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An Ownership Framework for Managers' Accelerated SEO Decisions: The Importance of Connected Institutional Investors in the REIT Industry

Executive Summary. In this paper, we present a mathematical simulation of a secondary equity offer (SEO) decision that captures the payoffs for investors with either low (e.g., actively managed funds) or high (e.g., passive index investors) monitoring costs. The calibrated solutions are consistent with overvalued SEOs being issued when institutions with high monitoring costs are present. Institutions with low monitoring costs either incentivize management to issue fairly priced SEOs or lead to greater ex post discipline of the CEO for value decreasing issuances. The existence of institutions with business relationships creates uncertainty regarding the value of SEOs. Ownership network alliances are beneficial.

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"I have been looking for opportunities to buy into REITs and MLPs as they sell off. Nothing crushes these stocks more than secondary stock offerings. In a good market environment for these sectors, stocks usually sell off when they announce a secondary offering, but now they're really getting hammered. In my daily perusing the list of the worst-performing stocks on the market, time and time again REITs and MLPs that have announced secondary offerings are popping up. Secondary offerings at some companies may be dilutive for investors, but investors need to understand that they are a necessity for REITs and MLPs. Without secondary offerings, these companies cannot grow. By law REITs and MLPs are required to pay out a substantial portion of their cash from operations to unitholders. As long as a company's management uses the funds from a secondary offering for intelligent acquisitions, they are actually a great thing for investors." By activiststocks (Special Situation Investing in Secondary Offerings June 24, 2015 http://www.valuewalk.com/2015/06/special-situation-investing-in-secondary-offerings/).

Real estate investment trusts (REITs), master limited partnerships (MLP), and business development

companies (BDC) are an increasingly important part of most institutions' portfolio allocation decisions. For example, according to NAREIT, the equity market capitalization is $853 billion for 196 REITs on the New York Stock Exchange in February 2016 and the average daily trading volume is $7.4 billion compared to $1.9 billion in February 2006.[1] This large increase in investment calls for a greater understanding of this sector, especially since only 46 equity REITs are rated investment grade. Moreover, this is a global issue given that more than 30 countries have similar investment vehicles and others are considering allowing this type of structure.

It is well known that an increase in interest rates will decrease the value of this asset type. What is less understood is how corporate governance issues play a role in the dilution of incumbent ownership during secondary equity offerings (SEO). The dilution of shares following SEOs has not gone unnoticed by some REIT institutional investors. In 2016, for example, Wintergreen Advisers LLC announced that it intends to vote against a Consolidated-Tomoka Land Co. board-sponsored proposal to issue additional shares of common stock.[2] The challenge from Wintergreen is based on their projection that a fully exercised SEO could dilute existing shareholders' value by as much as 23%. The projection is that if an institution owned $1,000 the dilution would immediately reduce the value of its shares to $765. In addition to the challenge against a new equity issuance, Wintergreen intends to also vote against the re-election of all seven directors for their intent to issue an additional 1.3 million shares. On April 11, 2016, Wintergreen Advisers LLC owned 26.45% of shares outstanding and Wintergreen Fund had 21.12%.

Wintergreen Advisers should not be the only large blockholder challenging REIT SEOs. It is extensively documented that investors react negatively to SEO announcements on average and that there is substantial variation in investor reactions (Cline, Fu, Springer, and Tang, 2014; Jones and Sirmans, 2016)). *Why* REITs issue overvalued securities is well understood: the regulatory restriction on retained earnings forces management to frequently issue new equity (Hardin and Hill, 2008; An, Hardin, and Wu, 2012). *Why* institutions allow REITs to issue accelerated SEOs that require little due diligence is the unanswered question, especially during recessions when the share price reaction to the announcement is most negative.

Wintergreen's concern about equity issuances should be widespread in the REIT capital market. Jones and Sirmans (2016) report that 55 REITs issued SEOs in 2006, prior to the financial crisis and 72 went to the equity capital market in 2011, two years after the recession. The authors find that in every year, the average three-day announcement period return is negative, on average, for the sample of SEOs and that the negative return increases significantly from −1.51% in 2006 to −2.41% in 2010. The rise in the average annual announcement return is surprising given that the number of SEO issuances reached all-time highs after 2009: the 80 issuances (72 firms) represent over 35% of all publicly traded REITs in 2011. What is more surprising is that the large negative reaction to SEOs in Jones and Sirmans' (2016) study in the period after the recession starting in 2010 did not coincide with a decline in accelerated SEO issuances even though these type issues create more uncertainty and risk for investors because the due diligence period is shortened to only a few days. Their results lead us to re-examine why investors consistently overpay for accelerated SEOs issued by REITs.

We develop a mathematical model of accelerated equity financing that presumes that connected shareholders' cross-ownership provides an explanation for observed returns throughout the SEO process. A key assumption is that institutional agents with large cross-ownership, a form of a real estate informal industry network, have greater expertise in project evaluation than non-connected investors that are the sole blockholder. Ownership interconnectedness is important because we assume that passive index funds vote with actively managed funds and facilitate change in control events or other disciplinary action subsequent to value decreasing SEOs. Our underlying assumptions in the mathematical model capture the qualitative facts observed in the literature regarding secondary equity issuances. We calibrate the model and show

that it generates a close qualitative match to many existing empirical findings where cross-ownership is not examined.

An empirical implication is that non-connected investors do not (do) suffer economic loss if a REIT also has (does not have) blockholders with business network affiliation as defined by correlated cross-ownership. It should be observed that accelerated SEO shares are fairly priced when actively managed fund blockholders with large cross-ownership positions are prevalent: investors buy shares from accelerated equity offers, whereas these same investors prefer debt or fully marketed offers otherwise. The intuition is straightforward: the choice of equity financing is linked to the likelihood of disciplinary actions led by actively managed funds resulting from ownership network relationships that existing blockholders have with each other through simultaneous equity positions. The inversion of the normal assumption that management knows substantially more about the growth in cash flows, option values, or the true cost of capital than existing blockholders with cross-ownership is consistent with the composition of REITs' ownership structure (Evans, Jones, and Mueller, 2016). Although by law REITs are required to have at least 100 shareholders, most investors are mutual funds rather than small individual owners or other types of institutions.

Empirical hypotheses are derived from the mathematical simulation that models a theory of signaling for accelerated SEOs resulting from informal business networks. Signals from different ownership structures affect REITs' ability to obtain accelerated SEO financing. The pecking order for REIT firms is opposite (identical to) that of Myers (1984) for those with connected (unconnected) actively managed fund blockholders with cross-ownership. If the market believes that these blockholders provide monitoring and reputation benefits, a positive relation should exist between the percentage of correlated cross-ownership and the likelihood of an accelerated equity issue, SEO announcement period returns, post-issue stock returns, and long-term operating performance. This supposition has not been empirically tested as the time series and partial anticipation consequences of SEOs are not typically examined. Our model explicitly derives the evolution of investor beliefs over the entire SEO process and models investor anticipation in a dynamically consistent way. The findings imply that research examining the valuation effects of SEOs should control for correlated cross-ownership among different types of blockholders for individual REITs from both a cross-section of event and nonevent firms, as well as from the time series of returns around the announcement.

This explanation is unique to the literature. Most theoretical explanations for why REIT seasoned stock offering announcements are negative rely on agency related information asymmetry problems that allow managers to issue shares at overvalued prices (Cline, Fu, Springer, and Tang, 2014), which may be based on an over estimation of free cash flow. Denis (1994), however, finds no observable relation between the wealth effects surrounding the announcement of an SEO and the profitability of investment opportunities for industrial corporations. His findings are consistent with Barclay and Litzenberger's (1988) assertion that most theories of equity offerings "have little or no power to explain the negative average stock return following these announcements." Thus, empirical hypotheses derived from our mathematical simulation contribute toward both the finance and real estate literatures.

The paper proceeds as follows. We summarize the research on REITs and SEOs and then describe the related literature on networks and SEOs. We next presents theoretical analysis and graphical representation of the role of business network ties in the manager's decision to issue accelerated or fully marketed SEOs. We then discuss the empirical implications of the theoretical analysis and provide a testable hypothesis for future research.

Research on REITs and SEOs

To our knowledge, existing empirical research does not evaluate why real estate firms can issue accelerated offers so often rather than fully marketed ones, especially during a recession (Ong, Ooi, and Kawaguichi, 2011; Cline, Fu, Springer, and Tang, 2014). In fact, with the exception of Jones and Sirmans (2016), empirical evidence on REITs does not

differentiate between accelerated and fully marketed offers. REIT studies, in general, provide mixed results on samples of all SEO issues combined. Ghosh, Nag, and Sirmans (1999, 2000) examine the pricing of SEOs by all equity issued by publicly traded REITs from 1991 to 1996. They find that the degree of underpricing depends on the percentage of total institutional ownership. They also report that more frequent issuances by an individual REITs leads to less underpricing and less negative announcement returns because institutional ownership mitigates information asymmetry.

Goodwin (2013) examines the degree of discounting and its determinants for REITs from 1994 to 2006. Her results are consistent with large discounting being related to asymmetric information as defined by how frequently management accesses the equity capital market. Alternatively, Gokkaya, Hill, and Kelly (2013) show that the direct costs for REIT SEOs are not related to information asymmetry after controlling for property type and operating partnership structure.

Market timing is currently the most strongly supported theoretical explanation (e.g., Friday, Howton, and Howton, 2000). The general idea is that management takes advantage of transitory windows of opportunity by issuing equity when, on average, they are overvalued (Loughran and Ritter, 2002). Yet, additional research documents the theoretical and empirical shortcomings of this theory. Carlson, Fisher, and Giammarino (2006) suggest that even though SEOs may appear to be driven by market timing, the pre-SEO stock price increase may simply reflect an increase in the value of issuers' profitable growth options. They argue that standard matching procedures fail to capture the price dynamics that provide explanatory power for pre-issuance price run-up, a negative announcement effect, and long-run post-issuance performance. The authors use mathematical simulation to test their rational expectations theory of observed SEO-related returns to an endogenous decrease in expected returns. In their analysis, equity issuance is associated with growth that converts real options into assets in place. They argue that the new converted assets are less risky than the real options they replaced and, therefore, the expected returns subsequent to the SEO are lower resulting in incorrectly perceived underperformance. Counterintuitively, option exercise reduces risk after issuance, which provides explanatory power for the pre-issuance run-up prior to announcement.

DeAngelo, DeAngelo, and Stulz (2010) also argue that since most empirical studies focus exclusively on the share price reaction of firms that actually choose to issue an SEO, the results are not sufficient to resolve the "pecking order" anomaly or provide explanatory power for why corporations can persistently issue accelerated offers that require minimal due diligence. In fact, the authors document that very few non-real estate corporations with highly favorable market timing opportunities actually issue SEOs. Their findings imply that empirical and theoretical models need to better explain *how* firms can issue accelerated or fully marketed SEOs in addition to explaining *why* they do.

Current explanations that center on issuers knowingly selling overvalued equity are controversial since they are inconsistent with efficient markets: the typical hypothesis is that investor under reaction to SEO announcements allows managers to issue overvalued equity as reflected by long-run under performance (Baker and Wurgler, 2002). Why would current institutional investors allow management to take advantage of existing shareholders if the act of issuing equity conveys a negative signal that investment decisions are suboptimal (Jung, Kim, and Stulz, 1996; Ooi, Ong, and Li, 2010)? Consistent with an agency-based explanation, Kim and Purnanandam (2014) find that share price reaction to SEOs is negative when managerial ownership is low, an indication of investor concern over the misuse of SEO proceeds. In their analysis, firms that use the proceeds for value-destroying corporate acquisitions suffer the largest negative SEO announcement returns. These analyses do not, however, control for networked institutional investors' willingness to discipline management for value decreasing accelerated SEO decisions.[3]

Our paper extends the literature by simulating the SEO decision process in the context of informal business networks characterized by simultaneous cross-ownership by institutional investors. An assumption is that managers make the decision to issue an SEO when investors have different access to information about the value of assets in place and new investment projects based on their connection through stock ownership. We evaluate whether the presence of connected institutional blockholders within a REIT's capital structure is a credible signal that the SEO is fairly priced and adds long run value to growth options. Another underlying assumption is that connected institutional investors use stock ownership as a legal way to transfer private information to each other, which may decrease the likelihood of managerial opportunistic behavior in the market for new equity financing or increase the likelihood of disciplinary actions that impose costs on management and board of directors. The theoretical paradigm follows Granovetter (1985) and Wetzel's (1987) suggestion that networks impose duties of trust and reciprocity between connected institutional investors, management, and board of directors. When networks increase monitoring, the gain to management from selling shares at an over inflated issue price is much less than the loss from ex post disciplinary actions and dissolved business relationships.[4]

The reduced agency costs and information uncertainty about the future value of investments associated with ownership networks could also possibly provide explanatory power for why REITs are able to issue accelerated SEOs so frequently that initially receive negative share price responses. DeAngelo, DeAngelo, and Stulz (2007) find that without SEO proceeds, most equity issuers would have insufficient cash to implement their investments the year after the SEO. They show that even though the SEO decision is positively related to a firm's market-to-book (M/B) ratio or prior excess stock return and negatively related to its future excess return, these relations are economically immaterial. They conclude that firms primarily conduct SEOs to resolve a near-term liquidity squeeze, rather than exploiting market timing opportunities.

Information asymmetry related to ownership networks in the sense that connected institutional investors' probability of disciplining issuing management for making value decreasing accelerated offers is unique to the literature. To date, limited research that empirically examines the importance of business networks exists in other settings in the social science literature (Williamson, 1975), IPOs (Cooney, Madureira, Singh, and Yang, 2015), mutual fund sub-advisors (Kuhnen, 2009), exchange relationships (Podolny, 1994), portfolio stock selection choice (Cohen, Frazzini, and Malloy, 2008; Cai, Walkling, and Yang, 2016), venture capital networks (Hochberg, Ljungqvist, and Lu, 2007), and board monitoring (Nguyen-Dang, 2007).

We extend these analyses by suggesting that in order to issue accelerated SEOs on a frequent basis, REITs have to depend on connected institutional investors with cross-block ownership (Howe and Shilling, 1988). Cross-block ownership is our definition for informal alliances among institutions that create real estate business networks. The importance of blockholders with cross-block positions across several REITs within the industry is an important question.

Business Networks and SEOs

Podolny (1994) is the first paper within economics to use a principle of exclusivity in selecting exchange partners to overcome problems of market uncertainty. The author's theoretical proposition implies that organizations engage in exchange relations with those with whom they have transacted in the past under conditions of market uncertainty. The author suggests that the establishment of networks within the business environment avoids market failures.

Recent studies primarily find that social networking among investors and board of directors is an important aspect of corporate governance. Cooney, Madureira, Singh, and Yang (2015) examine the role of social ties in IPO underwriting syndicate formation and find that an investment bank is more likely to

be included in the underwriting syndicate when it is connected to the IPO firm through interpersonal social ties between the respective executives and directors. Their results provide evidence that social ties between the IPO issuer and the chosen underwriters generate higher compensation for investment banks, consistent with a quid pro quo arrangement between the respective parties, as well as better net wealth gains for its pre-IPO shareholders. Their empirical analysis, however, does not reveal whether ownership ties between firms that issue new equity lead to quid pro quo arrangements between management or board of directors and investment or commercial bank blockholders, resulting in less disciplinary actions following value decreasing SEOs.

Cohen, Frazzini, and Malloy (2008) also use social networks to identify information transfers in security markets. They use connections among mutual fund managers and corporate board members via shared educational institutions: portfolio managers invest more if they are academically connected through their academic network, and perform significantly better on these holdings relative to their non-connected holdings. Their results suggest that an education social network is an important mechanism for information flow into asset prices, but they do not evaluate whether external stakeholders use real estate ownership networks to determine the value of accelerated SEOs. Their particular type of agency problem is based on the loyalty and friendship that may make boards less effective monitors, which should decrease management's credibility during periods of economic crisis.

Nguyen-Dang (2007) is concerned with the impact of social ties between CEOs and directors on the effectiveness of board monitoring. The author finds that CEOs are less accountable for poor performance depending on their position in the social network. To map the social network, the author uses data on the educational background of CEOs from the largest French quoted corporations and interlocking directorships. When board members and the CEO belong to the same social circles, the CEO is less likely to be punished for poor performance and more likely to find a new and good job after a forced departure. Apparently, individuals join boards for financial compensation, prestige, and contacts that are useful in securing future employment opportunities (Zajac, 1988). In later work, Kramarz and Thesmar (2007) and Fracassi and Tate (2012) show that social networks strongly affect board composition, which is detrimental to corporate governance because it reduces firm value and allows more value destroying acquisitions. The authors conclude that network ties with the CEO weaken the intensity of board monitoring at non-financial firms.

Braggion (2008) finds that in large publicly traded corporations, the Freemasons social connections give rise to agency conflicts between managers and shareholders as reflected by worsened financial performance. In related work, Gaspar and Massa (2007) find that personal connections between divisional managers and the CEO within a firm decrease the efficiency of decisions within the organization. Further studies confirm that firms whose directors are better connected and whose connections are with better connected directors, exhibit weaker firm governance.

From an ex post disciplinary perspective, these connected poorly performing CEOs are also less likely to be fired (Barnea and Guedj, 2007). In the mutual fund industry, directors tend to hire advisory firms that they have worked with in the past and offer them board seats when creating new funds (Kuhnen, 2007). Yet, other research finds that some networks are beneficial. Hochberg, Ljungqvist, and Lu, 2007) find that better-networked venture capital (VC) firms experience significantly better fund performance for investments that experience successful initial public offerings (IPO) or a sale to another company. We hypothesize that some connected blockholders add value during the SEO process because of their ownership stake.

Subrahmanyam (2008) finds that social networks, commonalities of social status, and income between board directors and the CEO are detrimental to effective corporate governance: a director's desire to stay in the CEO's social circle is greater than establishing or maintaining a reputation for effective governance. Firms with a larger number of directors who are CEOs of other companies have the worst corporate governance.

Although there is a growing literature on networks in economics, the focus is primarily on education alliances and interlocking board relationships even though other informal networks that rely on personal contacts exist.[5] Most authors state that an important network stems from well informed investors and board of directors that do business within the same industry as other network members. For example, members of banking associations represent a knowledge network that is not available to investors who are not affiliated with the industry and do not have an in-depth knowledge of banking business operations. To our knowledge, evidence on the nature and significance of informal networks within a real estate context is limited. Interdependence within a social network has been addressed with respect to the role of brokers in facilitating financing for retail real estate sellers and buyers within developing countries (Garmaise and Moskowitz, 2003).

To date, however, the majority of research does not theoretically or empirically explicitly measure the impact of ownership networks resulting from cross-block positions on accelerated seasoned equity issues. Although the importance of cross-ownership structure is now receiving considerable attention in economics and sociology literatures (Lin, 2001; Cooney, Madureira, Singh, and Yang, 2015), only a few finance studies examine connected ownership structure across firms (Crane, Michenaud, and Weston, 2014; He and Huang, 2015; Apple, Gormley, and Keim, 2016).

In our mathematical model, we define the business network as the link between connected institutional investors' cross-blockholder positions. Do institutional investors respond differently to SEO announcements when they are connected through simultaneous block positions across REITs in the industry? Rather than being close social friends, institutional investors that have large stock ownership often view management as business associates rather than social acquaintances and, thus, require accurate disclosure of cash flow, risk, and SEO price value. We conjecture that some connected institutional blockholders are less susceptible to norms related to excessive loyalty and trust to the CEO or board of directors. Consequently, the share price reaction to an SEO is expected to be positively related to actively managed fund institutional cross-blocks.

The existence of actively managed fund blocks affects the flow and quality of information, which is often difficult to verify, as well as blockholders' willingness and ability to both reward and punish management for poor decisions. High business network density (embeddedness) may breed a culture of institutional activism that can impose high economic costs (dismissals or reduced compensation) on senior executives.

Management's Decision to Issue Equity: A Simulation Analysis

Mathematical modeling provides tools for understanding the behavior of interacting parties with conflicting goals expressed in terms of payoffs determined by each player's choices. In this section, we construct an abstract game from components with straightforward economic interpretations. Empirical implications are derived from a mathematical model that allows the straightforward derivation of solutions for complex capital structure scenarios. The tractability of the approach stems from its modularity—a number of intuitive building blocks are provided that suffice for valuation in most typical situations (Ericsson and Reneby, 1998).

To begin formulating an abstract form of the interaction between management and institutional investors, we consider the Ultimatum Game. In the Ultimatum Game, two players win a fixed total payoff provided they can agree on how to divide it. Player A proposes to take some fraction of that total, and player B then either agrees to take the rest, or refuses the split. If player B accepts, they split the payoff as agreed. If player B refuses, the deal is off and neither of them wins anything. From the perspective of traditional rational game theory, player B should always accept any deal because his payoff will be positive, compared to zero if he refuses. Knowing that, player A should always offer player B the smallest fraction allowed. However, if the game is repeated by many pairs in a large population and players are allowed to keep track of each

other's reputation, then proposing and accepting even splits becomes the preferred fair strategy (Nowak, Page, and Sigmund, 2000).

The SEO Game is similar to the Ultimatum Game. REIT management offers an SEO that may lead to a short-term loss for institutional investors, who must then decide whether to spend resources to punish management. The capital market is meant to allocate capital efficiently to REITs with good investment opportunities. Efficient allocation, however, becomes more difficult when management uses accelerated methods rather than fully marketed offers (Jones and Sirmans, 2016). In a full market offer, investment banks present the valuation documents to institutional investors prior to the actual issue in order to build a book of pre-sales. They meet with institutions and analysts over an extended period of time. In contrast, accelerated book built offerings are often completed in 48 hours through committed presales to selected institutions that do not require due diligence.

Investment banks are paid direct costs fees that are a percentage of the proceeds and underwriting discounts defined as the SEO offer price minus the closing day price. Direct costs compensate them for marketing services and their affiliations with institutional investors that participate in pre-sales. Underpricing of the investment banker's shares compensates corporations for bearing risk related to the SEO offer price. Institutions that participate in the pre-sale period are also compensated with discounting on their shares.

A general class of investors purchases shares at the offer price. These investors know that management is tempted to issue SEOs when the market overprices the shares. Consequently, general investors interpret most SEOs as an indication that the stock is overpriced, which leads to a negative chain of events: general investors sell their shares, which causes a drop in market price, which then causes institutional investors to lose money and consequently seek to punish management. We assume that a relative drop in the stock price (say 1% to 2%) happens at the announcement of an accelerated SEO issuance because the market may have some idea that the stock is overpriced, but not exactly how much overpriced. This assumption is consistent with REIT management knowing more about the SEO's true value than the average, unconnected capital market participant. Thus, the announcement return to the announcement of an SEO issue is the perceived valuation of the offer price relative to the intrinsic value. If the shares are perceived to be over (under) valued, the announcement return will be negative (positive). If the offer price is perceived to be fairly priced, the announcement return will be zero. In our analysis, the perception and, hence, REITs' ability to issue accelerated offerings is related to the percentage of connected actively managed fund block holders with large cross-ownership.

The first action in the SEO Game is that management offers an accelerated SEO at a specific price to fund a project, such as an acquisition or hotel project development that is expected to yield some synergistic gain in value. If investors buy the entire issuance, the SEO is successful. If, however, the SEO does not sell all of its shares, the offer is considered to be rejected and the project cannot be pursued. Investors should accept offers that are perceived to be fairly priced or undervalued and reject overvalued prices. Institutional investors have the option of accepting the deal as is, or punishing management for perceived overvalued offers. In the REIT industry, many block holders are index funds unable to punish management by selling off shares and, therefore, must rely on expensive disciplinary actions (proxy fights, hostile takeovers, decreased executive compensation, forced sale of the firm, or dismissal of the CEO, CFO, chairmen or board members) that decrease the likelihood of investigation.

Institutional investors must spend resources to monitor or punish management. From the perspective of traditional rational game theory, they should never do so, because it increases their immediate loss with no immediate benefit. However, as in the Ultimatum Game, one should look beyond a single interaction. It may make sense to punish management because both investors and management develop reputations. The expense of punishment causes institutional investors to incur an immediate cost but

could prevent future losses by discouraging management from making additional value decreasing SEOs.

We now mathematically formulate the SEO Game between the management of a REIT and the connected institutional investors who are affiliated with real estate ownership networks. The variable z is the difference between the actual value x of a share as computed by management and the market price $x + z$. The z variable represents the degree of information asymmetry between management and investors in the general market. In the analysis, informed (connected to the ownership networks) institutional investors are assumed to be knowledgeable enough about the market and firm to more reliably estimate x and z. For this discussion, we fix $x = \$100$, so that z may also be interpreted as a percentage of the stock's intrinsic price.

In the model, we assume that management plans to make an accelerated secondary offering of shares in the near future to fund a specific project and that the market is sufficiently volatile to provide opportunities for the SEO issue price to be within a range of values of z so it may be accurately valued, overvalued, or undervalued. Management's strategy is represented by a function $f(z)$ that represents management's initial willingness to issue the SEO at the given value of z. The absolute magnitude of f turns out to be a free parameter. We therefore scale f so that the area under its graph is 1 and it may be interpreted as a probability density function. Consistent with the majority of the literature, f will be a decreasing function with a right tail for $z > 0$ because (1) it is unusual for the market price to be too far above the fully informed estimate; (2) at too high of a price the SEO will fail because it is impossible to sell all n shares; and (3) management is reluctant to make an SEO when the stock is excessively overpriced for fear of certain punishment or disciplinary costs.

We also consider negative values of z. A negative z value is consistent with management issuing an SEO at an issue price that is below the intrinsic value. This allows for the possibility that management may issue an accelerated SEO during a recession, for example. For $z < 0$, f is increasing and has a left tail because management is assumed to be reluctant to make an SEO if the market substantially undervalues the firm. That is, management is willing to sell n new shares but no more, so as not to damage the value of their own shares or make the firm accountable to too many additional investors. If the offering price is too low, an SEO of n shares cannot yield enough funding for the project. Thus, management's strategy function $f:(-\infty, \infty) \to \mathbb{R}$ is assumed to be smooth and hill-shaped, with one critical point at a global maximum. The value of f should be fairly high for z near 0 because if management is even considering making an SEO, they must be satisfied with the share value, give or take some volatility.

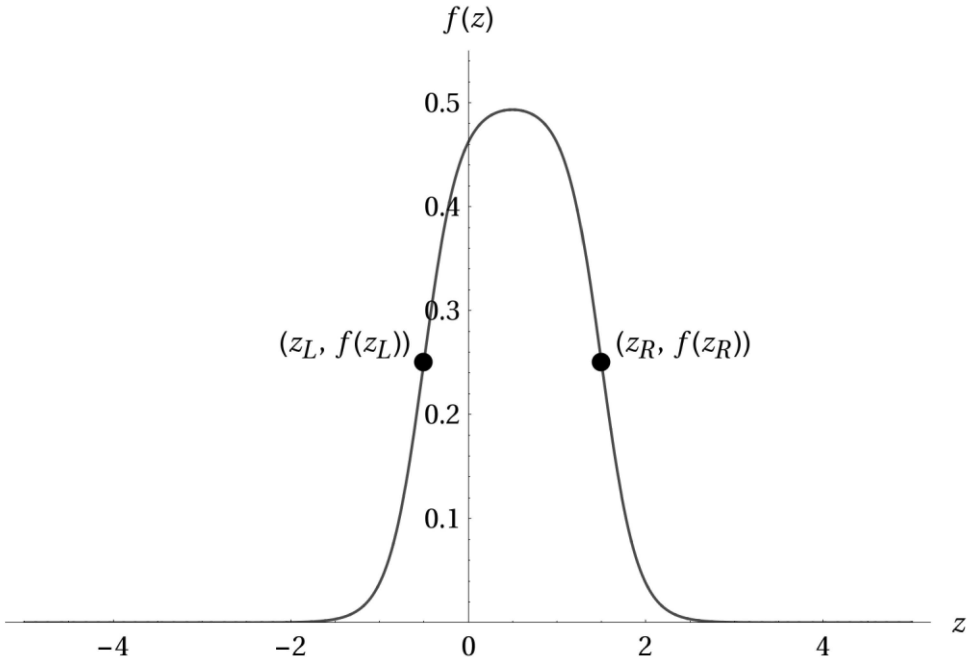
As an example of a management strategy function with the correct properties, consider a sum of two logistic functions:

$$f(z;\, \beta,\, z_L,\, z_R) = \frac{1}{z_R - z_L}\left(\frac{1}{1 + e^{-\beta(z-z_L)}} + \frac{1}{1 + e^{-\beta(z-z_R)}} - 1\right). \quad (1)$$

The parameters z_L and z_R control approximately where f has inflection points, and β controls the steepness of the rise at those control points. See Exhibit 1 for an example. Notice that under the strategy in Exhibit 1, management is willing to issue an accelerated SEO at prices above the true intrinsic value of the stock (at positive z). The value of f at the inflection points is approximately half of its maximum.

Institutional investors' strategy is represented by a function $g(z)$, the probability that they will punish management after they make an SEO when the market overprices the stock by z. Thus, $g:(-\infty, \infty) \to [0, 1]$ should increase and approach 1 for large values of z. It should be nearly 0 for small values of z because it will cost investors some amount of money, influence, and uncertainty to punish management, so they will not do it readily.

Exhibit 1 | Probability of an Accelerated SEO—Ignoring Punishment



Notes: Graph of $f(z)$ as in equation (1) with $\beta = 5$, $z_L = -0.5$, and $z_R = 1.5$. The graph shows the initial probability density function for whether a REIT issues an SEO when the market price of a share $x + z$ is at a premium / discount relative to the intrinsic value x. Given an underestimate a of z and an overestimate b (that is, it is known that $a < z < b$), the probability of issuing the SEO is $\int_a^b f(t)\,dt$.

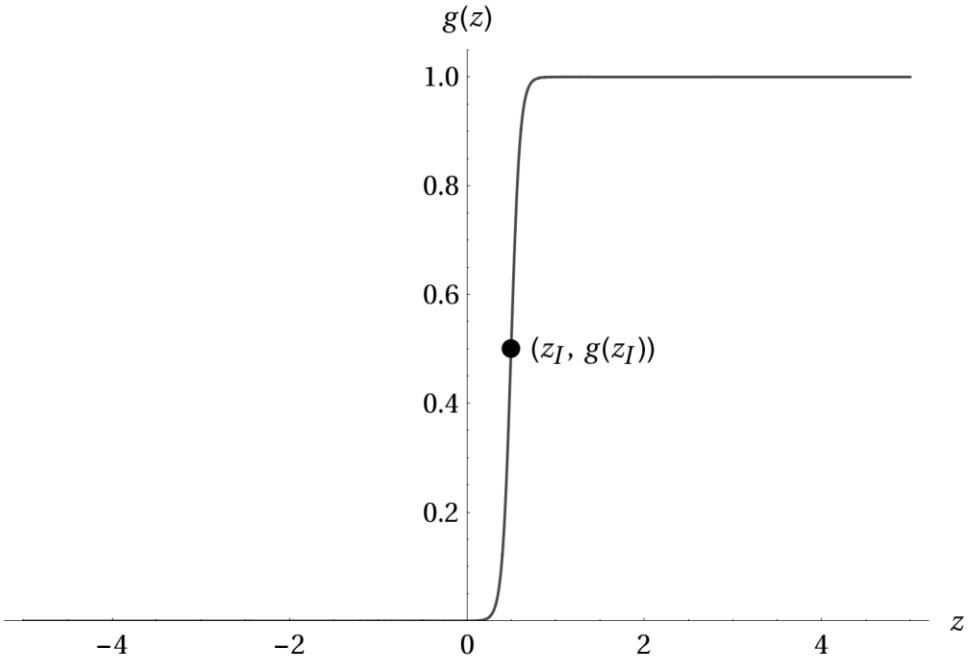
As an example of an institution strategy function, a logistic function:

$$g(z;\ \gamma,\ z_I) = \frac{1}{1 + e^{-\gamma(z - z_I)}} \qquad (2)$$

has the correct shape. The parameter z_I controls the horizontal position of the inflection point, and γ controls the steepness of the rise. An example is shown in Exhibit 2. This example rises very sharply at a low value of z, modeling an investor strategy that has a low tolerance for overpriced SEOs and will eagerly punish management.

Consistent with previous research, the managers and participants in the capital markets are assumed to be equally informed about market-wide risk or non-firm-specific information, but issuing firm executives know more firm-specific information. It is assumed that connected affiliated investors that are part of the same social or business network as the issuing firm's management or board of directors know more than other shareholders. Consequently, $f(z)$ and $g(z)$ vary with board of directors and institutions' affiliation with business networks due to differential levels of information asymmetry, board of directors' incentives to effectively monitor, and institutions' abilities to impose disciplinary costs. For example, management knows that institutions will take disciplinary action only if they spend money on monitoring activities. We assume that actively managed funds that are connected with other institutions through block ownership and not affiliated with management via social and business networks have lower cost of monitoring and will impose disciplinary costs more readily than other investors because they do not have institutional restrictions related to selling shares or entangling business relationships. If they are controlled by issuing firm managers or are passive, however, then these blockholders are less likely to question managers' actions due to value-decreasing duties of loyalty and trust, which increases the cost of monitoring for some connected institutional investors.

Exhibit 2 | Probability of Punishment from Institutional Investors Distant from Management



Notes: Graph of $g(z)$ as in equation (2) with $\gamma = 20$ and $z_I = 0.5$. The graph shows the probability that institutional investors punish management after an accelerated SEO when the market price of a share $x + z$ is at premium / discount z relative to the intrinsic value x. In this scenario, institutional investors have a low tolerance for overpriced SEOs.

We now examine the decision to make a secondary offering incorporating several other factors, including current capital market valuations for all publicly traded corporations, the present value k of the future return of whatever project the SEO is intended to fund, the number of shares offered n, the actual share value x, the level of information asymmetry z, and the probability $g(z)$ of ex post disciplinary actions that impose significant costs m on senior management. The payoff to management expressed as a random variable is:

$$(1 - S(z)) \cdot 0 + S(z) \cdot (n(x + z) - G(z) \cdot m), \quad (3)$$

where $S(z)$ is a random variable that is 1 if the SEO is made given z and 0 if not. Likewise, G is 1 if institutional investors punish management conditioned on the SEO being made at z. The payoff for not making an SEO is 0. We therefore define the expected payoff to management P_M to be the expected value of (3), which is:

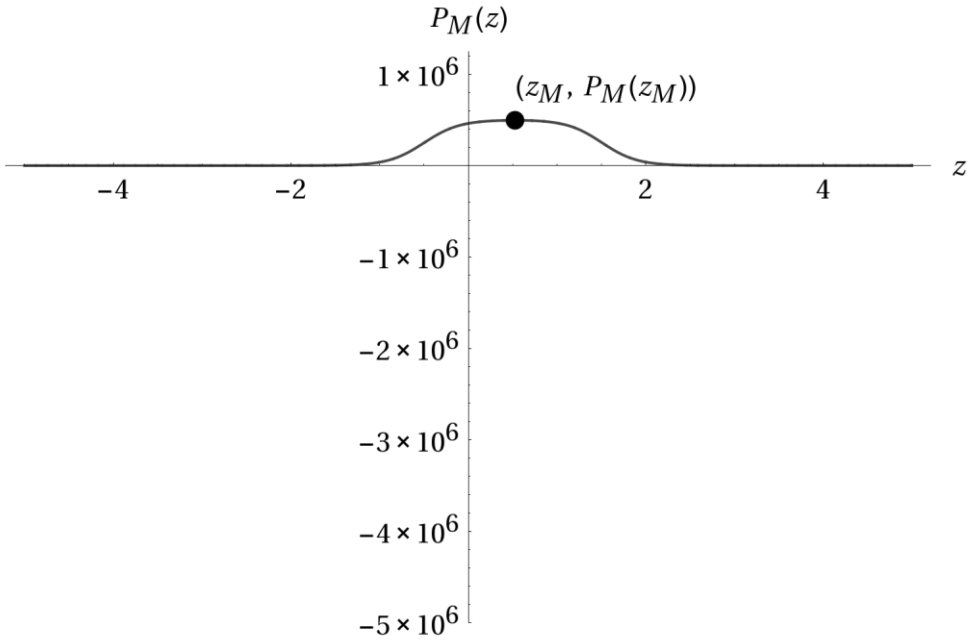
$$P_M(z; m, n, x) = f(z)(n(x + z) - mg(z)). \quad (4)$$

That is, the expected payoff at a given z is the probability that the SEO is made, multiplied by the difference between the money collected $n(x + z)$ and the expected punishment $mg(z)$. We will focus on the value z_M of z that maximizes $P_M(z)$.

To narrow the discussion, we fix values of certain quantities. We fix the number of shares to be offered during the SEO at $n = 10{,}000$ so that approximately $nx = 1{,}000{,}000$ dollars will be collected. The punishment is $m = 10{,}000{,}000$ to represent potential income lost by punished managers when they are fired and their reputations are damaged.

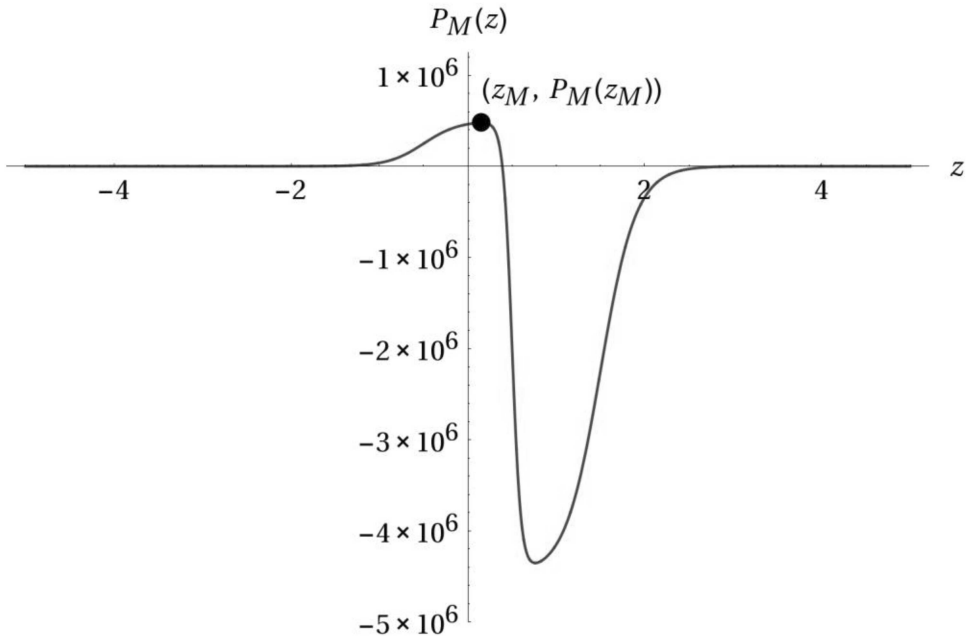
Let us continue with the example strategy f from Exhibit 1 and first consider the case in which institutional investors are completely inactive, that is, the probability of punishment is $g(z) = 0$. In this scenario, management is free to issue an overvalued

Exhibit 3 | REIT Management's Payoff—Inactive Institutional Investors



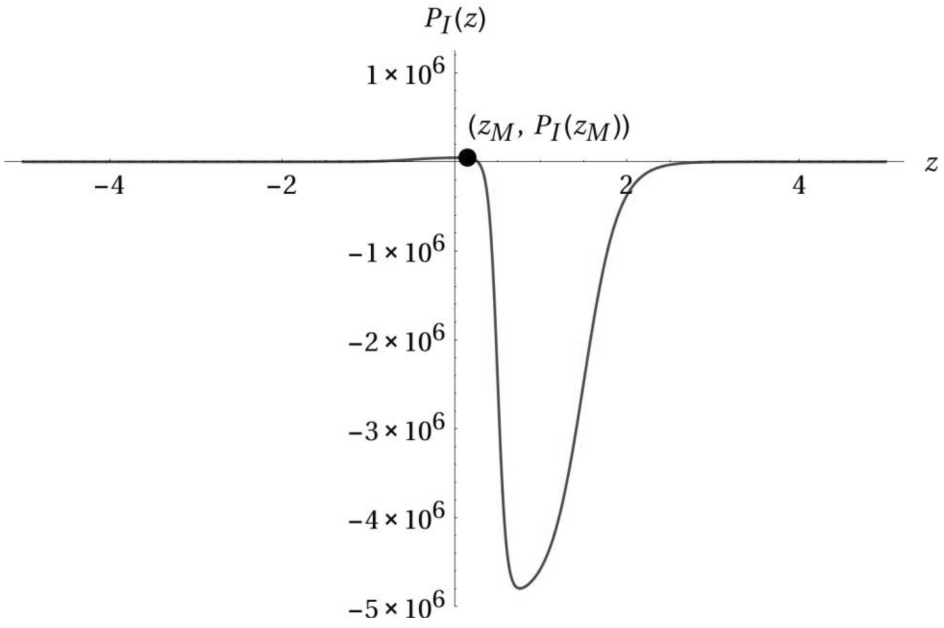
Notes: Graph of $P_M(z)$ as in equation (4) in the scenario when management is free from punishment, assuming $f(z)$ is as in Exhibit 1, and $g(z) = 0$. The indicated point is the maximum at $z_M = 0.53$. The graph shows the payoff to management when issuing the SEO at different premiums / discounts z relative to the intrinsic value when institutional investors are completely inactive.

Exhibit 4 | REIT Management's Payoff—Institutional Investors Distant from Management



Notes: Graph of $P_M(z)$ as in equation (4) in the scenario when management is constrained, assuming $f(z)$ is as in Exhibit 1, $g(z)$ is as in Exhibit 2. The graph shows the payoff to management when issuing the SEO at different premiums / discounts z relative to the intrinsic value. The indicated point is the maximum at $z_M = 0.15$. In this scenario, institutional investors are likely to investigate the premium. The large dip is at values of z at which management initially prefers to make the SEO, but punishment is likely.

Exhibit 5 | REIT Management's Payoff—Loosely Connected Institutional Investors Distant from Management



Notes: Graph of $P_I(z)$ as in equation (6) in the scenario when management is constrained, assuming $f(z)$ is as in Exhibit 1 and $g(z)$ is as in Exhibit 2, and setting $h = 1000$, $k = 200{,}000$, and $i = 10{,}000{,}000$. The graph shows the payoff to investors when the SEO is issued at different premiums/discounts z relative to the intrinsic value. The indicated point is for the same z_M as in Exhibit 4. The payoff to investors at z_M is $P_I(z_M) = 43{,}494$. In this scenario, institutional investors are loosely connected and likely to investigate the premium.

SEO at whatever z_M maximizes the expected money collected, as shown in Exhibit 3.

Alternatively, now suppose management is constrained by connected institutional investors using a strategy function like that shown in Exhibit 2. In this scenario, management's preferred strategy is to issue the SEO at a smaller z_M, as shown in Exhibit 4. The expected payoff becomes negative and of large magnitude for larger z, because the probability of punishment is nearly 1. For much larger z, the expected payoff approaches 0 because $f(z)$ drops to 0.

Institutional investors' payoff can be divided into several parts. A loss occurs because the market initially interprets the accelerated SEO as a sign of an overvalued issuance price. The loss is a multiple h of the share price $x + z$ that incorporates how many shares the institutional investors own and the expected drop in share price. A future gain or loss with a present value of k occurs because the money collected from the SEO is invested in some project that eventually influences share price. Finally, there is the cost i of punishing management, which may involve intangibles such as an institution's reputation and influence on other investors that must be translated into dollars so as to be compatible with k and the share price. Expressed as a random variable, the payoff to institutional investors is:

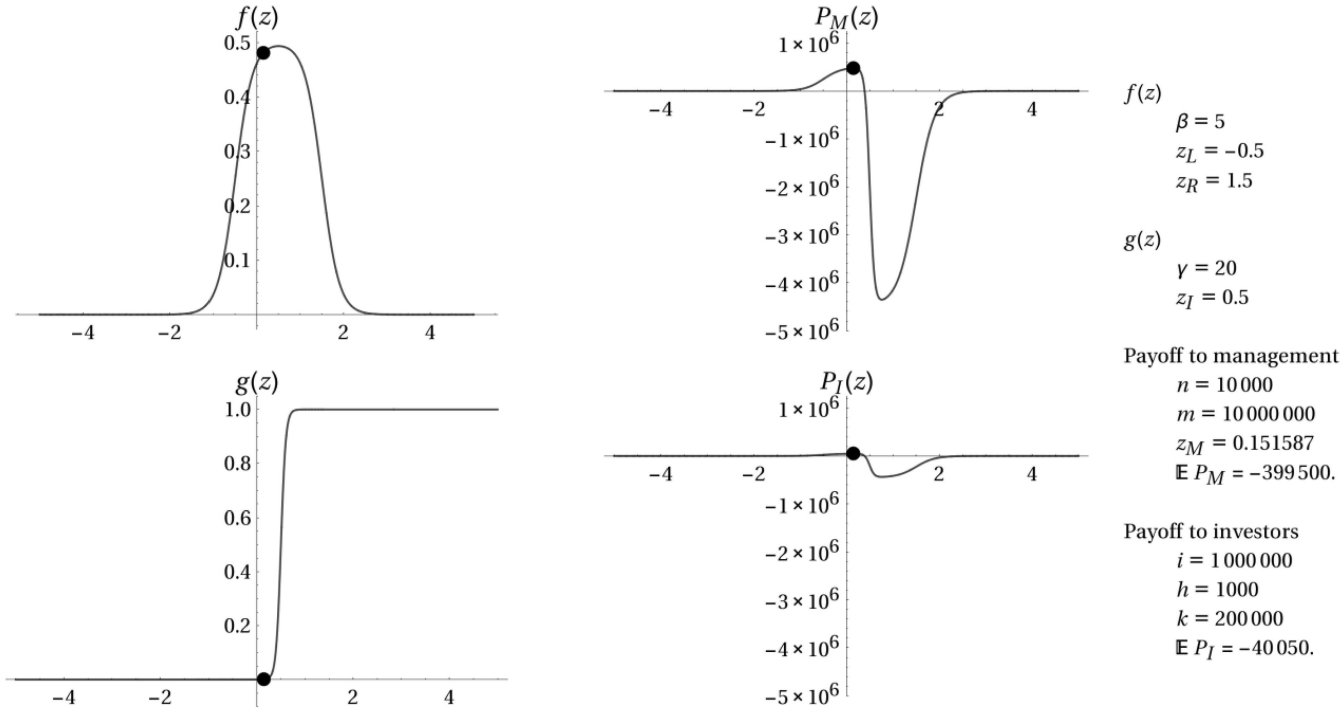
$$(1 - S) \cdot 0 + S \cdot (k - h(x + z) - G \cdot i), \quad (5)$$

where S is 1 if the SEO is made given z and 0 if not, and G is 1 if institutional investors punish management and 0 otherwise. Again, the payoff is zero if no SEO is issued. We therefore define the expected payoff to investors P_I to be the expected value of (5), which is:

$$P_I(z; k, h, i) = f(z)(k - h(x + z) - ig(z)). \quad (6)$$

Continuing the constrained scenario from Exhibit 4, the expected payoff to investors is shown in Exhibit 5. We set $h = 1000 = 50{,}000 \times 0.02$, meaning that these investors own 50,000 shares (worth around

Exhibit 6 | Strategy and Payoff Functions—Tightly Networked Institutional Investors Distant from Management



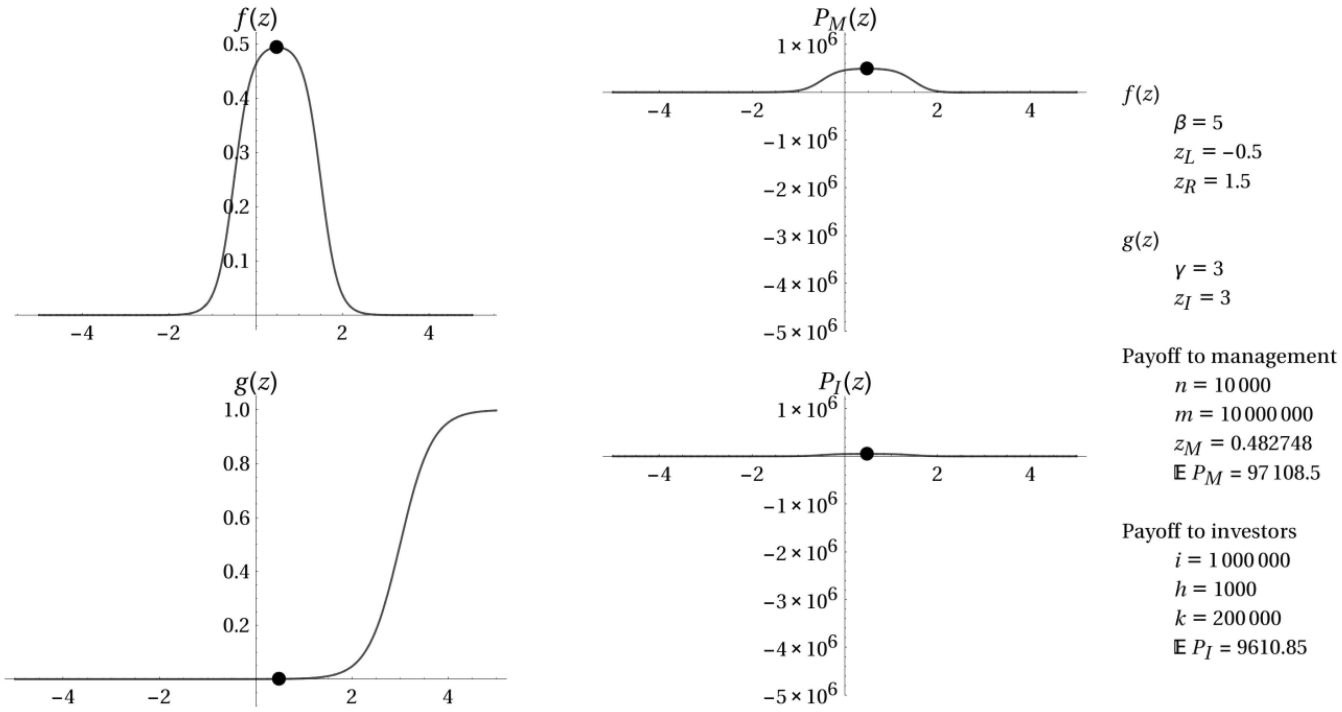
Notes: Graphs of f, g, P_M, and P_I for the scenario of investors tightly networked among themselves, and socially distant from management. The graphs show strategies and payoffs as functions of the premium / discount z at which the SEO is issued. Punishment is less expensive than in Exhibit 5. Investors are likely to investigate the premium.

$5 million total) and expect them to drop by 2% just after an SEO. For this picture, we temporarily suppose that the future value of the project is k = 200,000 and that punishment is expensive, costing i = 10,000,000. Note that the only positive contribution in equation (6) is $f(z)k$, so if the present value k of whatever project management is funding is sufficiently large, investors can realize a positive payoff from an SEO provided z is not too large, as is the case with z_M in Exhibit 5. However, if k is too small, then management is making a bad investment, and institutional investors will have to think in terms of minimizing an inevitable loss. The large negative payoff around z = 1 in Exhibit 5 is due to the high cost to investors of implementing punishment, which is unlikely to be necessary unless $z > z_I$ = 0.5. In the scenario shown in Exhibits 1–2 and Exhibits 4–5, we assume that institutional investors are socially and professionally distant from the firm's management, as indicated by the sharp rise in g, and that institutional investors are loosely networked among themselves, so that the cost to inflict punishment is high.

Let us consider what happens when we vary those circumstances. If institutional investors are tightly networked, then punishment is much less expensive (i = 1,000,000), as shown in Exhibit 6. This has no immediate impact on management, but it reduces the deep pit around z = 1 in the payoff to investors. Management is most strongly controlled under these assumptions.

A more interesting scenario is shown in Exhibit 7. In this case, investors are tightly networked among themselves, so punishment is less expensive. They are socially and professionally connected to management, which is modeled by changing g so that the rise is more gradual and happens at a greater z-value of z_I = 3. That is, investors are reluctant to punish their friends or business associates. Consequently, the maximum payoff to management is at

Exhibit 7 | Strategy and Payoff Functions—Tightly Networked Institutional Investors Close to Management



Notes: Graphs of f, g, P_M, and P_I for the scenario of investors tightly networked among themselves, and socially connected to management. The graphs show strategies and payoffs as functions of the premium / discount z at which the SEO is issued. Punishment is inexpensive, but investors are unlikely to investigate the premium.

$z_M = 0.48$, which is distinctly higher than the value of $z_M = 0.15$ when management is strongly controlled.

A fourth scenario is when investors are socially or professionally connected to management, but not strongly coordinated with each other. This situation is modeled by combining the g from Exhibit 7 with the high cost of punishment from Exhibit 5. As shown in Exhibit 8, since investors are reluctant to punish, management is essentially unconstrained, and the results are very similar to Exhibit 7.

We now consider the problem of whether it is possible for this game to have an equilibrium in the sense of a feasible value of z that simultaneously approximately maximizes P_M and P_I. Since P_I must be negative for all sufficiently large z, any equilibrium must be no more than a bit above 0. Suppose that management is unwilling to make an accelerated SEO if the market price is below a certain threshold. Let z_f be that lower bound. Let z_u be the positive solution to $P_I(z_u) = 0$, assuming there is one. Then the only feasible values of z are in the interval $[z_f, z_u]$. Assumptions on the shape of f and g imply that $z \in [z_f, z_u]$, $g(z) \approx 0$ and $f'(z) \approx 0$. Consequently, P_I is controlled by the term $k - h(x + z)$, and will slope downward. Thus the only possibility for a maximum of P_I is at $z = z_f$. Since $P_I(z_f)$ must be positive to be a maximum, it follows that:

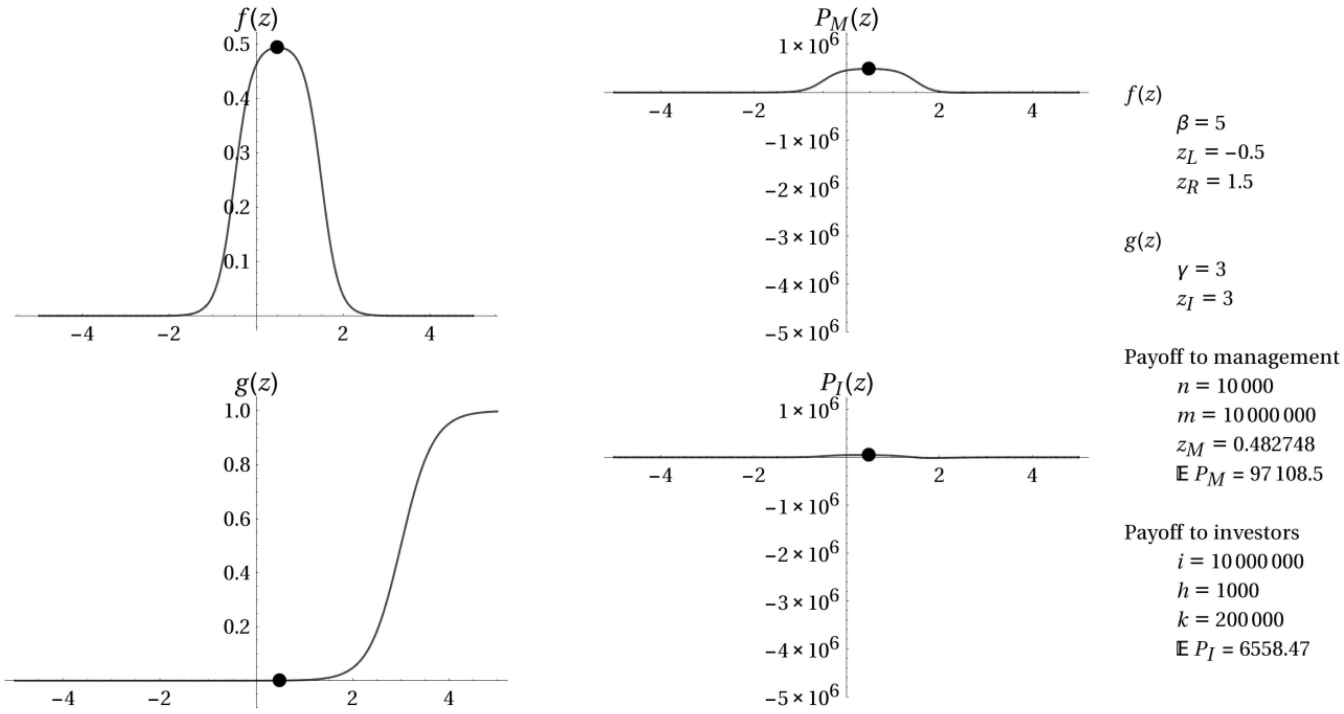
$$k - h(x + z_f) - ig(z_f) > 0. \tag{7}$$

This inequality can be interpreted as a constraint on k:

$$k > h(x + z_f) + ig(z_f). \tag{8}$$

That is, the present value of the project to be funded must be greater than the expected loss to institu-

Exhibit 8 | Strategy and Payoff Functions—Loosely Networked Institutional Investors Close to Management



Notes: Graphs of f, g, P_M, and P_I for the scenario of investors loosely networked among themselves, and socially connected to management. The graphs show strategies and payoffs as functions of the premium / discount z at which the SEO is issued. Punishment is expensive, and investors are unlikely to investigate the premium.

tional investors from the SEO. It can also be interpreted as a constraint on z_f:

$$\frac{k - ig(z_f)}{h} - x > z_f. \tag{9}$$

That narrows the problem to ensuring that P_M has a maximum at z_f. One possibility is that P_M has a critical point at z_f, in which case $P'_M(z_f) = 0$. However, since P_M is hill-shaped on $[z_f, z_u]$, it is also possible that the critical point lies to the left of z_f, in which case the maximum is still at z_f but $P'_M(z_f) < 0$. From (4),

$$P'_M(z_f) = f'(z_f)(n(x + z_f) - mg(z_f)) + f(z_f)(n - mg'(z_f)). \tag{10}$$

Setting $P'_M(z_f) \leq 0$ and using the assumptions that for $z \in [z_f, z_u]$, $g(z) \approx 0$, $f'(z) \approx 0$, and $f(z) \geq 0$, we get an approximate inequality:

$$n - mg'(z_f) \leqslant 0 \tag{11}$$

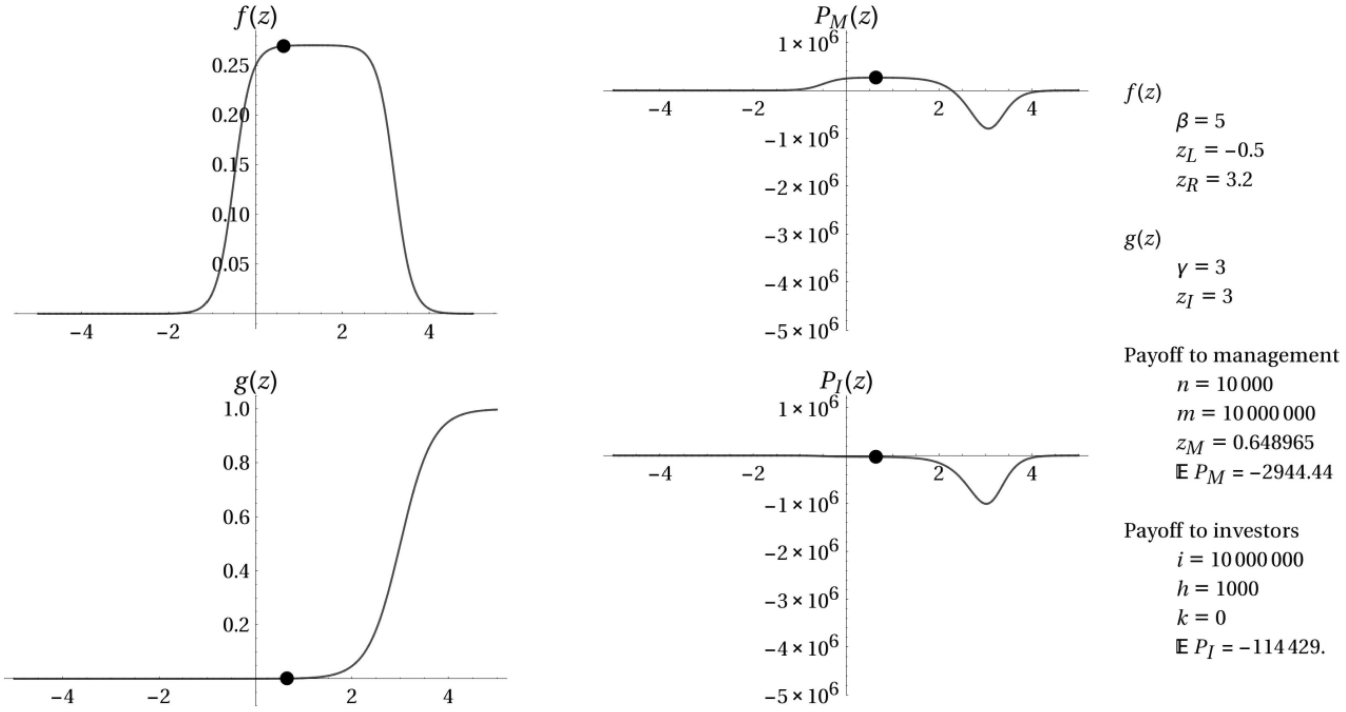
or

$$n \leqslant g'(z_f)m. \tag{12}$$

Combining equations (8) and (12), an equilibrium at $z = z_f$ is possible if k is distinctly greater than $h(x + z_f)$, and the number of new shares n that management plans to issue is no more than a certain fraction of the possible punishment m. Institutional investors can therefore control n by adjusting their strategy function g, specifically, its derivative at z_f. Note that it would be *safe* for management to issue an SEO with n smaller than $g'(z_f)m$; however, that limits the budget of the project in question.

Continuing the example scenario from Exhibit 6, let us suppose that management is willing to offer the SEO at any $z \geq 0.1$. Then, $0.1 = z_f < z_M = 0.15$, so

Exhibit 9 | Strategy and Payoff Functions—Bad Investment, Loosely Networked Institutional Investors Connected to Management



Notes: Graphs of f, g, P_M, and P_I for the scenario of investors loosely networked among themselves, and socially connected to management. The graphs show strategies and payoffs as functions of the premium / discount z at which the SEO is issued. The investment is bad ($k = 0$), punishment is expensive, and investors are unlikely to investigate the premium.

Exhibit 10 | Predicted Share Price Reaction to SEO Announcement

Economic Value	Share Price Response	Long Run Abnormal Return	Punishment
$z = 0$ and large $k > 0$	+	+	No
$z = 0$ and small $k < 0$	—	—	Yes
$z > 0$ and large $k > 0$	—	+	No
$z > 0$ and small $k < 0$	—	—	Yes
$z < 0$ and large $k > 0$	+	+	No
$z < 0$ and small $k < 0$	—	—	Yes

the maximum of P_M is feasible. Checking the constraints, k is easily large enough to satisfy the constraint (8), as $100{,}100 = h(x + z_f) < k = 200{,}000$. Also, n is small enough to satisfy (12), as $10{,}000 = n < g'(z_f)m = 67{,}000$. The SEO would bring in $n(x + z_f) = 1{,}001{,}000$. Both management and investors are satisfied at this equilibrium.

As another example scenario, consider the non-equilibrium shown in Exhibit 9. Management is willing to risk punishment because z_R is large. Punishment is expensive and investors are reluctant to inflict it. The project is a poor investment because its present value is $k = 0$. The exact critical point of P_M is $z_M = 0.65$, although for z between 0 and 2, P_M is nearly maximal. Investors are not satisfied because P_I is negative over this range, with the maximum on the left at z_f. Investors in this scenario may decide to organize and monitor management more closely.

Conclusion

We now discuss the empirical predictions implied by the simulations. The above analysis demonstrates that a reasonable parameterization of our model captures the announcement effect, the post-

issuance long run performance, and the incidence of disciplinary action (punishment) for value reducing SEOs. For small values of z (difference between the issue price and the intrinsic value) and different values of k (expected net present value from investing in the project), the hypotheses shown in Exhibit 10 are consistent with the simulation analysis.

Notice that an accelerated SEO will produce negative share price responses under different scenarios. If management issues overvalued SEOs when they have profitable investment projects that are not verifiable, the share price response will still be negative. Suppose that the true value of the project is not revealed until three years later, the immediate and one-year cumulative returns could still be negative, especially during a recessionary period when the level of uncertainty is high. During a recession, the share price response and institutional discounting may be very high even when the firm sells the stock at less than the current intrinsic value if the future investment is value decreasing. Future empirical research can better differentiate between these scenarios by measuring information asymmetry and the probability of disciplinary action by different types of cross-blockholders following value decreasing accelerated offers. Our calibrations are consistent with a fully rational, dynamically consistent model of SEO decisions in a manner similar to Carlson, Fisher, and Giammarino (2006).

The model also has empirical implications for other aspects of the SEO process that are not explicitly parameterized. Discounting, the offer price on the day of the announcement minus the closing price on the day prior to the announcement of the SEO, is the amount of money left on the table for institutions that participate in the pre-SEO announcement period. If discounting rewards connected institutional participants with large cross-ownership positions for facilitating accelerated SEOs, it should be negatively related to the percentage of connected block ownership. The monetary incentive for participation most likely increases during recessions and high volatility periods, but the benefit of discounted shares to connected blockholders increases the likelihood of an accelerated SEO because these investors require less due diligence. The existence of ownership networks in the industry may explain why some REITs continue to issue accelerated SEOs during credit and commercial real estate market crises.

Investment banks are paid with direct fees and underwriting equity gains from participating in the SEO. Gross direct fees as a percentage of issue value are compensation for their marketing efforts, whereas underpricing rewards underwriters for buying shares from the equity issuance (Goodwin, 2013). Given that costs should be related to the ease with which underwriters place offers by soliciting institutional investors in the pre-SEO announcement period, investment banking costs should be negatively related to the percentage of existing connected cross-block ownership if they are independent of the investment/commercial bank. If, however, the underwriter has a relationship with the coordinated cross-block holders, REIT management should be willing to pay larger compensation to the investment banks for their assistance with accelerated equity offerings. In this scenario, the costs may be similar to fully marketed offers that do not have these types of institutional investors.

Although the theoretical analysis uses REITs as an example, the implications apply to any type of corporation. Future empirical research should determine whether institutional investors with cross-holdings are part of the secondary equity issuance problem or part of the solution. Heineman and Davis (2011) state that the Committee for Economic Development has become "deeply" concerned about the excessive influence of institutional investors in the public equity markets. The authors state, "Even though institutional investors own more than 70% of the largest 1,000 companies in the United States, there is far less known about many of them than about the public companies in which they invest."

Endnotes

1. https://www.reit.com/data-research/data/industry-snapshot.
2. http://www.valuewalk.com/2016/04/wintergreen-advisers-consolidated-tomoka/.
3. Cremers and Nair (2005) find interaction between monitoring by activist institutional investors and pressure from the market for corporate control. They show that a portfolio manager

who buys firms with the highest level of takeover vulnerability and shorts those with the lowest probability generates annualized abnormal returns of 10% to 15% when public pension funds have block ownership. The two external pressures are complements.

4. For example, Stuart, Huang, and Hybels (1999) find that social ties within a strategic alliance partnership help young firms perform better than other similar companies.
5. The importance of social network connections and their influence in financial markets is an relatively new strand of finance research on analysts' alumni connections (Cohen, Frazzini, and Malloy, 2008), venture capital networks (Hochberg, Ljungqvist, and Lu, 2007), mutual fund managers word-of-mouth effects (Hong, Kubik, and Stein 2004), increased stock market participation (Hong, Kubik, and Stein 2004), mutual fund past advisory firm business connections (Kuhnen, 2009), and mutual fund and board of director common education (Cohen, Frazzini, and Malloy, 2008). The use of corporate board linkages as a measure of social personal networks is common in the sociology literature (e.g., Useem, 1984).

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