investors (Table 2 - Models 1 - 4). Among the measures of strategic incongruence, there were mixed results. First, for *relative R&D spending,* results are statistically significant and positively associated with proactive investor attention, overall supporting H1. However, it is unclear whether the degree of deviance matters for under- or over-investment relative to industry peers. To deepen the understanding of this direction using the *relative R&D spending*, I ran an additional analysis using spline variables (Table 2 - Model 4) to understand how the direction of the investments is related to proactive investor attention. For *relative R&D spending* spline variables, only negative relative R&D showed negative and significant results ($p < 0.01$). This suggests that for relative R&D, only those companies that spend less R&D than their peers yet are close to the industry average are likely to get proactive investor attention. *Relative diversification* was also positive and statistically significant in its association with proactive investor attention ($p <0.01$), supporting H1. Thus, companies whose degrees of diversification are different from their industry peers are likely to garner proactive investor attention.

Finally, there was strong evidence that *relative capital expenditure* is negatively associated with the likelihood of proactive investor attention ($p < 0.01$). The results suggest that companies that deviate less from industry peers' capital expenditures are more likely to attract activist investors. Similar to the first two strategic incongruence measures, I ran an additional model (Model 4) using the spline variables (Eggers and Kaul, 2018) that separate the *positive relative capital expenditures* (above the industry average) from *negative relative capital expenditures* (below industry average) values of capital expenditures and separately assess their relationship with proactive investor attention. I find that both the positive and negative spline variables for *relative capital expenditure* have a statistically strong and negative association with proactive investor attention. There are two elements involved in interpreting this finding. First, it suggests that when a firm's investment (capital expenditure) deviates from industry peers, it is likely to garner proactive investor attention. Second, it suggests that the likelihood of this attention does not grow with the degree of deviance. Instead, it appears that companies that are marginally on the outskirts of the industry average attract greater attention from the proactive investor group than those that are distinctly far from the comparable industry group. Also, a possible explanation for the different results from *relative R&D spending* could be that investors form different expectations for the types of investments and that they expect a certain level of R&D at the minimum. While the coefficient on *relative capital expenditure* is negative in the first model, contrasting with H1, the results using spline variables show that although the extent of deviance per se is not related to garnering investor attention, firms that are closer to the industry average but slightly deviating receive greater attention from proactive investors than those that range far out.

In sum, with mixed results, I find that strategic incongruence, measured in different ways, is related to proactive investor attention. An interesting takeaway that may require further exploration is that companies marginally outside of the industry average attract attention compared with those far out from the average, and there may be varying investor expectations on different types of investments.

The results further show that valuation, the underlying mechanism for the overall research model, is strongly associated with attracting proactive investor attention. The results indicate that companies are more likely to get investor attention when their shares are trading at a discount relative to their industry peers. Valuation discounts often reflect public market pressures, and to the extent that a company's strategies are not well received by the public market participants, this mechanism may take on an important role in garnering attention for the company. Both analyst-related measures *(number of analyst coverage* and *analyst recommendations*) were positive and significant, suggesting that the number of analyst coverage matters and that more negative analyst ratings (given the scale – from 1 a strong buy to 5 a strong sell, higher values indicate more negative ratings) attract proactive investor attention, which is consistent with the intuition that investors would pay attention to negative commentary by analysts. I also find that companies with lower levels of *financial slack resources* and those with *governance issues* and a track record of *share repurchases* in the prior year tend to have a higher likelihood of proactive investor attention.

Lastly, in a supplementary analysis, I test the relationship between firms' strategic incongruence factors and investor demand *aggressiveness* (Table 3), which is a combination (average score of the two factors) of both *hostility* (tactics) and *involvement*

(the type of demands) as an alternative measure for the dependent variable, *proactive investor attention.* Using *aggressiveness,* I test how firms that pursue strategies that are not aligned with investor expectations may face greater levels of investor aggressiveness or degree of activist intervention. Here, results for the main strategic incongruence measures, relative capex, relative R&D, and relative diversification, do not show significance, but statistical significance with varying levels is found when probed further through the spline variable analysis. This supports the idea that *strategic incongruence* in the form of under- or over- investment relative to industry peers for both capex and R&D triggers greater levels of investor aggressiveness. *Valuation* continues to remain negative and significant in the analyses with varying degrees of investor aggressiveness as the DV. I provide the OLS fixed-effects analysis (DV = Aggressiveness) in Table 4 for reference.

**Supplementary mediation analysis**

Mediation analysis investigates whether a mediated process exists between the two variables of interest, X and Y (Figure 10). Using mediation analysis, I can test whether there is a full, partial, or no mediated relationship (through mediating variable M) between the independent variable X and the dependent variable Y. A typical mediation model produces direct effects (DE) of variable X on Y, mediating or indirect effect (IE) through mediator M on the dependent variable Y, and the sum of the effects (Total Effects or TE). Given the nature of mediation analysis with a focus on process or mechanisms, it has historically been widely adopted in disciplines such as Epidemiology, Psychology, and Organizational Behavior.

Methods for mediation analysis have also evolved over the years by addressing some of the weaknesses in the earlier studies (Baron and Kenny, 1986; MacKinnon,

Lockwood, and Williams, 2004; Pearl, 2009; Imai, Keele, and Tingley, 2010), while still in the process of forming a consensus on testing causality through these models (Agler and De Boeck, 2017). Baron and Kenny (1986) introduced one of the earliest studies of mediation that has been widely used, but one of the main criticisms is that it does not directly and accurately test the mediating relationship (Miller et al., 2007; Aguini, Edwards, and Bradley, 2017). Structural equation modeling (SEM) has also been adopted and is widely used in mediation analysis to overcome some of the weaknesses in earlier mediation analyses (Shaver, 2005; MacKinnon, Lockwood, and Williams, 2004; Hayes, 2013) and mitigate risks from potential issues such as measurement error (Bollen, 1989; Shook et al., 2004; Agler and De Boeck, 2017). That said, since SEM is known to be appropriate for certain linear form models, and Imai, Keele, and Tingley (2010) introduced the causal mediation analysis that extends the applicability to non-linear models and offers additional sensitivity analyses.

Although not as common as in other disciplines such as Psychology and Organization Behavior, studies in Strategy also use mediation analysis. However, some of the earlier works were found to be vulnerable to biases (Shaver 2005; Aguini et al., 2017), with one of the key concerns being that error terms of the equations used in the earlier studies may correlate and lead to biased results. In addition to the weaknesses discovered in the earlier mediation studies, the nature of the data used and the ideas tested in Strategy are often not randomized controlled experiments. As a result, measurement errors or missing variables may make such studies susceptible to biases. Shaver (2005) provides recommendations to address such issues using either the two-stage least squares estimator or the structural equation algorithms. Reflecting on these issues, some of the

more recent studies in Strategy that conducted mediation analysis (Choudhury and Haas, 2018; Chattopadhyay and Bercovitz, 2020) have relied on generalized structural equation modeling (GSEM) with robust SEs (a modified version from Baron and Kenny, 1986). These analyses are accompanied by a non-parametric process such as bootstrapping for confidence intervals that have been suggested as a preferred method in the literature to address non-normal distribution issues in indirect effects (MacKinnon, Lockwood, and Williams, 2004).

As a supplementary analysis to the main estimation models, I provide a mediation analysis using structural equation modeling with bootstrapping (Stata command: *medsem with zlc*; Zhao, Lynch, and Chen, 2010; Hicks and Tingley, 2012; Mehmetoglu, 2018) in Table 5. This allows me to use the structural equation modeling (SEM) based on modified Baron and Kenny (1986) by allowing fitting via one model. In addition to the *medsem* command, the *zlc* extension allows the bootstrapping of the indirect effect to address non-normal distribution issues. I also ran casual mediation analysis-based model (Imai et al., 2010; Hicks and Tingley, 2011) (Stata command: *medeff*) that further provides flexibility of estimation models, i.e., allowing other non-linear models such as logit and probit regression along with linear regression models in mediation studies. Both estimation models consistently show that there is full mediation which means that there is a strong relationship between X → M (Figure 10: Path a) and M → Y (Path b), but not a statistically strong direct relationship from X→ Y. Based on the results, path **a** (X → M) appears positive and significant ($p < 0.001$), path **b** (M → Y) is negative and significant ($p < 0.001$), however, the direct effect or path **c** (X → Y) does not have statistical significance (Table 5). This helps in understanding that *relative valuation*, specifically

relative valuation discounts that result from strategic incongruence (*relative capex*, r*elative R&D spending*, and *relative diversification*), fully mediates the effect of dimensions of strategic incongruence on the dependent variable, *proactive investor attention* (1/0). Thus, I observe a relationship between strategic incongruence and *proactive investor attention* only through the mediating variable *relative valuation*. As for the first stage relationship (path a), both *relative capital expenditures* and *relative R&D spending* have a positive association while relative diversification remains a negative relationship, consistent with my main analyses. In other words, a greater degree of strategic incongruence in the investment form of capital expenditures and R&D spending leads to higher valuation levels, while companies with more diversified business models compared to industry peers tend to have face valuation discounts.

**Conclusion**

This study examines how strategic incongruence influences attention from activist investors. Strategic incongruence is a theoretical construct that captures aspects of companies' strategies that may make them look different from industry peers or become hard to understand by outside investors. Such strategies may be critical for long-term growth and value creation, but since they are accompanied by higher levels of uncertainty and information asymmetry, they may trigger valuation discounts and pressures from investors in the public equity market. I build on the theoretical framework of the lemons problem in strategies (Benner and Zenger, 2016) and use a proprietary database of 13D filings on proactive investors who purchase 5% or greater of a firm's stock with the possible intent to intervene in management and governance. This study finds that the public equity market reacts to certain aspects of strategic incongruence, such as capital

expenditures relative to the industry peers and relative R&D spending, and relative diversification.

Studying the phenomenon become increasingly relevant and vital as the U.S. economy shifts towards a more intangible asset-based structure (Figure 9) from a previous tangible asset business structure (Bates, Kahle, and Loh, 2009; Lev and Gu, 2016; Doidge et al., 2018). This change is expected to pose higher levels of public equity market pressure on companies due to the rising levels of information asymmetry as their strategies become increasingly hard to understand. Despite significant implications for the firms, very little work has been done on these topics in strategy. This study aims to contribute to a growing body of strategy literature on various forms of public market pressures on firms, subsequently affecting their strategies. Related topics include equity market intermediaries such as analysts, the short-term orientation of investors, and subsequent valuation discounts on companies' shares (Benner and Ranganathan, 2012; Litov, Moreton, and Zenger, 2012; Sampson and Shi, 2017; Kaul, Nary, and Singh, 2018). Also, there is a potential contribution to the IPO literature in entrepreneurship on how public market pressures reshape private companies' incentives to go public. The differentiated contribution of this study is the focus on the strategic antecedents (strategic incongruence) that drive public market attention and stronger pressures felt by publicly-listed companies. Understanding the operating environment in the public equity market and the factors that affect companies' strategies is also vital to strategy scholars since publicly-listed companies are often central subjects of interest in the literature. Also, uncovering strategically incongruent factors that potentially conflict with proactive

investors, an extreme form embodying public market pressures, provides substantial managerial implications for both public and private companies.

**Limitations and Future Directions**

One of the key limitations of this study is that strategies and market expectations specific to an industry context or company's situation may not be fully captured by using standard measures across multiple industries. Thus, there are opportunities to revisit the main variable, *strategic incongruence,* and explore measures that may differ in specific contexts. Mitigating this concern will require additional subsample analyses to delve further into specific industries or contexts. A further search for context-customized strategy measures would be part of the future directions for this research. There also remain some empirical challenges related to endogeneity concerns and identification strategy. Sources of potential endogeneity concerns for this study are omitted variables and the potential selection bias issues as it is based on a non-randomized empirical setting using archival databases. These may pose the risk of alternative explanations to the main results of this study. The omitted variables relevant to this study would be the potential existence of factors that affect proactive investor attention but are not captured in the dimensions of strategic incongruence (*relative capital expenditure*, *relative R&D*, and *relative diversification*) *valuation* or other control variables. Also, an exploration into other estimation models should be considered. For example, in place of the current hazard model that accounts only for the first observation of proactive attention, the use of another estimation model, such as the logistic regression model, should be explored and examined as a supplementary analysis that can account for additional activist investor

events. Finally, when using the unique measure, *aggressiveness*, running additional tests using estimation methods for ordinal variables would be worthwhile.

This study uses a proprietary database, a hand collection of all 13D filings, and relevant proxy statements throughout 1997-2016 (raw data available from 1993 to 2018). Compared to prior research, this database stands as a more comprehensive one, covering a longer duration, and incorporates both 13D filings (Figure 8). The richness of the database offers potential opportunities to pursue future research on examining more granular analyses on proactive investor activities and possibly the progression in the investor aggressiveness, both of which may be unique and valuable research.

## Appendix

*Data collection*

Data used for this study involved a rigorous collection process for both the investor list and the raw filings. Based on the definition of proactive investors that I studied in the paper, I needed both historical activist investors and hedge fund investors that may or may not have a record of actual activism but nonetheless has the potential for future intervention. The challenge was that there is no one standard commercial database that provides a holistic list of hedge fund investors. As seen in Joenväärä et al. (2019), multiple data vendors were found to have very little overlap in terms of the information provided. This lack of consistency in databases necessitates a combination of various sources. Also, there is a risk of omission bias since funds fail over time and may be missing from the list. Many funds liquidate in the face of economic and financial market

downturns[8]. Some naturally decide to dissolve their portfolios as they become too large over time to manage or efficiently generate abnormal returns. In order to overcome these challenges, I used various data sources to accumulate, compile and cross-check potential investor names by searching for information on investors[9] using various media and online resources. I also used hedge fund names from Factset (Shark Watch), Hedge Fund Research (HFR), Lipper-TASS database, and Bloomberg to compile both currently active and dead fund/firm names. In addition, on many occasions, investors were found to form a consortium either with affiliated entities or founding investors (personal funds) to acquire a significant stake in a company's shares since 5% accumulation is no trivial task and often requires a significant amount of capital. For example, GAMCO, one of the most frequently shown investors in the database, most often jointly acquires investments with affiliated entities such as Gabelli Funds, GGCP Inc, Gabelli Foundation, Gabelli Securities, and founder investor, Mario Gabelli, using his personal funds. Paul Tudor Jones I - a hedge fund manager, often appears together with his hedge fund, Tudor Investment Corporation, and affiliated funds. Therefore, I also tracked key founder investors or managing director/portfolio managers of major hedge funds or activist investor funds.

As for the 13D raw filings, I mainly relied on the Python algorithm to web-scrape the text content of the entire filing collections from 1993 to 2018. I also have all of the information for 13G filings that I plan to use for supplementary analysis in future research. Specifically, I looked for the key information on each company's filing – name,

[8] https://www.nytimes.com/2015/10/14/business/dealbook/as-some-hedge-funds-sink-the-challenge-buoys-others.html?_r=0&module=inline

[9] The list mostly comprises hedge funds investors but also includes other institutional inverstors including some mutual fund investors and investor advisors that have past record of activism activities.

date, stake, and others. The challenge was to collect the information on the text content from item 4 in the 13D filings. Item 4 requires each investor acquiring more than a 5% stake in a publicly-listed company to indicate their stated intention in the acquisition. Because there is no fixed format for this item, investors' responses varied immensely from one-liners to multiple pages. I used the Python algorithm to clean the information into a formattable database.

*Data processing*

After all of the key information has been collected from both the investor lists and the 13D raw filings, I used the *Investor Threat Score* (Figure 5) built on prior literature (Brav et al., 2008) to categorize the data. Using two main categories, hostility (tactics) and involvement (demands), I coded the degree of such proactiveness in the range of no or little involvement (1) to extreme involvement (6) in demands and passive (1) to threatening (6) for the tactics (Figure 5). To do this, I created a dictionary based on the common keywords used by the investors in the Item 4 responses. Because there is a challenge in the wide variance of words that investors choose in the filings, I then went back and manually checked all of the filings to confirm that I have not missed out on any vague wordings in some filings. In the process, I identified those filings that were irrelevant for this study (companies in bankruptcy and post-merger-related filings) and excluded them.

## Essay 2: Going Private as a Solution to Public Market Pressures


### Abstract

Information asymmetry exists between companies and investors in public equity markets. A public firm's unique, complex, and uncertain strategies may lead to an even greater degree of rifts. Companies pursuing strategies that are misaligned with investor expectations may face penalizations such as valuation discounts. Such pressures can spur firms to abandon particular strategies even if they hold potential. Building on the lemons problem in the strategy framework, I argue that strategically incongruent companies facing pressures in the public equity market may choose to privatize as a response to these pressures. I use a parametric test of the maximum likelihood model based on domestic publicly-listed companies in the US during 1997-2016. I find some evidence that public market pressures are linked to companies' strategies and that there is also an association between public market pressure and privatizations.



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## Introduction

The number of publicly-listed[10] companies in the US has nearly halved from a peak seen in the late ’90s (Figure 2). Aside from fewer IPOs, a persistent level of delists over the years has contributed to this phenomenon (Figure 3) (Gao, Ritter, & Zhu, 2013; Davis, 2016; Doidge et al., 2018). This paper examines the underlying strategic drivers of this puzzling trend by focusing on the delist or privatization decisions that take form in transactions with private equity or private strategic investors (corporations) via mergers and acquisitions. A strong motivation for companies to pursue privatization is to alleviate regulatory and shareholder pressures imposed on public companies. Delisted companies no longer trade on the stock exchange and therefore are not subject to the public market regulations and the pressures from investors. Companies then engage with a new and smaller set of investors who have an exclusive relationship with the company, a transition through which companies may freely choose to pursue their unique strategies.

To understand the overall privatization process, the drivers behind the decision to go private need further investigation. Among the nontrivial and various changes that have unfolded at the US stock market over the last few decades, scholars have examined the possibility of a failure in both publicly-listed corporations and public equity markets to explain privatizations. Researchers in management and finance have highlighted changes in macroeconomic factors that include regulatory changes, institutional pressures from investors, a prolonged low financing cost environment, and subsequent evolutionary changes within public companies (Gao, Ritter, and Zhu, 2013; Hoskisson et al., 2013; Davis, 2016; Kahle and Stulz, 2017, Lev and Gu, 2016; Grullon et al., 2019; Kaplan and

[10] Listed companies are those that sourced external financing from the stock market through primary or secondary equity offerings. Their shares trade on the major stock exchanges.

Strömberg, 2019). For example, regulations such as the Sarbanes Oxley[11] Act that make it costly to operate as a public company have generally made the public equity market less attractive for firms. Also, rising pressures from public equity market investors compel companies to return cash to shareholders via dividends and share repurchases—these shareholders' increasing intervention in the management challenges firms' ability to carry out strategies.

In this study, I shift the focus from macroeconomic analyses to understanding how companies' heterogeneous strategies are related to subsequent privatization outcomes. I explore the strategic antecedents of privatization as a choice by companies and examine how firms whose strategies misalign with market expectations relative to the industry are more likely to go private. Specifically, I focus on the theoretical construct strategic incongruence from Essay 1 to explain the strategic drivers of privatizations.

In public equity markets, expectations form around a company and its shares, and different reactions occur for those that miss such anticipation (Benner and Ranganathan, 2013; 2017). Firms whose strategies do not align with market expectations tend to face additional pressures shown through mechanisms such as valuation discounts. Information asymmetry plays a central role in expectation misalignments between companies and investors. Although public companies report financial statements and other material information, the level of shared information remains insufficient for outside investors to comprehend companies' strategies in their entirety. The limited access to material tacit

[11] Sarbanes-Oxley Act of 2002, specifically section 404, is a more stringent auditing requirement for the publicly-listed companies in the US to have a stronger internal control process. This section has reportedly added cost pressures for the public companies. https://www.sec.gov/news/speech/2006/spch050806cag.htm According to SEC, the largest firms by market capitalization value ($10 billion and above) spent around 0.06% (of revenues) on SEC compliant audit fees, while the smallest companies by the same standard (market capitalization value of $25 million or less) spent up to 1.37% of revenues in 2004. In response to the concerns on increased cost burdens for the smaller companies, the SEC provided guidelines and extensions. By 2010, SEC has permanently exempted smaller-sized companies the internal audit requirement. https://www.sec.gov/spotlight/soxcomp.htm

knowledge in companies' strategies, and more recently, the rising intangible asset intensity due to newer business models and innovations, make it even harder to evaluate firms' strategies (Davis, 2016; Lev and Gu, 2016; Doidge et al., 2018).

The consequence of such market expectation misalignment, or strategic incongruence (Essay 1), often means rising information costs for public equity market investors. Higher information costs may eventually revert to the companies through public equity market pressures. As a result, firms may have to orient their strategies to short-term goals (Porter, 1992; Bushee, 1998) or end up forgoing high-quality investment opportunities (Benner and Zenger, 2016) in the process. A lemons problem in strategies (Benner and Zenger, 2016) might arise when companies face such pressures from the market. Consequently, they opt for lower-quality strategies that are easier for investors to understand over potentially higher-quality strategies that would be difficult to communicate to investors. Based on this theoretical framework, I study how certain public companies find solutions to such public market pressures by going private. Overall, I examine how firm strategies incongruent with market expectations would face more significant public market pressures and, therefore, more likely to go private. Specifically, I test how dimensions of strategic incongruence relate to privatization, (partially) mediated by public market pressures.

For the empirical design, I use archival data (1997-2016) on publicly-listed companies, focusing on non-financial industries (i.e., manufacturing and retail/wholesale services sectors) in the US and the respective privatizations. This amounts to 46,504 observations using 5,471 firms and 79 privatization events. I collected data from multiple archival sources (e.g., CCM and SDC Platinum) for companies' historical financials and

corresponding market data (closing share prices). Also, as a proxy for public market pressures, I use the measure derived from a hand-collected database of 13D filings, *proactive investor attention* (1/0) (a measure from Essay 1) to test a (partial) mediating effect in the process.

## Theory and Hypotheses

### *The Lemons Problem in Strategies and Privatizations as Extreme Solutions*

Privatizations reflect firms' choice of financial governance forms (Balakrishnan and Fox, 1993; Fama & Jensen, 1985; Jensen, 1986; Williamson, 1988; Folta and Janney, 2004). By choosing privatization, companies delist their publicly traded shares from the stock exchange and limit their exposure to a smaller and exclusive group of investors, such as private equity investors or strategic investors (corporations). Although privatizations are sometimes involuntary (e.g., bankruptcies or hostile takeovers), this study focuses on the voluntary forms of privatization that reflect firms' choices, highlighting the seller's perspective and motivations associated with the decision to go private. While acquisitions may appear to be driven mainly through buyers, prior studies have identified the acquisition process as a "courtship" between buyers and sellers (Graebner and Eisenhardt, 2004). Among voluntary acts of privatization, mergers and acquisitions (M&A) are the most prominent (Figure 12), followed by voluntary delisting, increasing yet rarer due to challenges in recapitalization (Doidge et al., 2018).

Privatizations also reflect an ultimate "extreme solution" by publicly traded firms to public market pressures (Benner and Zenger, 2016). The theoretical framework of a lemons problem in strategies (Benner and Zenger, 2016) suggests that companies may pursue lower quality strategies if they anticipate that the market does not fully understand

them. The consequences of such a lack of understanding companies' strategies are often nontrivial. It creates more significant levels of misalignment in expectations, shown through deep valuation discounts and, in some cases, less analyst coverage. Thus, companies with complex and unique strategies may opt for lower quality strategies as long as they are easier for investors to be on board. In this light, privatizations may be viewed as firms' active responses to public market pressures by opting out of the public equity market system rather than pursuing sub-optimal strategies that market participants may understand and accept. Management may also regain control of their slack resources by redirecting shareholder returns in dividends and share repurchases to investments in long-term growth.

In some ways, a private company may be better understood than a publicly-traded company due to the improved access to the more confidential information shared with an exclusive circle of sophisticated investors. Even prospect investors potentially command a higher understanding of the company benefitting from the due diligence processes. Also, having the capacity to wait out on a longer investment horizon as a private company may help build a more consistent and sustainable strategy. Publicly traded firms are motivated to keep certain information outside basic mandatory finings undisclosed due to security and competition risks. Without public dissemination of such knowledge, outsiders may have difficulty understanding.

That said, not all publicly-listed companies make consistent decisions on privatization to respond to rising public market pressures. Though most companies feel pressure from the public equity market, only certain firms exit the system and transform into private companies. I investigate such firm-level heterogeneity in privatization

choices by building on the notion of strategic incongruence. Strategic incongruence highlights that firms impose varying degrees of information asymmetry on their investors to the extent that their idiosyncratic strategies misalign with market-formed expectations. This study predicts that firms with greater strategic incongruence would have more significant market pressures due to their strategies, which may lead to stronger motivation to resort to privatization as an "extreme solution" to such market pressures. Thus, companies' decision to become private would be construed as a response to such public market pressures.

*H1. The greater a public firm's strategic incongruence, the greater the likelihood that it will go private (direct effect)*

In the form of acquisitions made by financial investors such as private equity investors, privatization might seem reminiscent of the numerous leverage buyout (LBO) transactions made by so-called "corporate raiders" that received much attention throughout the '80s. LBO firms tended to focus on restructuring or disinvestment of distressed assets from prior excessive corporate diversification movements and attempted to limit slack managerial resources that were considered potentially value-destructive (Fox and Marcus, 1992).

Earlier forms of private equity firms involved in such transactions were considered mere "financial engineers" that focused on boosting relatively temporary profit margins by reducing costs. Such efforts involved massive sell-off of unrelated assets. Since then, new and contemporary private equity firms have evolved to "operating engineers" that help the firm with a fundamental improvement in its operations, create economic value, and provide longer-term benefits that come from a reduction in

information asymmetry (Kaplan and Strömberg 2009; Matthews, Bye, and Howland, 2009; Bharath and Dittmar, 2010; Hoskisson et al., 2013; Benner and Zenger 2016; Kaul, Nary, and Singh, 2018). Private equity investors generally hold a majority stake in the firms, which gives them the controlling vote/power to sit on the board of directors and get deeply involved in the company's management. These private equity investors care for the process by which returns are made since how they create value for their investment (i.e., portfolio companies) may influence their overall reputation as an investor. However, the sale of a company to private equity investors as a means to privatization may be considered "temporary" in that within the next five to ten years, the target company will again experience switching of investors upon private equity investors' exit.

Another important form of privatization is driven by non-financial and private investors (i.e., strategic corporate investors) that acquire publicly traded companies. A strategic investor utilizes target companies' privatization as a means to inorganic growth, be it diversification, vertical integration, or scalability. From the seller companies' perspective, they have the motivation to operate in an environment less exposed to the public and with the liberty to take on longer-term and more uncertain projects. This is often a permanent transition through which additional considerations for potential compatibility with the acquirers' existing portfolio of businesses, or synergistic effect, may also occur.

In H2 and H3, I test how public market pressure built from greater levels of information asymmetry due to firms' varying degrees of strategic incongruence influences firms' decisions to go private. The prediction is that companies pursuing strategies characterized by greater strategic incongruence will lead to privatization

decisions, partially mediated by public market pressures, proxied by *proactive investor attention* (Essay 1) since these companies will be faced with more pressures from proactive investors' interventions.

*H2. The greater the strategic incongruence, the greater the public market pressure*

*H3. The greater the public market pressures, the greater the likelihood that the firm will go private, (partially) mediated by public market pressure (indirect effect)*

## Empirical strategy

### Data

I collected and combined data from multiple archival sources, including Compustat, CRSP, I/B/E/S, and SDC Platinum. This study uses firm-level observations (46,504 firm-year observations, 5,471 firms, and 79 "failure" or privatization events) between 1997 and 2016 among the domestic US public companies trading in the three major stock exchanges (NYSE, AMEZ, and NASDAQ). This study focuses on non-financial sectors, specifically, manufacturing and services (wholesale and retail) industries (sic codes 2000-3999 and 5000-5999), mainly due to the comparability of firm financials. This excludes financial services sectors and other regulated industries, such as utilities and public administration. All companies in the sample are domestic firms with headquarters in the US and whose primary currency is the USD. Those with missing critical financial information (such as sales or total assets) have been treated as zero, and the missing information is accounted for through dummy variables. The database is an unbalanced panel. The variance in the number of available years of financial information depends on a public firm's duration in the public equity market.

*Dependent, Explanatory, and Control Variables*

*Privatization* is the dependent variable for H1 and H3. I measure the variable as a binary variable (1/0) depending on whether a firm has delisted from three major US stock exchanges (NYSE, AMEX, NASDAQ). Thus, the privatization measure reflects acquisitions by private corporate investors and private financial investors, such as private equity. I collected data from both the Compustat database for the companies' financial information and the SDC Platinum for the acquirer information. Since the focus of this paper is on the companies' likelihood to go private by choice, I eliminated hostile transactions, which only account for a very small portion. As for the mergers and acquisitions information from SDC Platinum, I used only completed deals with effective transaction dates and deals with non-hostile attitudes, such as Friendly or Neutral. I also eliminated transactions from spin-offs and carve-outs. Privatizations that meet the criteria have been coded as one and otherwise as 0 to indicate when the event had occurred. In addition, transactions involving bankruptcy have not been coded as privatization in the sample. There were 79 privatization events in the sample. All explanatory variables are lagged one year.

*Relative R&D spending* is the first strategic incongruence independent variable for all three hypotheses (both dependent variables: public market pressures and privatization). This measure is continuous, captured as a firm's R&D investments relative to the industry average by taking the difference of a firm's R&D intensity (R&D expenses/Revenue) relative to the respective industry average. I reflect industry average spending in the measure to account for the fact that companies' investment strategies are impacted by the nature of the industry and the inherent competitive structure (Berger and

Ofek, 1995; Bushee 1998). Consistent with the study in Essay 1, I also provide a supplementary analysis: positive relative R&D spending (greater than average) and *negative relative R&D spending* (lower than average spending). This concept is drawn from the use of spline variables (Greve 1998; Baum & Dahlin, 2007; Eggers & Kaul 2018), whereby only the effect of interest is coded with the absolute value, and the others, such as zero and negative values, are coded as 0. For example, *positive relative R&D spending* would be coded with the absolute value of the excess R&D spending relative to the industry, and 0 would be used for other values, including negative and zero values. The same coding system applies for *negative relative R&D spending*. I collected the financial information from Compustat and adjusted with calendarization for differences for those companies whose fiscal years do not end in December. This process ensures consistency and comparability with other variables based on market information (and therefore based on a calendar year) and other firms in the sample.

*Relative capital expenditure* is the second measure of strategic incongruence consistent with Essay 1. Similar to relative R&D spending, I use the measure to explore how capital expenditures relative to a firm's industry peers may affect the likelihood of a company going private. For the supplementary analysis, spline variables are used to determine the ex-post analysis of directional spending (i.e., *positive relative capital expenditure* and *negative relative capital expenditure*).

*Relative diversification* is the relative degree of diversification of a firm in relation to its industry peers. This measure is the final alternative measure in studying how strategically incongruent actions of a firm may lead to privatizations.

*Public market pressures* (1/0) is a measure that I borrow from Essay 1 (*proactive investor attention*). This binary measure is included to incorporate potential proactive investor attention as another form of underlying mechanism in leading a firm's decision to go private as a response to the public market pressures that arise from strategic incongruence and information asymmetries. I conduct an analysis testing the (partial) mediation relationship using this variable. This measure is coded as a one if the company had a proactive investor attention event in the prior year and 0 otherwise. The underlying data is derived from the data collected from 13D filings, which investors have to file to the SEC when they acquire more than a 5% stake in a publicly-listed company with the intent to intervene in the company's management in the foreseeable future.

*Relative valuation* is a control variable that reflects the relative level of valuation of a given stock. Essentially, the distance in these cases would imply either a premium or a discount to the average industry valuation. In terms of the type of the valuation variable, I used trailing P/B multiples (adjusted by excluding outliers) for each firm to counter potential issues with large fluctuations in companies' earnings information.

*Number of analyst coverage* measures the number of analysts covering a company's stock in the previous year.

*Analyst recommendation* measures the average of the recommendations of the analysts covering the company's stock in the previous year based on I/B/E/S data (scale of 1 to 5, 1 being a strong buy and 5 being a strong sell).

*Annual trading volume* measures how liquid a company's stock is in the public market. I take the log value of individual companies' annual trading volume.

*Industry similarity* is used to account for the level of an industry's competitive landscape since external pressures from market competition may influence companies' investment strategies and other operations. I collected data from Hoberg and Philips (2016), in which the authors provide data for each publicly-listed firm using the text analysis method.

*Financial slack resources* is a control variable accounting for individual firms' available financial slack resources. The measure is generated by dividing the company's cash balance by its total assets.

*Firm size* is the log value of a firm's revenues.

*Performance* is included to control for the potential influence of firm performance (Wei & Zhang 2006; Cao, Simin, & Zhao, 2008). The variable is measured as the calendarized return on assets by computing the ratios based on financial information for each company.

*Governance issues (1/0)* indicates whether the company has had governance issues (e.g., dual-class structures, etc.) in the previous year.

*Share repurchase (1/0)* measures whether the company has a track record of share repurchases in the previous year.

*Industry* dummy variables are included to account for industry-specific effects, measured at the 2-digit SIC level.

*Year* dummy variables are included to account for possible factors that influence all firms within a specific year.

**Methodology**

This study uses the proportional hazard model (exponential), using maximum likelihood estimation for parametric regression survival models (Cleves, Gould, & Marchenko, 2016). The proportional hazard model is suitable for estimating the likelihood of a failure event, which in this study is the privatization outcome of public companies in the United States. A basic model takes form in multiplicative effect, as the following:

$h(t_j) = h_0(t)g(x_j)$, *where* $g(x_j)$ *is equal to* $exp(x_j\beta)$.

In terms of the setting of the proportional hazard model and the assumption for its error term distribution, I use the exponential model, which is a type of Weibull model that is suitable for data with constant hazard with time (and therefore, $h_0(t) = c$) (Cleves, Gould, & Marchenko, 2016). Outputs are in the form of hazard ratios. Estimation output from this model is designed to measure the likelihood of the privatization event.

**Results**

Models 1 - 3 in Table 6 show results for testing the first hypothesis. Here, I test the relationship between the key variables, i.e., the measures of strategic incongruence and the dependent variable, *privatization event*, in the absence of the *public market pressure* measure. Base models (Models 1 and 2) show that the coefficients on all three measures of strategic incongruence (*relative capex, relative R&D*, and *relative diversification*) are not statistically significant. Based on these results, I conclude that there is no direct effect of strategic incongruence on company decisions to go private, therefore, not supporting H1. Similar to Essay 1, I ran a supplementary analysis using spline variables to probe the differences in the direction of the strategic incongruence

(shown in Model 3). Consistent with the base models, there generally are no significant results except a positive coefficient on relative R&D spending. The results also suggest that firms' relative valuation levels do not significantly affect privatization decisions.

Models 4 – 6 in Table 7 show the results for the second hypothesis. H2 examines whether varying degrees of strategic incongruence is associated with public market pressure (proxied by the *proactive investor attention* (0/1) used in Essay 1). Consistent with the results from Essay 1, I find all three measures of strategic incongruence correlated with public market pressure. Results from a supplementary analysis using spline variables (Model 6) also are consistent with findings in Essay 1; investors give attention to firms spending capex marginally above the industry average and also firms that have lower relative R&D spending than average, yet are close to the industry average are likely to attract proactive investor attention.

Models 7, 8, and 9 in Table 8 show the results of tests of the third hypothesis, i.e., the association between strategic incongruence and the likelihood to go private, partially mediated by proactive investor attention. Thus, *public market pressure* (proxied by proactive investor attention (1/0)) is included in this model. Similar to the findings from H1, none of the strategic incongruence measures are statistically significant, implying no direct effect on privatization decisions. Yet, public market pressure appears to be strongly associated with the privatization event. This suggests that companies with public market pressure are likely to go private. Piecing everything together, while I do not find a direct link between strategic incongruence and privatization, I find that public market pressure relates to firm-level strategy. Subsequently, companies that face public market pressures are inclined to make privatization choices. This suggests some evidence of mediation and

the nontrival influence on publicly-listed companies. In addition, given the strong association between public market pressure and privatization, this leaves room for exploration in other forms of strategic incongruence that may be (partially) mediated.

**Conclusion and Contributions**

This paper has been motivated by the phenomenon of having fewer public firms in the US. As a step toward better understanding the underlying driver of this phenomenon, this paper has focused more narrowly on privatizations. Together with the decline in IPOs over the years, privatizations have contributed to the phenomenon (Figure 12). Therefore, this paper focuses on acquisitions by private investors, such as private equity investors and private strategic investors (e.g., corporations). Specifically, I studied which firms are likely to go private, given strategy choices that are incongruent with industry peers, in the form of relative R&D spending, relative capital expenditures, and relative diversification.

This paper builds on the theoretical lens of the lemons problem in strategy (Benner and Zenger, 2016) that has been proposed as a characteristic of public equity markets. Scholars have examined how novel, unique, or complex strategies pursued by public companies can face valuation discounts due to higher evaluation costs for investors (Litov, Moreton, & Zenger, 2012; Benner & Zenger, 2016). In the process, pressure for short-termism has influenced an important part of companies' strategies, such as in R&D investments (Bushee, 1998) and earnings management (Zhang & Gimeno, 2010). As a solution to higher information costs or evaluation costs for investors, prior literature has highlighted ownership by large block shareholders (Edmans, 2009) and acquisitions by private equity (Benner & Zenger, 2016), given PE's

evolved long-term advisory role. That said, what characteristics of firms are associated with these privatization choices are less well known.

In this study, I expand the discussion on which types of firms ultimately make these decisions to go private, focusing on prior characteristics related to firms' investment strategies. Building on prior work in which scholars explore how information asymmetry in public markets imposes various limitations to public firms' long-term growth, this study explores how inherent opportunity costs from public markets would motivate certain firms' privatization choices or alternative financial governance forms, primarily focusing on the firm-level strategic attributes. A novel element of the study is examining how a firm's level of strategic incongruence impacts privatization in the presence of public market pressures. Understanding this phenomenon has become increasingly relevant and vital for practitioners and academic scholars alike. Based on the empirical model of parametric test of maximum likelihood estimation, I find some evidence of how public market pressures are linked to companies' strategies and are likely to increase firms' likelihood of going private, overall consistent with Essay 1.

**Limitations and Future Directions**

This paper has several limitations. First, the paper is focused on observing and testing existing public firms' privatization choices by examining different investment forms of strategic incongruence. Given that the findings in this study lack support for H1 and H3 that test the direct and indirect effect of strategic incongruence on privatization choices, I plan to consider other ways of capturing strategy that may be more appropriate and relevant. For example, potential candidates would be measures of various facets of

investment uncertainties, such as longevity of assets, technological uncertainties, and other types of risk levels.

Also, other than privatizations as a form of firm responses to public market pressures, it would be important to expand the firm's choice set to include other responses such as divestitures or changes in investment directions/choices. For example, it is also important to consider the potential competing risk of divestitures (Feldman, 2016) in the selection pool for firms and the possible outcome that firms remain public but abandon particular strategies in the face of public market pressure.

In this study, I focused on firms' strategic incongruence and the relationship with privatization choices, with expectations for a potential mediation by elevated levels of public market pressures (or proactive investor attention). There remains a need for further studies in establishing a mediation relationship, especially with considerations for the challenges inherent in studying mediation (Shaver, 2005).

Finally, I plan to conduct a qualitative study based on interviews with private equity investors to provide a more comprehensive context.

## Essay 3: Firm Innovation Strategies and Private-to-Public Choices

**Abstract:** This study seeks to understand how firms' innovation strategies may impact firms' decisions to stay private, motivated by the decreasing number of IPOs (Initial Public Offering) and thus fewer publicly-traded firms in the US. Building on the lemons problems in strategies framework, I argue that innovation strategies that are more difficult to understand or value by public market participants may have firms avoid IPOs due to concerns that the public equity market will not fully appreciate its value. I examine this argument in the context of heterogeneous patenting activities in VC (Venture Capital)-backed firms. Preliminary findings show that technological incongruence does not positively affect the decision to go public but that it takes a longer time-to-IPO for those who decide to go public in some industries.

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## Introduction

The number of IPOs (Initial Public Offering) in the US has declined significantly over the last few decades (Figure 2). Consistent with the phenomenon, an increasing number of VC (Venture Capital)[12]- backed private companies have been exiting via acquisitions rather than going public, a stark contrast with the past (Figures 13 and 14). In addition, according to the National Venture Capital Association (NVCA), the time-to-exit from these transactions and the median age of the firm at the time of IPO have increased notably. In sum, private companies, specifically those supported by external financiers such as venture capitalists, have been involved more in mergers and acquisitions than IPOs, and the attributes of IPO candidates, such as size and age, appear to have also evolved over the years (Figure 16).

Some prior literature has sought explanations for this trend at the macro-economic levels (Gao, Ritter, and Zhu, 2013; Asker, Farre-Mensa, and Ljungqvist, 2014; Doidge, Karolyi, and Stulz, 2017; Doidge et al., 2018), noting that regulatory changes such as Sarbanes-Oxley (SOX 404) have increased the costs of maintaining a publicly-listed status in the US and thus have made public markets a less favorable environment than before, especially for smaller-sized firms. Consistent with this development, publicly-traded companies face greater pressures from public equity markets, as evidenced by higher share repurchases and dividends (Lazonick, 2014; 2015; Grullon and Michealy, 2004). A prolonged low-interest-rate environment and subsequent rise in access to private market capital have been widely discussed as culprits of the declining number of

[12] Venture capital investors are known to invest in relatively early-stage firms, often times in pre-IPO, private companies. They are often distinguished from angel/seed investors that primarily invest in very early-stage start-ups.

publicly-listed firms in the U.S. With that backdrop, there remain opportunities in understanding what firm-level strategic factors drive IPO vs. M&A decisions[13].

Decisions to go public or to be acquired by another entity are critical to companies' long-term outlook and may ultimately be tied to their existence. As such, this paper seeks to understand the strategic drivers associated with how companies decide their governance forms. Specifically, this study tries to explain how innovation strategies of a VC-backed private firm influence its likelihood to go public and whether such attributes have contributed to IPOs taking longer than in the past. This study does not aim to explain the trend factors, except for providing supplementary descriptive analyses.

This study is grounded in the theoretical lens of the lemons problem in strategies (Benner and Zenger, 2016) to explain how adverse selection in public equity markets due to information asymmetry arising from firms' innovation strategies may factor in a firm's decision to go public or stay private. The overall prediction is that, given the intent to exit, a potential 'mispricing' due to the lack of understanding of a company's strategies in public markets may induce firms (or their financiers such as venture capitalists) to avoid IPOs and ultimately stay private by being acquired by private entities.

The novel element in the essay is that I examine these questions in the context of heterogenous patenting activities in VC-backed firms and observe how these differences in innovative strategies may impact how firms (or their financiers) come to their decision. The underlying mechanism is that firms' innovation strategies, i.e., patenting activities that are unconventional or complex, are less likely to be understood by public equity markets. As a result, private companies that fall into this category may receive lower

[13] Hoehn-Weiss and Karim (2014) has found that a firm's alliance portfolio has an influence on the IPO versus M&A outcome.

valuations or IPO pricing and are thus more likely to pursue a merger or acquisition based on this anticipation. However, the firms pursuing these hard-to-understand or different strategies may be striving for higher levels of innovation.

With the rise in intangible assets for the economy (Figure 9) and the growing presence of the information and technology sector, comprehending the nature and degree of firms' innovation strategies has become more challenging and critical (Lev and Gu, 2016; Doidge et al., 2018), while doing so is increasingly important. The significance is that it may directly impact the universe of observations of publicly-traded companies and, therefore, the degree of information these companies provide. This question is also critical from the perspective of policymakers because fewer IPOs may adversely impact the overall US capital market and the economy[14]. I built a database combining various datasets from Harvard Dataverse, USPTO database, Venture Xpert, and other archival sources and used 8,249 firm-year observations (342 IPO transactions in this study. Based on preliminary analysis, I do not find support for the association with the technological incongruence and the decision to go public, but I do find that such strategic factors have some influence in delaying the time a firm takes to go public in certain industries.

## Theory

### *Public market pressures, innovation strategies, and going public choices*

Various forms of public equity market pressure on companies have been widely discussed; short-termism (Sampson and Shi, 2017), cash returns to shareholders (i.e., share repurchases or dividends) (Lazonick, 2014; 2015), and increasingly activism

[14] As a reflection of its significance, an IPO Task Force was formed in 2011, to make recommendations to the US Department of Treasury to address the problem of declining IPOs. IPO Task Force report to the U.S. Department of the Treasury (2011): https://www.sec.gov/info/smallbus/acsec/rebuilding_the_ipo_on-ramp.pdf

campaigns intended to intervene in management, notably by investors such as hedge funds (Chen and Feldman, 2018; DesJardine and Durand, 2020; Ahn and Wiersema, 2021). The lemons problem in strategies framework (Benner and Zenger, 2016) explains that public companies may resort to simpler and easier-to-understand strategies in response to such market pressures even if they could suggest pursuing lower quality strategies. Strategies that may appear complex or harder to communicate to the investors are often discouraged in fear of mispricing (undervaluation) of companies' share prices, essentially an adverse selection issue. Even in cases where managers are acting in the best interests of the company, if they have difficulty in communicating the complex aspects of corporate strategies to the outside investors, the market would likely penalize them, often in the form of share price underperformance, and in some extreme cases, analysts dropping coverage (Benner and Zenger, 2016).

Building on this theoretical lens, I ask the question on how firms' innovative strategies influence the company's exit via IPO. I argue that private companies with idiosyncratic innovation strategies that may not necessarily align with market expectations may, in response to public equity pressures or, as a function of adverse selection, seek other options than going public. Pressures from public equity markets shown through demands for dividends and share repurchases and the increasing amount of shareholder intervention (including activist investors) are well known to the managers and owners of the private companies even before they enter the market. Such prior knowledge about the nature of public markets may create reservations about the next step in the company's life cycle. To the extent that the firms believe that the nature of their strategies is relatively more difficult to be understood and accepted by the capital market

participants, these private firms may consider the risk of undervaluation during the IPO process and the share price movements after they become a public company. In private capital markets, contrary to how they are perceived due to the lack of publicly-disclosed information, the unlocking of the private information to highly probable investors is likely to reduce the level of information asymmetry between investors and management. This contrasts with the practice of sharing limited information with public equity market investors that require public dissemination and therefore risks underpricing for the companies during an IPO process or after the company has become publicly listed.

Setting the context among VC-backed (private) companies, I look at how patenting activities as a form of firms' innovation strategies take a role in the exit decision. Based on the theoretical lens of the lemons problem in strategies, I expect that companies with apparently difficult-to-understand innovation strategies shown through their patenting activities may shy away from public markets, fearing lacking investor acceptance and risk of undervaluation.

*Technological incongruence in firms' innovation strategies*

In this study, I explore the notion of technological incongruence - various facets of firms' innovation strategies that may misalign with public market expectations or lack public market understanding. I suggest certain traits because public equity market investors generally resist high uncertainty in companies' strategies. These characteristics would include those requiring more profound knowledge and understanding of firms' innovation strategies, unprecedented or new strategies that the market is unfamiliar with, and out-of-consensus initiatives inconsistent with an industry's standard practices. I argue that the degree of technological incongruence influences the IPO choice outcome as it

possibly reflects a more significant gap in investors truly understanding companies' innovation strategies and thus encourages these firms to choose an option that best fits their business model. Specifically, I posit that the breadth of technology may play a role. The breadth of technology refers to technological strategies lacking coherence or are involved in various areas. This is analogous to the diversification concerns that the public market has consistently expressed over time since investors value simplicity (Benner and Zenger, 2016). In the first hypothesis, I explore how the greater technological incongruence in the form of the breadth of technology may be associated with the likelihood to go public. Specifically, I posit that a higher level of technological incongruence would motivate the firm to stay private, given the outlook for potential confrontation and intervention from the public equity market investors.

*H1. The greater the technological incongruence in a VC-backed company's key operations, the smaller the likelihood for an IPO-exit*

Companies experience non-trivial changes as they transition into public equity markets. A major change is a shift in investor profiles and the nature of investors' expectations. Over time, companies generally see an increase in the number of investors and dispersion in the type of investors (e.g., long-time investors, transient investors with various trading patterns including shorting, activist investors with stronger intention to voice opinions to management). Unlike private market and early-stage investors, public market investors have a lower tolerance for uncertainty and demand higher predictability in earnings and cash flow streams in a relatively foreseeable future – generally no more than 2-3 years[15]. Time-horizon is also structurally different. Compared with venture

[15] This statement is based the average number of analysts' published estimates – usually up to three years, and the average official duration of target prices and recommendations that range from 6 months to 12 months (I/B/E/S).

capitalists that usually have a fixed investment period of around ten years (Kaplan and Lerner, 2010), public market institutional investors generally have shorter time horizons[16]. A distinct difference is that the ample liquidity in public equity markets allows investors to trade in and out with ease, potentially implying a different level of commitment to management.

I expect that companies with innovative strategies that are expected to be less understood by the public markets (i.e., a higher degree of 'technological incongruence') would take even more time to exit as they embark to face a new audience. This may involve a longer time to prepare to meet the expectations of the new audience group, which often look for more apparent financial matrices or strategies that are more coherent with industry peers. Or it may be associated with additional time that is consumed due to hesitation in choosing the appropriate form of financial governance. Based on such grounds, I posit that companies whose strategies have higher levels of technological incongruence would take longer to go public when they decide to go public.

*H2. The greater technological incongruence in a VC-backed company's key operations, the longer the time-to-IPO*

**Empirical Strategy**

**Data**

In order to examine the heterogenous patenting activities of private companies, I combine multiple datasets. To focus on companies with the possible intention to make an exit (via IPO), I narrow the scope of the study to those backed by external financiers, such as venture capitalists. Thus, I use Venture Xpert (ThompsonOne) as the primary source to get the universe of venture capital financed companies. This database provides

[16] Also, it is noteworthy that a large part of public market institutional investors face fund performance reviews on shorter time-horizons, such as quarterly or annual cycles.

detailed information on each round of venture capitalist funding and additional information on the venture capital (or their funds) – e.g., which stage they usually invest in. Next, I rely on the Harvard Dataverse and other patent shared databases to examine the organization (assignee)-level patenting activities building on prior literature that uses patent data to analyze innovation (Kogan et al., 2017). In addition, patents are helpful in this study, given that patents are more often managed and sought after by venture capitalists for use as signals of growth to outsiders (Mann and Sager, 2007). On the other hand, it is noteworthy that public market investors generally seek earnings predictability indicators, rely less on patents, and typically have less understanding in this area. Other data sources include the Jay Ritter IPO website, a shared database, Kenny and Patton IPO database (Emerging Growth Companies)[17]. The main database covers 1991 to 2010 using 8,249 firm-year observations (342 IPO transactions).

**Measures**

Dependent variables

*Exit mode (IPO)*: A key dependent variable is a binary variable (1/0) that indicates whether a VC-backed company with patenting activity has exited via IPO, using a pool of VC-backed companies that have exited by 2010. This is the dependent variable for H1.

*Time-to-exit*: I examine the time-to-exit, or specifically, the time-to-IPO, the dependent variable for H2. This measure is derived by calculating the time (number of years) a company took to go public since its founding year provided by the Kenny and Patton IPO database.

[17] I thank Professors Kenny and Patton for sharing their IPO database of Emerging Growth Companies.

The key independent variable to test the technological incongruence is the *breadth of technology.* This variable is measured using the average number of classes in a patent per company provided by the USPTO office. Alternatively, for robustness checks, I use concentration measures, such as HHI, or other entropy measures, to test the degree of dispersion in the average number of classes per patent.

Control variables include the *venture capital industry vintage* (number of venture capital funding rounds) and the *number of patent counts* per year for the assignee (firm-level). I include the vintage of the firm of interest as a proxy for the time associated with the venture capitalist since such duration may impact the (VC's) overall decision to exit. That is, in general, longer time spent with the venture capitalist may indicate more imminent exit likelihood versus those that have just entered into a new relationship with the external financier. Also, I include the information on the number of patent counts for the company based on the prior studies in that companies may try to increase the number of patents in the years leading up to the IPO to appear more attractive to the potential investors in the public equity market (Mann and Sager, 2007).

*Year* and *industry* dummies (industry classification used in the venture capital industry as per VentureXpert data) are included.

**Estimation models**

For the first hypothesis, I use the logistic regression as the main analysis, relying on the maximum likelihood estimation to test the likelihood of firms' exit choice for the IPO decision (binary). In order to test the time-to-IPO, given firms' choice to go public, I use the OLS regression model (between-effects analysis) to understand how differences in technological incongruence may affect a firm's time to go public across various firms.

**Results**

Models 1 - 5 in Table 9 show the main results of this study. The first model (Model 1) shows the results for H1 that test technological incongruence in association with the decision to go public. As seen in Model 1, the evidence of association of the breadth of technology (via the dispersion of patent classes) is not found. Here, only the *venture capital industry vintage* (via the count of VC funding rounds for a company) is shown to have a positive association with the firm's IPO outcome. Similar results are found in the second model, where H2, or the time it takes for a firm to go public given exit, also does not strongly correlate with the degree of technological incongruence. When additional sub-sample analysis is done based on the industry groupings, Model 4 shows evidence for an association between the breadth of technology and the time-to-IPO for companies that are in the computer and semi-conductor-related industries. On the other hand, no support is found in industries that include biotechnology, medical devices, and life sciences (Model 3) and other remaining industries, such as communications, media, and other non-Hitech industries (Model 5). Also, in the industry sub-sample analysis, I find that the number of patents in relation to the time-to-IPO does not show statistical significance in biotechnology and computer/semi-conductor related industries but is relevant in other industries such as communications/media and non-Hitech.

**Conclusion**

This study examines two key questions, whether technological incongruence is associated with the decision to public (IPO) and, given the exit, whether such strategic factors affect the firm's time-to-IPO. Based on the preliminary analysis testing H1 and H2 in the study, I find that technological incongruence, in the form of the breadth of

technology, does not have a positive relationship with a venture-backed private company's decision to go public. This is also the case with the testing of technological incongruence and the time-to-IPO. However, supplementary analysis using industry split samples shows that the breadth of technology does matter in extending the time for companies in the computer and semiconductor industry to go public. This finding suggests that innovation strategies and activities may markedly differ by industry and warrant additional, more relevant analyses to specific industries.

**Limitations and Future directions**

This study is a starting point for exploring the suggested notion of technological incongruence. Hence, the study only covers basic analysis and leaves room for numerous avenues of future work. First, I would need more work on uncovering the nature of the acquirer, in which companies would choose to exit (over IPOs). Currently, the primary analysis investigates the likelihood of IPO associated with the strategic factors (technological incongruence). However, a dominant portion of the transactions is increasingly made via mergers and acquisitions, which leaves ample room for exploration (Figure 12). The next step is to study the likelihood differences for an IPO vs. M&A, given an exit, as a competing risk analysis. An extended analysis worth exploring would be understanding the type of acquirer (private buyer or a publicly-listed acquirer). I can also further study the overall fit between the two parties regarding strategic factors such as technological incongruence.

Also, I need to explore alternative dimensions in the suggested technological incongruence framework. Potential candidates are novelty and complexity. These are based on the premise that public market investors are not favorable towards uncertainty.

Investors do not necessarily discourage higher risk-return strategies but avoid companies whose strategies exhibit higher uncertainty levels but lower predictabilities (Knight, 1921). This is more relevant, particularly for unfamiliar strategies, as seen from studies showing that investors penalize nascent firms in the market via valuation discounts (Sanders and Boivie, 2004). Complex strategies that are fundamentally hard for outside investors to understand would likely result in adverse selection due to a high degree of information asymmetry (Benner and Zenger, 2016).

In addition, there remain various endogeneity concerns that need to be addressed in future research. Concerns for omitted variables in this study would be potential factors related to the likelihood of choosing IPO over M&A as an exit choice (Brau, Francis, and Koher, 2003). In addition, there are some concerns for confounding factors that influence the time-to-IPO, other than strategic incongruence. In an attempt to mitigate potential selection bias issues, an instrumental variable such as the state-level R&D tax credit policies may be used. At different times, several states have introduced various forms of incentives for R&D by providing R&D tax credits. All but 13 states offer some form of the R&D credit. This should meet the relevance restriction in that R&D tax credits would spur state-level innovation activities that may be positively associated with firms' capacity to explore technologies incongruent with market norms. Also, exclusion restrictions should be met in that R&D tax credit at the state level does not necessarily lead to IPO events.

Lastly, the study warrants additional analysis in the size and industry specificity. In reality, a private company that is ready to enter the public market has to initially decide to stay private vs. going public based on its size. Based on the observations of

recent IPOs, companies that have already grown quite significantly by the time of the exit sometimes do not have much choice at the final stage. For example, a company that is considered a "decacorn" or those with post-market valuations over $10 billion would find it very challenging to find private companies that have the capacity to acquire the firm. Thus, these companies have to exit via the IPO market.

On the other hand, in reality, companies that are considered to be in the "middle-market" (companies under around $1 billion in value) are generally regarded as more appropriate and attractive targets for the acquirers. Based on this understanding, I need to pursue additional split-sample analyses that focus on specific size groups with different propensity to decide to go public or stay private. This also goes for industry specificity. As seen in the supplementary analysis in the study that looked at different industry groups, innovation strategies pertaining to the patent activities may be drastically different for those in the biotechnology industries vs. those in computer-related (e.g., software) industries and so forth. Thus, additional studies related to industry differences should be done in future research.

**Contribution**

Beyond the limitations and future directions for this study, some contributions are made through this study. First of all, finding answers to how firms' innovation strategies matter in the likelihood of going public remains important. Recent years of momentum in the IPO market have redirected the attention to companies' decisions to go public. Despite the elevated interest in some of the recent IPO transactions, the overall level of IPOs remains relatively subdued. The level of pressure from the public equity market participants remains an increasing concern for companies operating in the environment.

In addition, entrants into the public equity market have been deriving more creative ways to reduce the costs that stem from the information asymmetry when entering the public equity market. For example, more companies are choosing direct listing – where the company goes public only with the existing shares and no additional issuance, as opposed to the traditional IPO process. Also, over the past year, an alternative mode of entering the public equity markets, i.e., SPACs (Special Purpose Acquisition Company) that simply bypasses the conventional complicated IPO process, has been garnering much attention. These initiatives essentially are efforts to lower the costs associated with the IPO process by simplifying the process and risks from undervaluation of the share prices due to information asymmetry.

Furthermore, implications from the findings of the study may be significant for the Strategy research. This is because the decline in the universe of subject public companies as an outcome will ultimately lead to even higher levels of information asymmetry between managers and investors since a smaller number of companies will remain public. Hence, further pursuit of the question in a more granular and in-depth analysis would be necessary.

# Tables

Table 1. Descriptive statistics and pairwise correlation table for key measures for Essay 1

| | | Mean | SD | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Positive relative capex | 0.02 | 0.04 | 1.00 | | | | | | | | | | | | | | | | |
| 2 | Negative relative capex | 0.02 | 0.02 | (0.28) | 1.00 | | | | | | | | | | | | | | | |
| 3 | Relative capex | 0.00 | 0.05 | 0.91 | (0.65) | 1.00 | | | | | | | | | | | | | | |
| 4 | Positive relative R&D | 0.03 | 0.09 | (0.05) | (0.01) | (0.03) | 1.00 | | | | | | | | | | | | | |
| 5 | Negative relative R&D | 0.02 | 0.04 | (0.00) | (0.10) | 0.04 | (0.20) | 1.00 | | | | | | | | | | | | |
| 6 | Relative R&D | 0.01 | 0.11 | (0.04) | 0.02 | (0.04) | 0.94 | (0.53) | 1.00 | | | | | | | | | | | |
| 7 | Relative diversification | 0.14 | 1.07 | (0.04) | 0.01 | (0.04) | (0.12) | 0.13 | (0.15) | 1.00 | | | | | | | | | | |
| 8 | Valuation | 0.34 | 0.47 | 0.03 | (0.03) | 0.04 | 0.09 | (0.11) | 0.12 | (0.06) | 1.00 | | | | | | | | | |
| 9 | Number of analyst coverage | 5.88 | 7.09 | 0.02 | (0.09) | 0.05 | 0.02 | (0.13) | 0.07 | 0.07 | 0.14 | 1.00 | | | | | | | | |
| 10 | Analyst recommendation mean | 1.60 | 1.07 | (0.01) | (0.11) | 0.04 | 0.04 | (0.08) | 0.06 | 0.02 | 0.03 | 0.49 | 1.00 | | | | | | | |
| 11 | Trading volume | 11.96 | 1.96 | (0.00) | (0.07) | 0.03 | 0.11 | (0.13) | 0.14 | 0.10 | 0.19 | 0.68 | 0.38 | 1.00 | | | | | | |
| 12 | Industry similarity | 3.71 | 5.36 | 0.06 | 0.03 | 0.03 | 0.33 | (0.06) | 0.31 | (0.08) | 0.09 | 0.11 | 0.05 | 0.18 | 1.00 | | | | | |
| 13 | Financial slack resources | 0.19 | 0.21 | (0.10) | 0.01 | (0.09) | 0.44 | (0.00) | 0.38 | (0.19) | 0.13 | (0.01) | 0.00 | 0.09 | 0.34 | 1.00 | | | | |
| 14 | Size | 5.91 | 2.10 | (0.06) | (0.10) | (0.01) | (0.26) | (0.04) | (0.22) | 0.29 | 0.05 | 0.57 | 0.33 | 0.64 | (0.06) | (0.36) | 1.00 | | | |
| 15 | Goverance issue | 0.23 | 0.42 | (0.04) | (0.08) | (0.00) | (0.06) | (0.04) | (0.04) | 0.13 | 0.01 | 0.40 | 0.32 | 0.36 | (0.05) | (0.10) | 0.40 | 1.00 | | |
| 16 | Share repurchases | 0.13 | 0.34 | (0.02) | (0.02) | (0.01) | (0.03) | (0.01) | (0.02) | 0.00 | (0.02) | 0.15 | 0.12 | 0.10 | (0.04) | 0.01 | 0.11 | 0.12 | 1.00 | |
| 17 | Performance | (0.01) | 0.74 | (0.02) | (0.03) | (0.00) | (0.25) | (0.03) | (0.21) | 0.05 | (0.03) | 0.09 | 0.03 | 0.01 | (0.17) | (0.16) | 0.21 | 0.10 | 0.07 | 1.00 |

Table 2. Summary results for Essay 1 (DV = Proactive Investor Attention (1/0))

| | (1) | (2) | (3) | | (4) |
|---|---|---|---|---|---|
| | DV = Attention (1/0) | | | | DV = Attention (1/0) |
| VARIABLES | Hazard model | | | VARIABLES | Hazard model |
| | | | | Positive relative R&D | 0.928 |
| | | | | | (0.423) |
| | | | | Negative relative R&D | 0.000*** |
| | | | | | (0.000) |
| Relative capex | | | 0.163*** | Positive relative capex | 0.073*** |
| | | | (0.097) | | (0.066) |
| Relative R&D | | | 4.435*** | Negative relative capex | 0.002** |
| | | | (1.495) | | (0.004) |
| Relative diversification | | | 1.191*** | Relative diversification | 1.230*** |
| | | | (0.040) | | (0.043) |
| Relative valuation | | 0.793*** | 0.801*** | Relative valuation | 0.798*** |
| | | (0.014) | (0.015) | | (0.015) |
| Number of analyst coverage | 1.062*** | 1.083*** | 1.082*** | Number of analyst coverage | 1.077*** |
| | (0.010) | (0.010) | (0.010) | | (0.010) |
| Analyst recommendation | 2.138*** | 1.791*** | 1.910*** | Analyst recommendation | 1.911*** |
| | (0.172) | (0.143) | (0.153) | | (0.155) |
| Annual trading volume | 0.781*** | 0.840*** | 0.846*** | Annual trading volume | 0.842*** |
| | (0.025) | (0.027) | (0.028) | | (0.029) |
| Industry similarity | 0.974** | 0.974** | 0.965*** | Industry similarity | 0.956*** |
| | (0.011) | (0.011) | (0.011) | | (0.011) |
| Financial slack resources | 0.280*** | 0.349*** | 0.255*** | Financial slack resources | 0.173*** |
| | (0.056) | (0.070) | (0.054) | | (0.038) |
| Size | 1.010 | 0.959 | 0.932** | Size | 0.938* |
| | (0.033) | (0.032) | (0.032) | | (0.034) |
| Governance issues (1/0) | 7.696*** | 8.079*** | 7.732*** | Governance issues (1/0) | 8.121*** |
| | (0.821) | (0.863) | (0.827) | | (0.869) |
| Share repurchase (1/0) | 1.567*** | 1.423*** | 1.427*** | Share repurchase (1/0) | 1.447*** |
| | (0.151) | (0.137) | (0.137) | | (0.139) |
| Performance | 0.760* | 1.188 | 1.733** | Performance | 1.584** |
| | (0.115) | (0.230) | (0.386) | | (0.352) |
| Constant | 0.002*** | 0.005*** | 0.005*** | Constant | 0.012*** |
| | (0.003) | (0.006) | (0.007) | | (0.015) |
| Year dummies | YES | YES | YES | Year dummies | YES |
| Industry dummies | YES | YES | YES | Industry dummies | YES |
| Observations | 34,698 | 34,698 | 34,698 | Observations | 34,698 |
| Number of firms | 4,765 | 4,765 | 4,765 | Number of firms | 4,765 |

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: Reported results in the table are hazard ratios.

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: Reported results in the table are hazard ratios.

Table 3. Supplementary analysis for Essay 1 using OLS Between-effects estimation (DV = Aggressiveness)

| VARIABLES | (5) Aggressiveness OLS Between-effects | (6) Aggressiveness OLS Between-effects | VARIABLES | (7) Aggressiveness OLS Between-effects |
|---|---|---|---|---|
| | | | Positive relative R&D | -0.209** |
| | | | | (0.101) |
| | | | Negative relative R&D | -0.739* |
| | | | | (0.401) |
| Relative capex | | 0.151 | Positive relative capex | 0.439* |
| | | (0.155) | | (0.252) |
| Relative R&D | | 0.012 | Negative relative capex | -0.995* |
| | | (0.086) | | (0.554) |
| Relative diversification | | 0.0028 | Relative diversification | 0.005 |
| | | (0.009) | | (0.010) |
| Valuation (1/0) | -0.009*** | -0.009*** | Valuation (1/0) | -0.009*** |
| | (0.002) | (0.002) | | (0.002) |
| Number of analyst coverage | -0.006*** | -0.006*** | Number of analyst coverage | -0.006*** |
| | (0.002) | (0.002) | | (0.002) |
| Analyst recommendation | 0.017 | 0.018 | Analyst recommendation | 0.019 |
| | (0.022) | (0.022) | | (0.022) |
| Annual trading volume | 0.003 | 0.003 | Annual trading volume | -0.0013 |
| | (0.007) | (0.008) | | (0.008) |
| Industry similarity | -0.001 | -0.001 | Industry similarity | -0.002 |
| | (0.002) | (0.002) | | (0.002) |
| Financial slack resources | 0.028 | 0.036 | Financial slack resources | -0.006 |
| | (0.052) | (0.056) | | (0.057) |
| Size | -0.001 | -0.001 | Size | 0.003 |
| | (0.008) | (0.008) | | (0.008) |
| Governance issues (1/0) | -0.072** | -0.072** | Governance issues (1/0) | -0.074** |
| | (0.033) | (0.033) | | (0.033) |
| Share repurchase (1/0) | 0.043 | 0.044 | Share repurchase (1/0) | 0.042 |
| | (0.037) | (0.037) | | (0.037) |
| Performance | -0.024 | -0.022 | Performance | -0.034 |
| | (0.044) | (0.046) | | (0.046) |
| Constant | 0.588 | 0.576 | Constant | 0.730 |
| | (2.356) | (2.357) | | (2.353) |
| Year dummies | YES | YES | Year dummies | YES |
| Industry dummies | YES | YES | Industry dummies | YES |
| Observations | 40,802 | 40,802 | Observations | 40,802 |
| Number of firms | 4,905 | 4,905 | Number of firms | 4,905 |
| Standard errors in parentheses | | | Standard errors in parentheses | |
| *** p<0.01, ** p<0.05, * p<0.1 | | | *** p<0.01, ** p<0.05, * p<0.1 | |

Table 4. Supplementary analysis for Essay 1 using OLS Fixed-effects estimation (DV = Aggressiveness)

| VARIABLES | (8) Aggressiveness OLS Fixed-effects | (9) Aggressiveness OLS Fixed-effects |
|---|---|---|
| Relative capex | | 0.037 |
| | | (0.134) |
| Relative R&D | | -0.043 |
| | | (0.081) |
| Relative diversification | | -0.005 |
| | | (0.009) |
| Valuation (1/0) | -0.006*** | -0.006*** |
| | (0.002) | (0.002) |
| Number of analyst coverage | 0.001 | 0.000 |
| | (0.002) | (0.002) |
| Analyst recommendation | -0.002 | -0.002 |
| | (0.011) | (0.011) |
| Annual trading volume | -0.018** | -0.018** |
| | (0.007) | (0.007) |
| Industry similarity | -0.003 | -0.003 |
| | (0.002) | (0.002) |
| Financial slack resources | -0.078 | -0.076 |
| | (0.056) | (0.056) |
| Size | -0.008 | -0.008 |
| | (0.011) | (0.011) |
| Governance issues (1/0) | 0.023 | 0.023 |
| | (0.016) | (0.016) |
| Share repurchase (1/0) | -0.005 | -0.006 |
| | (0.014) | (0.014) |
| Performance | -0.083*** | -0.086*** |
| | (0.024) | (0.025) |
| Constant | 0.857 | 0.854 |
| | (0.680) | (0.678) |
| Year dummies | YES | YES |
| Firm dummies | YES | YES |
| Observations | 40,802 | 40,802 |
| Number of firms | 4,905 | 4,905 |

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

| VARIABLES | (10) Aggressiveness OLS Fixed-effects |
|---|---|
| Positive relative R&D | -0.079 |
| | (0.088) |
| Negative relative R&D | -0.657* |
| | (0.385) |
| Positive relative capex | 0.025 |
| | (0.198) |
| Negative relative capex | 0.121 |
| | (0.331) |
| Relative diversification | -0.004 |
| | (0.009) |
| Valuation (1/0) | -0.006*** |
| | (0.002) |
| Number of analyst coverage | 0.000 |
| | (0.001) |
| Analyst recommendation | -0.002 |
| | (0.011) |
| Annual trading volume | -0.018** |
| | (0.007) |
| Industry similarity | -0.003 |
| | (0.002) |
| Financial slack resources | -0.076 |
| | (0.056) |
| Size | -0.008 |
| | (0.011) |
| Governance issues (1/0) | 0.023 |
| | (0.016) |
| Share repurchase (1/0) | -0.005 |
| | (0.014) |
| Performance | -0.087*** |
| | (0.025) |
| Constant | 0.868 |
| | (0.679) |
| Year dummies | YES |
| Firm dummies | YES |
| Observations | 40,802 |
| Number of firms | 4,905 |

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 5. Supplementary analysis for Essay 1 using Mediation Analysis

| **Independent variables** | **Coefficient** | **SE** | **95% CI** | |
|---|---|---|---|---|
| Relative capex | 2.795 | 0.348 | 2.112 | 3.478 |
| Relative R&D | 2.137 | 0.208 | 1.729 | 2.545 |
| Relative diversification | -0.150 | 0.017 | -0.183 | -0.116 |
| Number of analyst coverage | 0.041 | 0.004 | 0.034 | 0.049 |
| Analyst recommendation | -0.195 | 0.020 | -0.233 | -0.157 |
| Annual trading volume | 0.344 | 0.015 | 0.315 | 0.374 |
| Industry similarity | 0.011 | 0.005 | 0.002 | 0.020 |
| Financial slack resources | 1.304 | 0.113 | 1.081 | 1.528 |
| Size | -0.047 | 0.016 | -0.078 | -0.016 |
| Governance issues (1/0) | -0.383 | 0.046 | -0.474 | -0.292 |
| Share repurchase (1/0) | -0.402 | 0.051 | -0.502 | -0.301 |
| Performance | 0.593 | 0.084 | 0.428 | 0.759 |

| **Independent variables** | **Coefficient** | **SE** | **95% CI** | |
|---|---|---|---|---|
| Valuation | -0.002 | 0.000 | -0.003 | -0.002 |
| Relative capex | 0.014 | 0.018 | -0.021 | 0.050 |
| Relative R&D | 0.005 | 0.011 | -0.017 | 0.026 |
| Relative diversification | -0.001 | 0.001 | -0.003 | 0.000 |
| Number of analyst coverage | -0.001 | 0.000 | -0.001 | -0.000 |
| Analyst recommendation | 0.004 | 0.001 | 0.002 | 0.006 |
| Annual trading volume | 0.002 | 0.001 | 0.001 | 0.004 |
| Industry similarity | -0.001 | 0.000 | -0.001 | -0.000 |
| Financial slack resources | 0.010 | 0.006 | -0.001 | 0.022 |
| Size | -0.003 | 0.001 | -0.004 | -0.001 |
| Governance issues (1/0) | 0.002 | 0.002 | -0.003 | 0.007 |
| Share repurchase (1/0) | 0.004 | 0.003 | -0.002 | 0.009 |
| Performance | -0.014 | 0.004 | -0.023 | -0.006 |

Table 6. Summary Results for Essay 2 (H1: DV = Privatization)

| VARIABLES | (1) DV: Privatization Hazard model | (2) | VARIABLES | (3) DV: Privatization Hazard model |
|---|---|---|---|---|
| | | | Positive relative R&D | 0.000** |
| | | | | (0.000) |
| | | | Negative relative R&D | 0.000 |
| | | | | (0.001) |
| Relative capex | | 0.042 | Positive relative capex | 0.091 |
| | | (0.087) | | (0.292) |
| Relative R&D | | 0.036 | Negative relative capex | 95.789 |
| | | (0.075) | | (610.160) |
| Relative diversification | | 1.174 | Relative diversification | 1.168 |
| | | (0.193) | | (0.194) |
| Value/growth valuation (1/0) | 0.851 | 0.900 | Value/growth valuation (1/0) | 0.869 |
| | (0.228) | (0.243) | | (0.237) |
| Number of analyst coverage | 1.125*** | 1.140*** | Number of analyst coverage | 1.135*** |
| | (0.038) | (0.039) | | (0.039) |
| Analyst recommendation | 2.746*** | 2.747*** | Analyst recommendation | 2.793*** |
| | (0.739) | (0.735) | | (0.767) |
| Annual trading volume | 0.606*** | 0.631*** | Annual trading volume | 0.626*** |
| | (0.073) | (0.078) | | (0.078) |
| Industry similarity | 0.962 | 0.975 | Industry similarity | 0.968 |
| | (0.035) | (0.035) | | (0.036) |
| Financial slack resources | 0.530 | 0.692 | Financial slack resources | 0.618 |
| | (0.425) | (0.579) | | (0.526) |
| Size | 1.253* | 1.136 | Size | 1.151 |
| | (0.148) | (0.142) | | (0.145) |
| Governance issues (1/0) | 3.628*** | 3.308** | Governance issues (1/0) | 3.547** |
| | (1.775) | (1.628) | | (1.751) |
| Share repurchase (1/0) | 0.720 | 0.733 | Share repurchase (1/0) | 0.692 |
| | (0.304) | (0.308) | | (0.292) |
| Performance | 0.680** | 0.667*** | Performance | 0.666*** |
| | (0.124) | (0.104) | | (0.101) |
| Constant | 0.000 | 0.000 | Constant | 0.000 |
| | (0.000) | (0.000) | | (0.000) |
| Industry dummies | YES | YES | Industry dummies | YES |
| Year dummies | YES | YES | Year dummies | YES |
| Observations | 46,504 | 46,504 | Observations | 46,504 |
| Number of firms | 5,471 | 5,471 | Number of firms | 5,471 |

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: Reported results in the table are hazard ratios.

Table 7. Summary Results for Essay 2 (H2: DV = Proactive Investor Attention)

| | (4) | (5) | | (6) |
|---|---|---|---|---|
| | DV = Attention (1/0) | | | DV = Attention (1/0) |
| VARIABLES | Hazard model | | VARIABLES | Hazard model |
| | | | Positive relative R&D | 0.693 |
| | | | | (0.328) |
| | | | Negative relative R&D | 0.000*** |
| | | | | (0.001) |
| Relative capex | | 0.078*** | Positive relative capex | 0.078*** |
| | | (0.048) | | (0.073) |
| Relative R&D | | 4.064*** | Negative relative capex | 0.004** |
| | | (1.395) | | (0.010) |
| Relative diversification | | 1.182*** | Relative diversification | 1.219*** |
| | | (0.040) | | (0.042) |
| Relative valuation | 0.804*** | 0.812*** | Relative valuation | 0.813*** |
| | (0.014) | (0.015) | | (0.015) |
| Number of analyst coverage | 1.082*** | 1.082*** | Number of analyst coverage | 1.078*** |
| | (0.010) | (0.010) | | (0.010) |
| Analyst recommendation | 1.815*** | 1.912*** | Analyst recommendation | 1.944*** |
| | (0.145) | (0.153) | | (0.156) |
| Annual trading volume | 0.844*** | 0.853*** | Annual trading volume | 0.847*** |
| | (0.028) | (0.028) | | (0.029) |
| Industry similarity | 0.973** | 0.963*** | Industry similarity | 0.954*** |
| | (0.011) | (0.011) | | (0.011) |
| Financial slack resources | 0.317*** | 0.234*** | Financial slack resources | 0.153*** |
| | (0.064) | (0.049) | | (0.033) |
| Size | 0.953 | 0.925** | Size | 0.931 |
| | (0.032) | (0.032) | | (0.034) |
| Governance issues (1/0) | 8.289*** | 7.854*** | Governance issues (1/0) | 8.314*** |
| | (0.887) | (0.839) | | (0.889) |
| Share repurchase (1/0) | 1.517*** | 1.514*** | Share repurchase (1/0) | 1.539*** |
| | (0.145) | (0.144) | | (0.147) |
| Performance | 1.027 | 1.421 | Performance | 1.293 |
| | (0.190) | (0.305) | | (0.275) |
| Constant | 0.001*** | 0.001*** | Constant | 0.001*** |
| | (0.001) | (0.000) | | (0.001) |
| Year dummies | | YES | Year dummies | YES |
| Industry dummies | | YES | Industry dummies | YES |
| Observations | 34,543 | 34,543 | Observations | 34,543 |
| Number of firms | 4,725 | 4,725 | Number of firms | 4,725 |

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Note: Reported results in the table are hazard ratios.

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Note: Reported results in the table are hazard ratios.

Table 8. Summary Results for Essay 2 (H3: DV = Privatization)

| VARIABLES | (7) DV: Privatization Hazard model | (8) | VARIABLES | (9) DV: Privatization Hazard model |
|---|---|---|---|---|
| | | | Positive relative R&D | 0.000** |
| | | | | (0.000) |
| | | | Negative relative R&D | 0.000 |
| | | | | (0.002) |
| Relative capex | | 0.048 | Positive relative capex | 0.155 |
| | | (0.102) | | (0.501) |
| Relative R&D | | 0.069 | Negative relative capex | 97.945 |
| | | (0.144) | | (642.230) |
| Relative diversification | | 1.140 | Relative diversification | 1.130 |
| | | (0.188) | | (0.189) |
| Public market pressure | | 9.586*** | Public market pressure | 9.347*** |
| | | (3.939) | | (3.875) |
| Valuation (1/0) | 0.851 | 0.882 | Valuation (1/0) | 0.846 |
| | (0.228) | (0.237) | | (0.231) |
| Number of analyst coverage | 1.125*** | 1.154*** | Number of analyst coverage | 1.150*** |
| | (0.038) | (0.040) | | (0.040) |
| Analyst recommendation | 2.746*** | 2.650*** | Analyst recommendation | 2.666*** |
| | (0.739) | (0.707) | | (0.730) |
| Annual trading volume | 0.606*** | 0.594*** | Annual trading volume | 0.586*** |
| | (0.073) | (0.074) | | (0.074) |
| Industry similarity | 0.961 | 0.966 | Industry similarity | 0.961 |
| | (0.035) | (0.036) | | (0.036) |
| Financial slack resources | 0.523 | 0.643 | Financial slack resources | 0.562 |
| | (0.425) | (0.531) | | (0.475) |
| Size | 1.252* | 1.200 | Size | 1.212 |
| | (0.148) | (0.153) | | (0.156) |
| Governance issues (1/0) | 3.628*** | 3.147** | Governance issues (1/0) | 3.416** |
| | (1.775) | (1.550) | | (1.687) |
| Share repurchase (1/0) | 0.720 | 0.727 | Share repurchase (1/0) | 0.689 |
| | (0.304) | (0.307) | | (0.292) |
| Performance | 0.680** | 0.746* | Performance | 0.743* |
| | (0.124) | (0.123) | | (0.115) |
| Constant | 0.000 | 0.000 | Constant | 0.000 |
| | 0.000 | 0.000 | | 0.000 |
| Industry dummies | YES | YES | Industry dummies | YES |
| Year dummies | YES | YES | Year dummies | YES |
| Observations | 46,504 | 46,504 | Observations | 46,504 |
| Number of firms | 5,471 | 5,471 | Number of firms | 5,471 |

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Note: Reported results in the table are hazard ratios.

Table 9. Summary results for Essay 3

| VARIABLES | (1) Exit Hazard | (2) Time-to-IPO OLS | (3) Time-to-IPO OLS Biotechnology | (4) Time-to-IPO OLS Computer | (5) Time-to-IPO OLS Others |
|---|---|---|---|---|---|
| Breadth of Technology | 1.228 | 1.393 | 1.421 | 7.750* | -2.199 |
| (dispersion of classes) | (0.379) | (3.094) | (2.231) | (4.199) | -10.450 |
| Venture capital industry vintage | 1.403** | -2.927** | 1.371 | -2.219 | -7.084 |
| (round count) | (0.155) | (1.407) | (1.061) | (1.894) | (5.158) |
| Number of patents | 0.997 | 0.111** | 0.064 | 0.064 | 0.359* |
| | (0.002) | (0.0552) | (0.042) | (0.073) | (0.183) |
| Constant | 0.000*** | 5.758 | 6.807 | 7.454 | 13.440 |
| | (0.000) | (4.928) | (4.322) | (6.775) | (11.610) |
| Industry dummies | Yes | Yes | Yes | Yes | Yes |
| Year dummies | Yes | Yes | Yes | Yes | Yes |
| Observations | 9,789 | 342 | 138 | 110 | 94 |

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Results in Model (1) is reported in hazard ratios

## Figures

Figure 1. Connectivity of the three essays

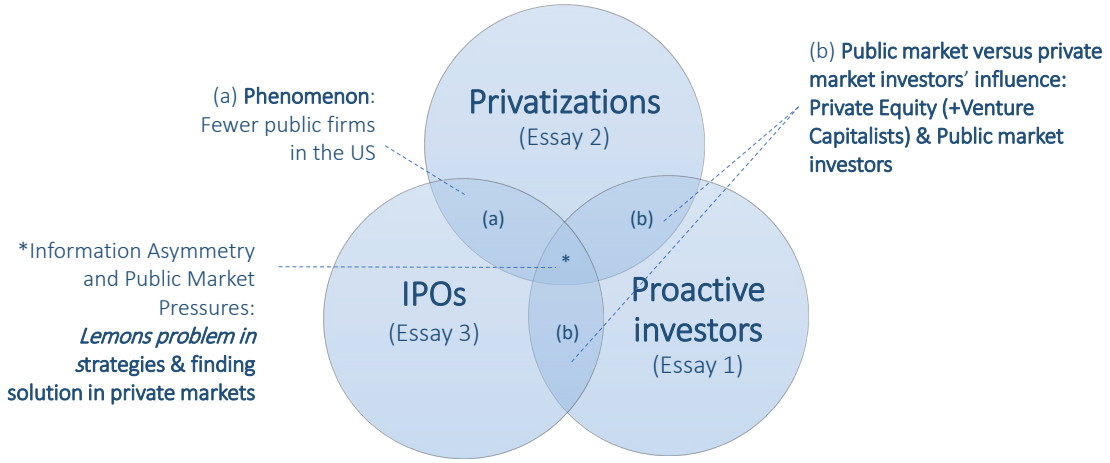
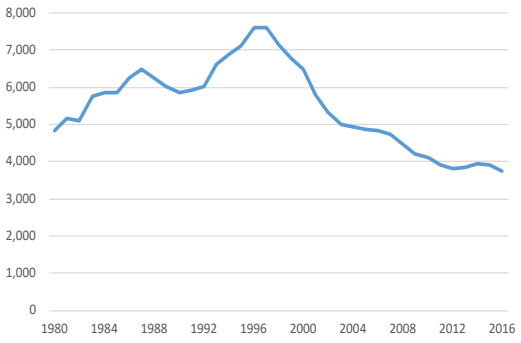
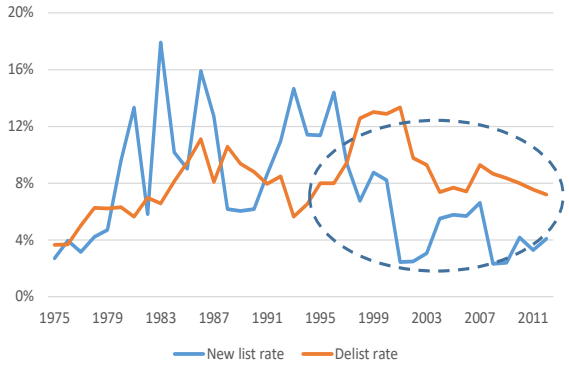



Figure 2. Historical trend of publicly-listed firms in the US

Figure 3. Historical trends in % of new listings and delists




Source: WDI, Doidge, Karolyi, and Stulz (2017)

Figure 4. Research model summary for Essay 1

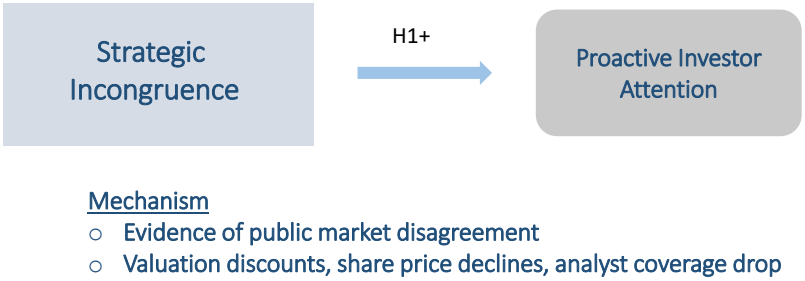



Figure 5. Unique proprietary database for Essay 1 and Essay

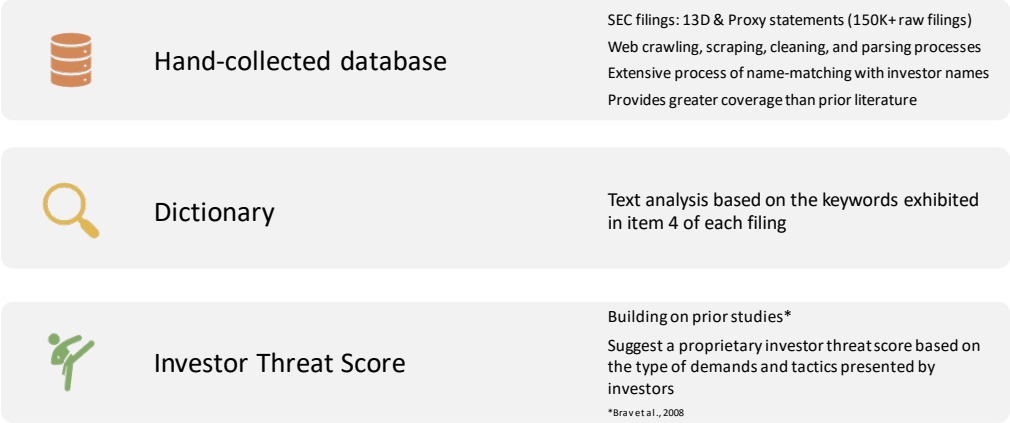



Figure 6. Text analysis of investor demands and tactics for Essay 1

| Involvement (Type of demands) | Hostility (Type of tactics used) |
|---|---|
| does not intend to control | intends to regularly communicate with mgt |
| for investment purposes/under-valued | to continue to monitor/review |
| to maximize shareholder returns | conversion from 13G to 13D |
| to express concerns with/management should take further steps in | sent a letter to the board outlining/issued a press release regarding |
| has done a poor job communicating | purposes of influencing/to influence |
| to nominate the following persons as board | urge the board to/propose that the issuer |
| to propose all strategic alternatives to | filed a complaint/take legal action |
| to oppose the deal recently announced by the management/transaction price is too low | encourage fellow shareholders to do likewise/will solicit proxy votes |
| to force out/to oust/to demand resignation | demand a shareholder meeting |
| encourage the sale of the company | offered a takeover |

Note: This is part of a longer list (dictionary)

Figure 7. Investor threat score table for Essay 1

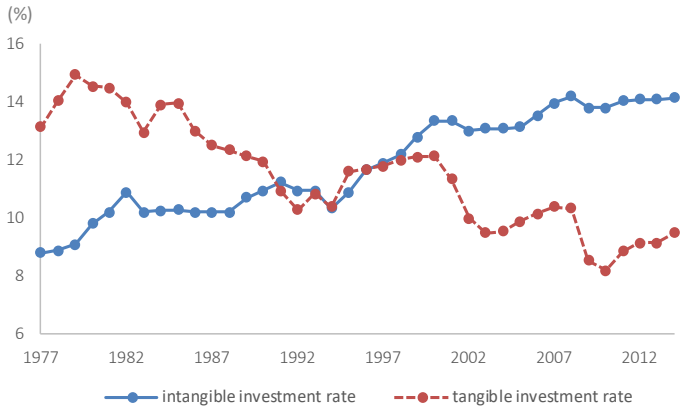
| Hostility (related to tactics) | Scale | Description |
|---|---|---|
| 13D filings | 1 | Passive |
| 13D + Past relationships<br>13D + Intends to regularly communicate with the management and closely monitor company's strategic decisions, support (serves as a board member) | 2 | Engaging |
| 13D + Letters to the management and board of directors<br>13D + Shareholder proposals | 3 | Aggressive |
| 13D + Suggest threatening alternatives<br>Proxy Statements + Lawsuit | 4 | Hostile |
| Takeover bid (Offer letter)/Hostile takeover | 5 | Threatening |

| Involvement (related to type of demands) | Scale | |
|---|---|---|
| **[General]**<br>No comment/No plans<br>Share underperformance | 1 | No or little involvement |
| **[Maximize value]**<br>Maximize, unlock, or enhance shareholder value<br>Possible interventions in the future (e.g., strategic alternatives)<br>Indicate intention to take active role in the management | 2 | Planned/Potential involvement |
| **[Cash utility or capital structure]**<br>Dividends or share repurchases<br>Operational efficiency/General improvement in performance | 3 | Clear involvement |
| **[Corporate governance demands]**<br>Compensation pay related<br>Changes in board members<br>Including future rights to appoint/replace board member(s) | 4 | Major involvement |
| **[Major interventions in company's strateiges]**<br>Business strategies/restructuring<br>Suggest asset sale or acquisition<br>Propose alternative strategic decisions (specific)<br>Opposition to company's announced decisions<br>Sale of company to another buyer or ask better pricing<br>Divestiture of business unit or division (asset sale or ask better pricing)<br>Replace the entire board or the CEO<br>capital deployment, investments (excl. M&A) | 5 | Critical involvement |
| **[Sale of Company]**<br>Suggest the sale of company to private equity or other buyers/Taking company private<br>Suggest the liquidiation of company<br>Tender offer/Hostile takeover | 6 | Extreme involvement |

Figure 8. Database comparison with prior literature for Essay 1

| Study | Journal | Time frame | Data Source | Focus |
|---|---|---|---|---|
| Brav, Jiang, Partnoy, and Thomas (2008) | Journal of Finance | 2001-2006 | 13D, 13G, 13F filings, and media search for names | Hedge fund activism and firm performance |
| Klein and Zur (2009) | Journal of Finance | 2003-2005 | 13D filings | Differences in hedge fund and other entrepreneurial activism |
| Edmans, Fang, and Zur (2013) | The Review of Financial Studies | 1995-2010 | 13D and 13G filings, media search for names | Liquidity and block formation |
| Clifford (2008) | Journal of Corporate Finance | 1998-2005 | 13D and 13G filings, media search for names | Effects of hedge fund activism (active vs passive) on firm stock and operating performances |
| Norli, Ostergaard, and Schindele (2015) | The Review of Financial Studies | 1994-2007 | Proxy statements (PREC14A, PREN14A, PRRN14A, DEFC14A, EFN14A, DFAN14A, and DEFC14C) | Liquidity and Shareholder (not only hedge funds) Activism |
| Chen and Feldman (2018) | Strategic Management Journal | 2007-2015 | Factset Sharkwatch (based on activism/campaign events) | Activist-impelled divestitures and shareholder value |
| DesJardine and Durand (2020) | Strategic Management Journal | 2000-2016 | SEC filings and Activist Insight | Hedge fund activism on firm financial and social performance |
| Kim and Benner (2021) | Working paper | 1997-2016 (Data available from 1993 to 2018) | 13D and media search for names | Strategic Incongruence and the Proactive Investor Attention |

Figure 9. The U.S. economy has shifted to a more intangible-investment intensive model




Note: US private sector investment in tangible and intangible capital (relative to gross value added), 1977-2014, Source: Lev and Gu (2016)

Figure 10. Mediation model

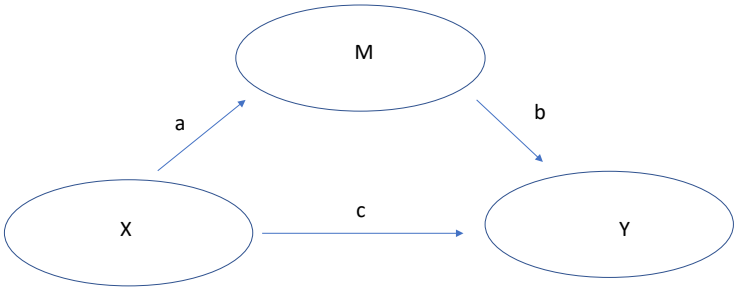
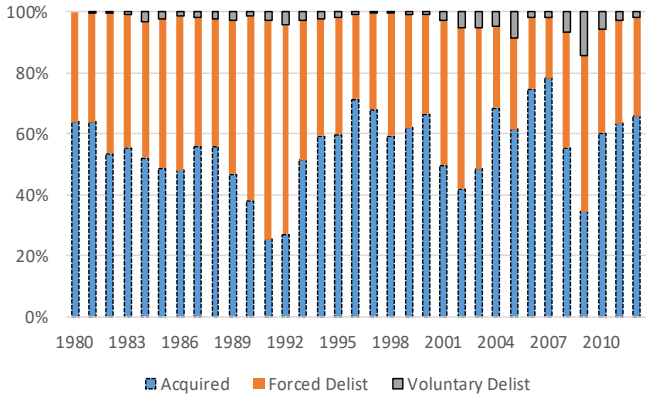


Figure 11. Public companies' choice in financial governance forms for Essay 2

| | Financial | Strategic (Non-financial) |
|---|---|---|
| **Private** | **Private equity (PE)** | **Private companies** |
| **Public** | **Public market investors (e.g., institutional investors)** | **Publicly listed companies** |

Figure 12. Historical breakdown of delists in the US




Source: WDI, Doidge, Karolyi, and Stulz (2017)

Figure 13. Research model summary for Essay 2

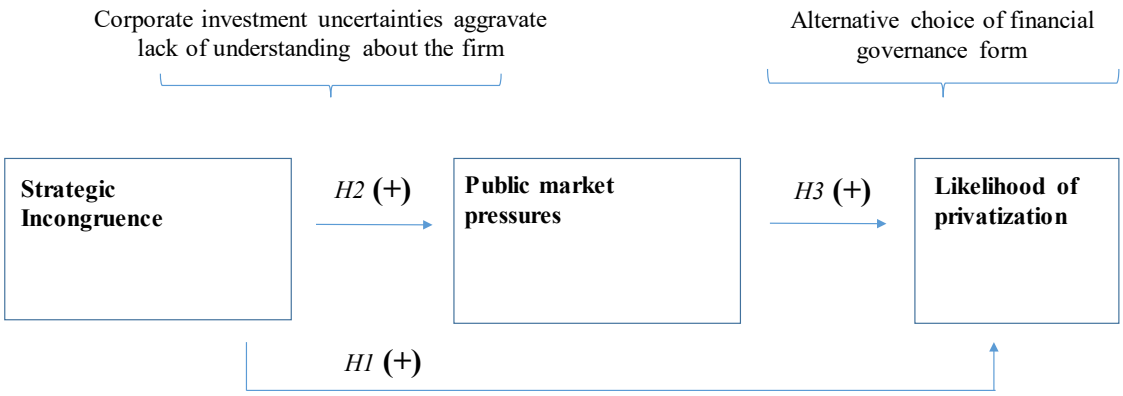


Figure 14. VC-backed IPO trends (count and %) for Essay 3

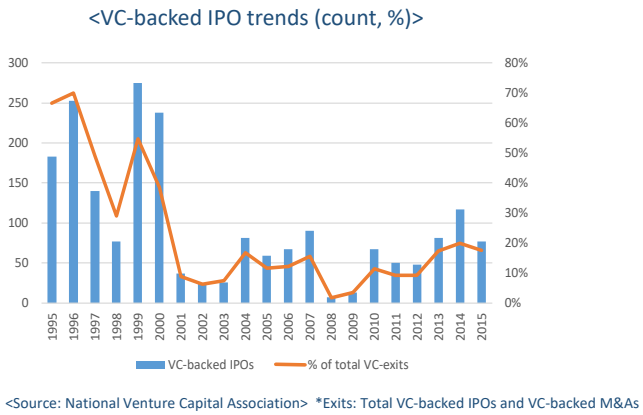



Figure 15. VC-backed IPO vs. M&A transaction trends for Essay 3

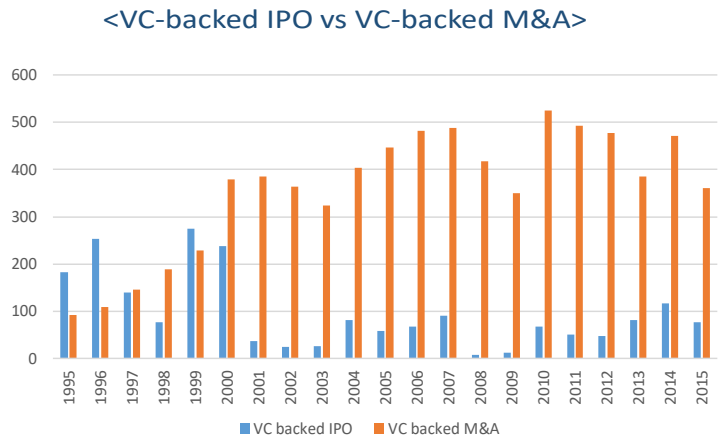



Figure 16. Historical trends in IPO firms' median age for Essay 3

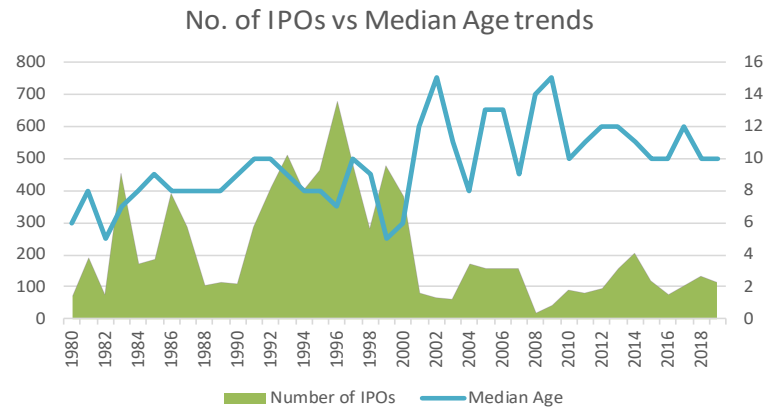
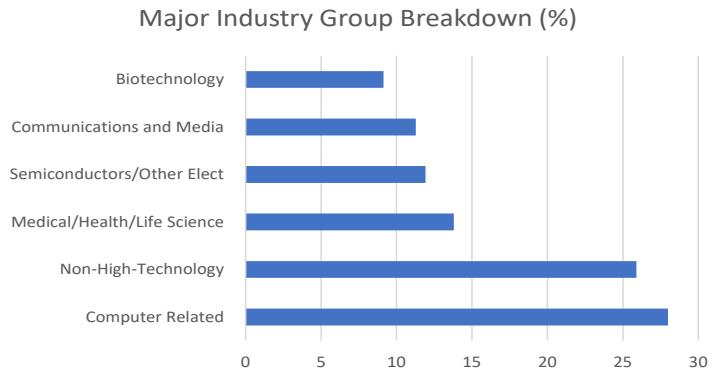


Figure 17. Industry breakdown of VC-backed IPOs for Essay 3



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