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Network effects on organizational decision-making: Blended social mechanisms and IPO withdrawal☆

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ABSTRACT

This paper develops a new approach to the study of network effects in organizations and markets by proposing that structural influences on social and economic action result from contingent blends of well-understood social mechanisms. We emphasize the interplay of three different network processes: resource and information transfer, status signaling and certification, and social influence. Different mixes of these mechanisms characterize disparate networks because the obligations imposed by ties and the capacities of partners result in situations where mechanisms amplify or diminish one another. We test hypotheses about mechanism interactions using four years (1997–2000) of data on high-technology IPOs that situate organizational decisions about whether to withdraw an offering in two distinct networks. We find that network mechanisms exert multiple moderating effects on one another and that those effects vary systematically across venture capital syndicate and director interlock networks. These findings help to explain why different networks exert disparate effects, why the effects of some structures change as their larger contexts shift, and why even very successful organizations can sometimes find themselves hamstrung by their connections.

1. Introduction

Networks shape social and economic action through multiple, co-occurring mechanisms (Podolny and Baron, 1997; Fernandez et al., 2000; Podolny, 2001). We develop the idea that social and organizational connections blend together at least these three social mechanisms: Among other things, relationships channel flows of tangible and intangible resources (Granovetter, 1973; Burt, 1992), signal status and membership (Podolny, 1993; Zuckerman, 1999), and convey influence (Friedkin and Johnsen, 1990). We seek to explain how these mechanisms intensify or diminish one another's effects to enforce tradeoffs on or offer unanticipated gains to the participants in particular networks.

We begin with the observation that relationships in a network are not static indicators of a single social process. While it is tempting to assume, for instance, that the fact of a connection entails the transfer of valuable information between partners, it need not. Network ties are clean representations of messy interactions. They thus stand in for complicated social processes that can shape action and outcomes through several means. We contend that network scholars must begin to elaborate the ways in which structures reflect the workings of multiple social mechanisms that might act in concert or at cross purposes, depending on the actors, activities, and context that characterize a particular empirical network. At least three processes – information transfer,[1] status signaling, and social influence – are muddled up in most relationships. Moreover, we expect the

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[1] For the sake of rhetorical simplicity we use the phrase 'information transfer' to encompass all movements of valuable tangible and intangible resources through network connections.

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strength and salience of each mechanism to vary across different types of activities and partners.

Put succinctly, this means that network theorizing must become more contingent as the mechanisms at work and thus observable effects of social structure will vary from context to context. We seek to contribute to the development of a more contextual theory of network multiplicity that expands our ability to explain the varied effects exerted by differently configured networks by emphasizing the blends of mechanisms that characterize their workings. To that end we make two related arguments.

First, we contend that an individual or organization's position in a given network activates several processes that condition each other's effects (cf. Smith et al., 2012). Networks influence action and outcomes through blends of mechanisms. Second, we argue that the content of ties and characteristics of their participants matter for understanding how mechanisms blend. All networks contain some mix of information transfer, status signaling, and social influence processes. However, characteristics of the parties involved and the types of relationships linking them affect how these simultaneous processes operate – in tandem or at cross-purposes – to produce observable outcomes.

We test hypotheses about when and how different social mechanisms amplify or diminish each others' effects using data on the venture capital syndicate and director interlock networks of the population of high-technology companies that announced their intention to go public between 1997 and 2000. We seek to explain why corporations that have signaled their intention to pursue a liquidity event by filing a prospectus indicating they will undertake an initial public offering (IPO) change course by withdrawing their IPO to remain private and independent.

Research in finance and entrepreneurship has demonstrated that the decision to withdraw an IPO has to do with a corporation's (or its advisors') perceptions of the firm's chances for market success. The financial characteristics of offerings and companies underpin common firm level explanations for withdrawal. Greater revenues, less debt, and larger offerings all decrease the likelihood of withdrawal (Busaba et al., 2001; Zhao, 2005; Dunbar and Foerster, 2008). In addition, a corporation's choice of partners is important: underwriter prestige and the choice of whether or not to have venture capital backing affect the likelihood of withdrawal (Boeh and Southam, 2011). We extend this insight into the role of partners and propose that key networks influence the likelihood of withdrawal. The decision to forgo a desired outcome stems from a combination of resource and information transfer, status signaling, and social influence mechanisms that vary across the interlock and syndicate networks.

Our argument for a more contingent, contextualized approach to network theorizing creates new challenges for empirical network studies, including this one. Our conclusion and implications section more fully discusses the general characteristics of a behavioral network theory that takes the kinds of contingencies we study seriously. For now it is important to highlight a key tension: the desire to create generalizable theory about network processes is often at odds with the goal of contextualizing our understanding about those same processes. On the one hand, we seek to articulate and test hypotheses that are general enough to provide purchase on the effects networks exert in many settings. On the other, we are acutely conscious that our core argument depends on the notion that there are likely to be few universal relationships between network measures and outcomes. In an effort to make claims that are as generalizable as possible while still doing justice to our arguments about the contextual dependence of networks, we take the unconventional step of introducing our empirical setting before presenting our theoretical arguments in order to allow the empirical details of our focal setting and actors to inform the analytic work that follows.

2. Setting

We develop and test our hypotheses in an examination of firms' decisions about whether or not to realize an initial public offering (IPO) in high technology industries in the period from 1997 to 2000. The IPO is a bellwether event in the life of a young firm (Gompers and Lerner, 1999) and is a routinely used outcome measure in finance (Lerner, 1994; Ritter and Welch, 2002) and strategy (Pollock and Rindova, 2003; Higgins and Gulati, 2006). Yet firms that indicate their desire to go public need not complete the process. At any time after announcing intentions to IPO, a firm may "withdraw," canceling its ability to offer securities on the public market.

The decision to pursue an IPO carries the considerable costs of developing and filing a prospectus, establishing underwriters, and working to generate demand for an issue, a process called "book building" (Busaba, 2006). When an organization files an S-1 form with the Securities and Exchange Commission (SEC) it is publicly announcing a strong preference to realize its IPO. In addition to the sunk costs of beginning the IPO process, companies and managers have disincentives to forgo an IPO.

Withdrawing an IPO diminishes the reputation of both the organization and the individuals that run it (Acimovic and Lyn, 2000). Companies that withdraw IPOs are much less likely to make a second, successful attempt to go public (Dunbar and Foerster, 2008), and if they do, they suffer a valuation penalty as a result of being perceived as a higher risk (Lian and Wang, 2009). Thus firms that stay independent in the wake of a withdrawn offering have to rely on other – frequently more expensive – sources of financing. Withdrawing an IPO without an alternative liquidity event also defers insiders' and financiers' ability to profit from pre-IPO equity and options.[2]

Nevertheless, IPO withdrawals occur fairly often. Over a 20 year period, Lian and Wang (2012) estimate that slightly more than 20% of all attempts to go public result in a withdrawn registration. Companies in the IPO pipeline can withdraw for numerous reasons including negative (bankruptcy) and more positive (appealing acquisition opportunities) outcomes. However, some percentage of companies step away from equity markets only to remain alive and independent or to try the IPO process again at a later date.

We take the decision to withdraw an IPO by a company that does not subsequently go bankrupt or cease to be independent to represent an instance where an organization changes course to pursue a costly alternative other than the one for which it has already signaled a strong preference. In addition to firm level factors (small offerings, few or no revenues) that have been shown to influence withdrawal rates (Busaba et al., 2001; Zhao, 2005; Dunbar and Foerster, 2008), we propose that firms' networks will influence the likelihood of withdrawal. This is consonant with Boeh and Southam's (2011) finding that features of a firm's coalition of backers and advisors affect the likelihood of withdrawal. For example, the more prestigious the underwriter and the more active the venture capital investors, the lower the likelihood a firm will withdraw (Boeh and Southam, 2011).

There are three reasons that decisions about whether to withdraw an IPO and forgo other sources of liquidity offer a particularly rigorous test of our approach to network effects on organizational

[2] One reason firms commonly withdraw an IPO is to enable them to pursue an attractive financial alternative such as a merger or acquisition. (Despite the fact that while there is a valuation benefit to companies which are acquired during the IPO process, this benefit exists only if the company is acquired before formally withdrawing the IPO (Lian and Wang, 2009.) By focusing our discussion and analyses on firms that withdraw and remain independent, we avoid the possibility that similar financial incentives may drive both the decision to file for an IPO and the decision to withdraw.

action. First, filing an S-1 is a clear, costly, and public declaration of an organization's intention to pursue a particular, observable course of action. Second, withdrawing the IPO represents an equivalently public, costly, and observable declaration of the intention to shift course and pursue an alternative. Third, the period before filing an S-1 is one of the very few times that a private firm, subject to many fewer regulatory constraints than its public counterparts, has much more leeway to strategically configure key networks in order to maximize the chances of achieving its goal. Thus, our analysis of withdrawal decisions as a function of position in venture capital syndicate and director interlock networks at this time in the organizational life course represents a very hard case for our theory because the interests of most relevant actors are likely to be aligned in favor of pursing liquidity. As a result the seemingly curious choice to pursue an IPO only to later withdraw from the process provides a substantive motivation for our theoretical exploration of blended network mechanisms.

3. Theory in context

3.1. Three mechanisms: pipes, prisms, and peers

In order to explain how organizational positions in these two different networks combine to influence the decision to withdraw an IPO, we turn to three well-known network mechanisms. We begin with Joel Podolny's (2001) memorable metaphorical distinction between network pipes and prisms. When understood as pipes, relationships work by channeling resources from place to place in a differentiated social structure. Those resources can be tangible, as in the case of financial investments made by venture capitalists, or intangible, as when a firm's partners bring them timely and relevant information about competitors, markets or other important matters of business. Regardless of whether the resources are tangible, this mechanism proposes that valuable things move through networks. More central positions thus offer greater opportunities and advantages. Network theories that emphasize individual level differences in social capital (Lin, 2001; Burt, 2005) rest on this conception. When viewed as prisms, in contrast, networks order the experience of complicated settings by signaling the relative status of participants to important outsiders who control key resources (Podolny et al., 1996). Network theories that treat ties as means to certify uncertain quality (Stuart et al., 1999) or to establish membership in a valued category (Zuckerman, 1999) rest on this understanding. Here status benefits can accrue to centrality in networks whether or not valuable resources such as timely information pass through them.

We also incorporate a third, somewhat less strategic mechanism that leads networks to shape economic outcomes: social influence. Research in this tradition "...links the structure of social relations to the attitudes and behaviors of the actors who compose a network" (Marsden and Friedkin, 1993: 127). Social influence emphasizes the shared norms (Useem, 1984), expectations (Coleman et al., 1966), mindsets (Galaskiewicz, 1985), and identities (Podolny and Baron, 1997) that pressure egos to make decisions based on the perspectives, actions and experiences of alters. This mechanism highlights conformity and social pressures on decision-making and may be independent of or even antithetical to ego's strategic goals. In keeping with Podolny's "pipes" and "prisms," we dub the social influence mechanism "peers" to denote the role that relationships play in shaping individual attitudes and group norms (Friedkin, 2003).

More abstractly, we propose that the pipes mechanism depends on timely flow of potentially valuable information and resources to ego through their partners. The prisms mechanism depends on signals of quality inferred by third parties from the degree of visibility of ego's more or less well-connected partners. The peers mechanism depends on the accessibility and salience of a partner's opinions or expectations to ego. As we mobilize them here both the pipes and peers mechanisms emphasize flows of information through networks, but only the former requires that the information be of potential value to ego. The prisms mechanism does not require any flow of information through ties. Instead, others' inferences based on observing their presence drive outcomes.

How these three mechanisms blend in particular empirical settings, we contend, is deeply dependent on the quality of attention that partners can pay to ego and the factors which make partners' opinions and knowledge salient to ego's decisions. The key empirical questions for predicting how these networks might blend in particular contexts are: (1) does increased centrality come at the cost of attention; and (2) what does the character of attention in a network suggest about the sources of particular partners' salience to a given ego. These questions, we contend, cannot be answered in the abstract. In other words, we propose that the quality of attention partners can pay to ego is key to both the value and the salience of information that might flow through networks. Thus we emphasize partner's attention as a way to understand when different mechanisms are more likely to be more or less determinative of organizational decisions.

3.2. The networks of high-technology pre-IPO firms

At least two different networks might influence the withdrawal decision. Young technology firms often receive early financial support from VCs. Those investments have important implications for a company's eventual success (Stuart et al., 1999; Podolny, 2001; Gulati and Higgins, 2003) because they influence stock market investors' valuations of potential offerings and offer access to expertise in addition to capital. VC investments have two further features that make them interesting for our purposes.

First, VCs tend to be "hands on" investors who exert real influence on the strategy and management decisions of their portfolio companies (Stross, 2000). Ties between financiers and the companies in which they invest transfer important tangible and intangible resources to the company (Hsu, 2004). In addition to cash, venture capitalists bring extensive managerial and sometimes technical expertise to the organizations in which they invest. VCs also routinely serve as matchmakers by, among other things, helping young companies identify and hire the executive officers who will shepherd them through the IPO and subsequent growth. Second, contemporary VCs rarely invest alone. Instead they syndicate deals with other firms in the industry. Thus it is possible to position portfolio companies and their investors in a syndication network that spans the private equity market (Hochberg et al., 2007; Kogut et al., 2007).

Pre-IPO startups also maintain important ties to already publicly traded corporations. Those connections often take the form of board of director interlocks (Mizruchi, 1996; Useem, 1982; Mizruchi, 1992; Palmer et al., 1995). Interlock networks are configured differently than VC financing networks. Here, a technology firm (ego) has a tie through a shared director to another firm (partner) whose similar ties to other companies make it more or less visible to outsiders who use the director interlock to make inferences about the pre-IPO company's quality. Both director interlocks and VC investments can convey status and allow the transfer of information. Only VC investments also come with direct transfers of material resources to the firm. But when entrepreneurs have a choice of venture capitalists they often accept lower levels of financial investment in return for access to the attention and expertise of established VC partners (Hsu, 2004). We thus frame most of the discussion that follows in terms of information that flows through networks while

recognizing that many other things are also transferred through relationships.

3.2.1. Access, search, and network pipes

The key insight underlying the networks as pipes view is that the collective structure created by relationships in a field can yield individual benefits for some. The key imagery here is one of increased ability to compete that results from a salutary position. As Burt (2005: 4) notes: "One's position in the structure of . . .exchanges can be an asset in its own right." If we take the metaphor of the network pipeline seriously, then one's competitive advantages stem from beneficial levels of access to information or resources that flow from partners.

All other things equal, then, we expect that technology firms whose investors and directors are better connected will have greater access to timely and potentially valuable information through those connections. However, we also contend that the ability of investors and directors to convey what they know to particular firms in a timely and effective manner depends on their ability to attend more exclusively to the companies they are connected to. Firms that benefit from the attention of well connected alters will thus have an advantage by virtue of being better able to select the appropriate time to go public, to secure more beneficial backing in the form of high status underwriters, and to present themselves more effectively in the often arduous 'road show' presentations that precede an IPO. In other words, when these networks are conceptualized as resource pipelines, we expect pre-IPO firms that are more central to be better advised and more likely to succeed in their pursuit of a successful IPO. We thus hypothesize:

H1. *Ceteris paribus*, access to information and resources through both VC and interlock network 'pipes' will decrease the likelihood of IPO withdrawal.

3.2.2. Certification, status, and network prisms

Network ties also order outsiders' experiences of social and economic settings. Structures linking participants in a field provide a social map that outsiders utilize to evaluate a given participant's prospects. In settings where the true value of organizations, products, or services is uncertain, investors and customers mine observed relationships for clues about quality (Podolny, 1993). The performance of initial public offerings (IPOs) is thus conditioned by the presence or absence of firms' ties to prominent partners (Stuart et al., 1999). Prism effects help participants by making them seem more valuable than competitors who lack the right kinds of connections. In this view, the attention and attributions of outsiders may be largely independent of the intentions and needs of the egos and partners that are party to a tie.

Strong prism effects created by investments from high status VCs and board membership of prominent directors increase the visibility of pre-IPO corporations to investors. Such ties also signal value in uncertain IPO markets, increasing the likelihood that outside investors will be willing to purchase shares in a new offering and the price of those shares. The status hierarchy of these fields is fairly transparent (Podolny, 1993; Hsu, 2004). We thus expect pre-IPO firms that have not secured high profile partners will perceive their chances of success to be lessened and as a result to withdraw at a higher rate. Thus we predict that pre-IPO companies with strong 'prism' networks to have and know they have a greater likelihood of IPO success. Thus:

H2. *Ceteris Paribus*, signals of value from ties to prominent partners through both VC and interlock network 'prisms' will decrease the likelihood of IPO withdrawal.

3.2.3. Influence and the salience of network partners

Social influence has been little studied in the context of IPOs. The peers mechanism focuses on the expectations, obligations, and social pressures that accompany relationships. The pipes and peers mechanisms can be difficult to distinguish analytically because both rely, though in different fashions, on the idea that information flows through networks (Burt, 1992; Marsden and Friedkin, 1993).[3] For the peers mechanism, partners shape the grounds ego uses to make decisions. Partners' knowledge and expectations, which are often garnered through their connections to others, can render some types of actions illegitimate for ego while introducing or legitimating alternatives. The information partners convey may or may not increase ego's competitive advantage and the tie that channels that information may or may not be positively perceived by outsiders. What flows through ties in the peers conceptualization is not resources or signals but social pressure and expectations (Uzzi, 1996). In short, the network peers mechanism treats relationships as means for partners' opinions and experiences to shape ego's conception of a situation.

A key aspect of influence involves the partner's possession of some source of expertise that might influence ego's decision, combined with structural arrangements that make that experience visible and salient to ego. In particular, we contend that experience with *other* entities in the network gives the partner a particular source of influence. When partners have experience with alternatives, their connections to ego make those alternatives visible. Ego, in turn, is more aware of different options and thus more likely to pursue a new course.

To put things more concretely, we expect that network ties to powerful partners who have been investors or directors for another firm that withdrew its IPO will make the possibility and potential legitimacy of withdrawal more salient to ego. The increased salience of withdrawal will in turn make that option a more likely one for ego. We thus propose:

H3. *Ceteris paribus*, connections to VC and interlock network 'peers' that have experience with a prior withdrawal will increase the likelihood of IPO withdrawal.

3.3. Blending mechanisms

3.3.1. Prisms moderate pipes

Ego's relationships signal greater status (prism effect) when its partners are better connected to others in the network. The route to competitive advantage through the prisms effect for ego is to have partners whose own expansive connections make them (and by extension, ego) more prominently visible to observers. In contrast, ego's relationships provide advantages via the pipes mechanism when more and better flows of information reach it via its direct connections to partners. Earlier we argued that the quality of attention that partners can pay to ego conditions the quality of information that they can bring to ego's deliberations. Whether

[3] The efficacy of network pipelines depends on timely movement of potentially valuable tangible and intangible resources from partners that give one a leg up in competitive environments. In contrast, the network peers mechanism depends only on flows of information that make the attitudes and decisions of others clear and salient (Friedkin, 1993). While nuanced, the difference is an important one. Take, for example, the oft-noted tendency of cohesive networks, where most participants are interconnected, to generate redundant information (Granovetter, 1973; Burt, 1992) groupthink (Coleman et al., 1966; Lave and Wenger, 1996) or a similar mindset (Galaskiewicz, 1985). In this view partners shape the grounds ego uses to make decisions. Partners' knowledge and expectations, which are often garnered through their connections to others, can render some types of actions illegitimate for ego while introducing or legitimating alternatives. The information partners convey may or may not increase ego's competitive advantage and the tie that channels that information may or may not be positively perceived by outsiders.

prisms amplify or interfere with pipe effects thus depends on the network being examined. When ties impose continuing obligations on partners who have limited capacities to manage and maintain their connections, having ties to prominent partners who increase ego's status can diminish the flow of valuable resources and information to ego. Put simply, when partners who have lots of ties (and are thus more prominent) cannot attend as carefully to a particular ego, the quality of information they transfer will decline. Indeed this very dynamic may account for findings that suggest having prominent directors adds very little to corporate performance (Mizruchi, 1996; Davis and Robbins, 2005).

Thus we argue that director interlock networks – where information that flows from partners (other corporations with whom ego shares a director) depend on individuals for whom added board memberships multiply the information, meetings, and concerns to which they must attend – are just this kind of network. In order for ego to benefit from information made available through ties to other firms in this type of network, its directors must be able to glean relevant tidbits from others with whom they share a different board room, recognize the importance of that knowledge to ego, and convey it in a timely fashion.

Ego's status in a director interlock network increases because its directors sit on more and more prominent boards for other corporations. Thus, increases in status mean that ego's directors hold more jobs (appointments as directors of other corporations), which take up the directors' time and focus. As a result, ego's ability to gain valuable information though highly connected directors rests on the ever more overloaded mechanism of individual cognition and attention (March and Simon, 1958). The basic idea here is that the characteristics (lots of ties to other partners) that allow directors to increase ego's status diminish those directors' ability to attend to ego because of the varied and competing calls on their times and the sheer volume of information to which they are exposed. Under such circumstances, increased status signaling will diminish the effect of information transfer. Thus we expect:

H4. *Ceteris Paribus*, as signals of value from interlock network 'prisms' increase, the effect of access to information through interlock network 'pipelines' will weaken (become less negative).[4]

In contrast, when partners' capacities to manage and maintain connections are enhanced, having prominent alters will also amplify the flow of valuable information to ego. VC contributions to the firms where they invest are likely to increase as the status of the financier grows because visibility in the syndication network accompanies experience derived from engagement with more deals and partners. The internal, partnership-based structure of most VC firms makes the advice given to particular portfolio companies the province of individual general partners, but common partnership meetings ensure that the collective experience of the firm is brought to bear in that advice (Stross, 2000; Perkins, 2007). The standard VC business model yields a mix of exclusive, customized attention and network reach to portfolio companies that are the targets of investment from well-connected VCs.

The standard organizational practices of VC firms – staged and syndicated investments linked to particular milestones and accompanied by active managerial engagement by an individual general partner – ensure that investors have a great degree of oversight and authority over their portfolio companies (Gompers and Lerner, 1999; Lerner, 2012). That attention is most strongly felt when experienced and higher status investors exert significant input in the IPO decision (Lerner, 1994). We argue that the business model of contemporary VC firms makes the syndication network a context where an increasingly strong prisms mechanism will amplify the effect of the pipes mechanism. Thus, we expect:

H5. *Ceteris Paribus*, as signals of value from VC network 'prisms' increase, the effect of access to information through VC network 'pipelines' will strengthen (become more negative).[5]

In concrete terms, our argument in this section suggests that there are some networks where status signals and social capital amplify one another, offering cumulative advantages to egos who are able to secure ties to well-connected alters that are able to attend closely to them. In other structures, however, prisms will interfere with pipes, forcing egos to tradeoff between access to valuable information and signals of quality. The key to this difference is the capacity of partners to attend to the needs and circumstances of ego.

3.3.2. Mixing pipes and prisms with peers

Three conditions are necessary for social influence to shape a firm's decision to forgo an IPO after filing to pursue one. First, partners must have experience with a withdrawn IPO. Second, a tie linking ego to the partner makes that experience visible to ego by allowing information about prior withdrawal to transfer. Third, the advantages that accrue to ego through its partners must make that visible experience salient in ego's decision-making. Many things could focus ego's attention, but we emphasize cases where alter has power over ego because of ego's dependence on alter (Pfeffer and Salancik, 1978).[6] Networks create such power differentials by making ego more or less reliant on particular partners for benefits derived from relationships (Blau, 1964). That reliance is most obvious when the partner can remove something of benefit to ego. In the networks we study, partners can change ego's ability to compete by (a) interrupting the flow of tangible or intangible resources to ego; or by (b) severing its ties to ego thus removing a valuable status signal.

In other words, either information transfer or certification can amplify the effects of influence by making a partner's visible experience more salient to ego. The question of which direction one predicts is an empirical one that hinges on identifying whether pipes and prisms offer substitutable or complementary sources of advantage. For instance, Haunschild and Beckman (1998) demonstrate that when firms have access to alternative sources of information through CEO memberships in professional or trade associations, board influence on acquisition decisions declines. In the terms we use here, this finding means that when ego's dependence on partners decreases, so too does the partners' influence on ego's decision-making. In other words, pipes positively moderate peers.

We also suggest, though we can find no published examples to support the idea, that ego's recognition of partners' status contribution also creates dependence. Small businesses who land a

[4] A negative moderation is hypothesized here. However, since the direct effects of pipes and prisms are hypothesized to be negative, the interaction term is expected to be positive.

[5] In contrast to H4, a positive moderation is hypothesized here. However, since the direct effects are hypothesized to be negative, the interaction term is also expected to be negative.

[6] In the terms French and Raven (1959) develop, we are arguing that a partner's ability to punish ego makes its experiences more salient in ego's decision-making. We suspect that other sources of power could accomplish the same goal. Podolny and Baron (1997), for instance, argue that ego's identification with alter creates salience. Burt (1987) makes a similar claim about competition. In a study of board of director influence on strategic decisions about acquisitions, McDonald et al. (2008) demonstrate that director experience with similar acquisitions at the other companies (partners, in our terms) on whose boards they also serve increase the value of ego's acquisitions. The positive influence of the partner's experiences, however, is magnified by a governance structure that makes boards independent of management. In other words, formal authority can also make partners' sources of influence more salient to ego.

well-known company as a customer often advertise the achievement, knowing that having a prominent customer is looked upon favorably by other potential customers. As a result, the relationship with the prominent customer may be attended to more carefully and nurtured by the business owners. Losing a single, well-connected partner can thus deal a significant blow to outsider valuations of ego to the extent that the relationship served a certifying purpose. In short, prisms too can positively moderate peers.

To summarize, when ties impose continuing requirements for attention on partners and when partners have limited capacities as is the case in the interlock network, we expect increased attention from partners to amplify their influence. In other words, when a partner's attention is a limited resource the value of their contribution to ego will be increased as the relationship becomes more exclusive. Thus we expect:

H6. *Ceteris Paribus*, as director attention through interlock network 'pipelines' increases, the salience of director withdrawal experience grows, increasing the likelihood of withdrawal.

In differently configured networks, however, we expect partners with many other connections will be able to send strong status signals while also increasing ego's information and resource advantages. When information and certification mechanisms amplify one another, as we expect to be the case in the VC syndicate network, a partner's visibility will make their experiences more salient in ego's decision-making, thus increasing the likelihood of influence. Thus, we expect:

H7. *Ceteris Paribus*, as signals of value from VC network 'prisms' increase, the salience of investors' withdrawal experience grows, increasing the likelihood of withdrawal.

In concrete terms, these two hypotheses suggest that gaining greater capacity to compete via network pipes or prisms can sometimes make it less likely that ego will succeed in its stated goals. Contra our first hypotheses (H1 and H2), we expect dependence that results either from partners who can interrupt resource flows or whose departure will send negative status signals to make it more likely that firms will withdraw their IPOs when those partners have prior experience of withdrawal because ego's dependence will make that experience more salient. We expect that both pipes and prisms sometimes blend with peers to enforce tradeoffs on ego's ability to pursue its goals using resources garnered from its connections.

Taken together, hypotheses 4–7 suggest the beginnings of a mechanism-based theory of network multiplicity. Networks vary in terms of the key resources that flow from partners to egos, in terms of the type and limitations of partners themselves, and in terms of the kinds of signals outsiders might seek to glean from the ties they observe.[7] These factors lead multiple, mutually contingent social processes to blend together in different ways, giving disparate networks their distinct character and effects.

4. Data and methods

Testing our hypotheses requires a unique dataset that we constructed from multiple sources. Our empirical analysis focuses on U.S. based VC funded high-technology firms that registered an initial public offering with the Securities and Exchange Commission's (SEC) by filing an S-1 prospectus in the years between 1997 and 2000. We define high-technology industries using four digit Standard Industrial Codes (SIC).[8] The firms' primary activities fall in five sectors: drugs and biotechnology, hardware and semiconductors, medical and laboratory devices, software and Internet, and analytic services. Corporations that declared bankruptcy after filing an S-1 but before realizing their IPO were excluded from the sample, as were companies that withdrew an IPO as a result of merger or acquisition.[9] In total 453 firms are included in the analysis. The sample is unevenly distributed across the four years we observe due to the overall growth of technology IPOs across this time period: 15.23% of sample firms filed S-1s in 1997, 13.02% in 1998, 35.98% in 1999 and 35.76% in 2000. Table 1 presents the broad sectors and the SIC codes that comprise them along with a count of IPO registrations. The firms in these sectors represent the core of the high-technology or knowledge economy. These companies thus partook of and reacted to the rise and fall of the stock market that is associated with the technology bubble that built up during the late 1990s and ended abruptly in 2000.

4.1. Identifying the population of pre IPO firms

We began by collecting all S-1 filings that firms in our five industrial sectors filed with the SEC. In SEC's EDGAR database, which includes all electronically filed forms, the primary industry is missing for a large number of S-1 forms. To avoid missing valid technology prospectuses because of incomplete SEC index data, we adopted a multi-stage data collection strategy. The first stage drew on two databases, SEC Edgar and Thompson Research, to collect the names of all firms active in any of the 44 SICs identified in Table 1. These searches were based on S-1 filings as well as 10-K annual reports and thus included both companies that were publicly traded in the time period and those that sought to go public. Having identified all active corporations in these industries we collected S-1 forms and hand coded the primary industry the filing firm reported on the first page. We treat the company's own conception of its primary industry as the best indicator of the firms' activities. We exclude S-1s that do not announce an initial public offering by appeal to SDC Platinum's new issues database and, where necessary, hand coding of individual forms. The final dataset consist of 453 VC funded firms that filed an S-1 indicating their intention to pursue an IPO in the years 1997–2000 and that did not withdraw their IPO due to bankruptcy. Table 1 reports the distribution of those organizations across industries and sectors.

4.2. Dependent variables

A surprising number of companies that file IPO prospectuses never actually go public. Firms that decide to withdraw an initial public offering indicate that decision by filing a form RW with the SEC. We collected these forms from the EDGAR database and checked their validity with the SDC New Issues dataset in order to determine the date when an offering was realized or withdrawn.

[7] Because the relevant outsiders for both the networks we observe are the same (analysts and investors) and because we do not attend (ala Gulati and Higgins, 2003) to contextual effects on those outsider's key uncertainties, we bracket the question of how outsider perceptions might shape network blends here, but note that this is another potentially fertile ground for the style of analysis we propose.

[8] The firms we examine in this sample are a subset of a larger dataset that tracks that the rise and evolution of knowledge intensive U.S. industries. For the purposes of this study, we define a 4 digit SIC to be research or knowledge intensive if R&D spending by firms whose primary industrial classification is in that sector account for 10% or more of the industrial R&D spending in the 3 digit SIC code in which it is nested.

[9] Some firms withdraw from the IPO process to obtain an alternate liquidity event – to merge with or get acquired by another firm. If the goal of an IPO is liquidity, then a withdrawal to pursue an alternative source of liquidity may not truly be a decision to forego a desired outcome. As a result, we exclude firms that are merged/acquired within four years of the IPO withdrawal. Similarly, firms that are failing and declare bankruptcy are not so much choosing to forego a desired outcome, but rather are forced to leave the IPO process despite their hopes or intentions.

Table 1
Sample firms by industry and sector.

SIC	Industry	Sector	IPO reg.
2833	Medicinal chemicals and botanical products	Drugs/biotech	1
2834	Pharmaceutical preparations	Drugs/biotech	27
2835	In vitro and in vivo diagnostic substances	Drugs/biotech	1
2836	Biological products, except diagnostic substance	Drugs/biotech	12
3571	Electronic computers	Hardware	3
3572	Computer storage devices	Hardware	1
3575	Computer terminals	Hardware	0
3577	Computer peripheral equipment, NEC	Hardware	8
3578	Calculating and accounting machines, except electronic comp.	Hardware	1
3661	Telephone and telegraph apparatus	Hardware	21
3663	Radio and television broadcasting and communication	Hardware	9
3669	Communications equipment, NEC	Hardware	4
3671	Electron tubes	Hardware	0
3672	Printed circuit boards	Hardware	5
3674	Semiconductors and related devices	Hardware	45
3675	Electronic capacitors	Hardware	0
3676	Electronic resistors	Hardware	0
3677	Electronic coils, transformers, and other inductors	Hardware	0
3678	Electronic connectors	Hardware	0
3679	Electronic components, NEC	Hardware	4
3822	Automatic controls for regulating residential and commercial environments and appliances	Med/lab devices	0
3823	Industrial instruments for measurement, display, and control of process variables; and related products	Med/lab devices	2
3824	Totalizing fluid meters and counting devices	Med/lab devices	0
3825	Instruments for measuring and testing of electricity and electrical signals	Med/lab devices	2
3826	Laboratory analytical instruments	Med/lab devices	10
3829	Measuring and controlling devices, NEC	Med/lab devices	1
3841	Surgical, medical, and dental instruments	Med/lab devices	6
3842	Orthopedic, prosthetic and surgical appliances and supplies	Med/lab devices	2
3844	X-ray apparatus and tubes and related irradiation	Med/lab devices	0
3845	Electromedical and electrotherapeutic apparatus	Med/lab devices	11
7371	Computer programming services	Software/Internet	41
7372	Prepackaged software	Software/Internet	104
7373	Computer integrated systems design	Software/Internet	23
7374	Computer processing and data preparation services	Software/Internet	20
7375	Information retrieval services	Software/Internet	29
7376	Computer facilities management services	Software/Internet	0
7379	Computer related services, NEC	Software/Internet	21
8710	Engineering, architectural, and surveying	Analytic services	0
8711	Engineering services	Analytic services	0
8731	Commercial physical and biological research	Analytic services	31
8732	Commercial economic, sociological, and educational	Analytic services	4
8733	Noncommercial research organizations	Analytic services	2
8734	Testing laboratories	Analytic services	2

In ten cases, we found no official indication of withdrawal via an RW form filing. Following SEC regulation, which treats a prospectus left unrealized for 270 days as abandoned, we treat those right-censored "abandoned" IPOs as cases of withdrawal.[10] Across all firms we identified, the average time from S-1 filing to successful IPO was 76 days, while the average time from filing to an official withdrawal was more than double that, 151.5 days.

In our sample, 93% (64) of the firms that filed an S-1 in 1997 realized an IPO. This number decreased to 71% in the following year, and then rose again to 95% in 1999. In 2000, the year when the technology bubble burst, 76% of companies that filed a prospectus realized an IPO. Overall, 15% of the sample firms withdrew their offering after filing an S-1.[11] We searched SEC filings (primarily 8-K announcements of unscheduled events), the business press and comprehensive databases such as OneSource in order to identify the "final fate" of technology companies that withdrew their IPOs. We test our hypotheses by examining the conditions under which firms that have filed an S-1 opt to forgo a liquidity event by withdrawing their offering to remain independent and privately owned.

4.3. Independent variables

Our primary independent variables reflect different positions a pre-IPO company can occupy in two relevant networks; the structure comprised of syndicated VC investments and the network made up of interlocking directorships with publicly traded corporations.

4.3.1. Constructing VC syndicate networks

We constructed four cross-sections of the entire network of venture capital syndicates. Data were obtained from VentureXpert for all financiers that have made at least one venture capital investment in a U.S. based company. A tie between a venture capital firm and a portfolio company is assumed to last until the company that receives funds goes public, is acquired or receives a new round of venture capital financing. For investment relationships with missing end dates, we assume that the tie lasts for five years. We base our measures on complete cross-sections of the network

[10] Note, however, that eight of the ten cases are firms that had no VC backing or were acquired soon after the withdrawal and thus were excluded from our inferential analysis.

[11] While other studies have found an average rate of withdrawal of around 20% (Lian and Wang, 2012) those analyses typically include firms that withdraw to pursue mergers or acquisitions, which we exclude.

as of January 1 of the relevant year. Because withdrawals are only very rarely repeated events, our data are structured as a series of cross-sections. In 1997 the two-mode network included 1623 venture capital firms with investments in 7606 portfolio companies. In 1998, 1814 VC firms owned shares in 8604 companies; in 1999, 1961 VCs had private equity in 9532 corporations. Finally in the year 2000, 2391 VCs held investments in 10,774 private companies.

4.3.2. Constructing the interlock networks

Constructing complete interlock networks that include firms at IPO (and, most importantly, those that never succeed in going public) posed a more substantial challenge. There is no existing database that comprehensively tracks corporate directors at the point when a still privately owned firm files for an IPO. Moreover, board composition often shifts when a firm's ownership structure changes. To identify the firms' connections to public companies via board interlocks, we collected data on the firms' officers and directors from the management and director biographies included in filed S-1 forms. In total we collected names, ages and positions within the firm for 9456 officers and directors of pre-IPO companies. Because many of these companies eventually withdrew their offerings, relevant director information never became available in standard data sources used for the construction of public company interlock networks. We thus matched the names of executives and directors from pre-IPO firms to a larger dataset tracking directors and officers for all publicly traded firms.

We constructed four cross-sections of the entire board interlock network among U.S.-incorporated public corporations listed on the New York Stock Exchange, American Stock Exchange, and Nasdaq (Non-national and National systems). Data on board membership were collected from Compact Disclosure's January releases for 1997–2000. This set comprises 1045 companies and 46,505 individual director listings for 1997; 7284 firms and 50,328 directors for 1998; 6855 companies and 55,527 individual director listings for 1999 and 6525 companies and 49,501 director listings for 2000.

The network construction process involved identifying which directors sat on more than one board, resulting in a two-mode network of directors and companies. This was accomplished by matching names and ages of directors, complemented by identifying numbers drawn from multiple sources including SEC insider filings, Compustat and the Center for Research in Security Prices (CRSP), when available. The name-matching process identified 4548 interlocked companies (plus their directors) in 1997; 4968 in 1998; 5159 in 1999 and 4831 in 2000. We positioned pre-IPO firms in these networks by appeal to the data on officers and directors collected from S-1 forms. Sample firms and their directors were inserted into the two-mode board interlock network via the same name matching procedures, resulting in yearly networks that include both public boards and pre-IPO companies.

4.3.3. Measuring the potential for information transfer: pipes

To identify the effects of the "pipes," or information transfer mechanism, we constructed a modified network centrality measure that we call *attention weighted degree centrality*. The standard degree centrality measure is defined as the number of connections that a company has in a given time. In our context, this measure translates into the number of venture capital firms that have investment ties to the company or the number of all directors on a company's board. We weight this measure by the inverse of the sum of other partners connected to ego's alters in order to capture the extent to which a pre-IPO company's VC investors or directors are able to focus their attention on the needs and situation of the firm. Degree weighted centrality thus captures the exclusivity of a board's attention to ego by weighting the number of directors by their other connections. We define weighted degree centrality as

$$d_w = \sum_{i=1}^{k} \frac{1}{d_i}$$

where d_i represents the number of connections for the ith firm with investments in our focal company (or the number of boards on which the ith director sits). Larger values on this measure thus reflect firms that have more partners who themselves are *less* well connected and thus more exclusively focused on ego. For instance, if a pre-IPO company had six directors on its board, each of whom had no other directorships at publicly traded corporations, the value of our pipes measure would be six. If each of those individuals held three additional directorships, the value would be 1.5. More succinctly, higher values on this measure indicate that ego has more exclusive access to the attention of its partners.

4.3.4. Measuring the potential for status signals: prisms

We measure the social status of a pre-IPO firm using eigenvector centrality. Where our pipes measure indexes the extent to which an ego must compete with degree two partners for an alter's attention, this measure captures the extent to which an ego is made visible by being part of a long chain of connections linking prominent alters. In the VC syndicate network we operationalize this measure as the average eigenvector centrality of a pre-IPO company's VC investors in the complete syndicate network. To obtain the eigenvector centrality of VC investors, we created a one-mode investor by investor projection of the syndicate network, where ties between investors indicate sharing an investment in a portfolio company. Similarly, for the interlock network we measure the average eigenvector centrality of our focal firm's directors in the director by director projection of the public interlock network (where ties between directors indicate co-serving on a firm's board). As a result, the prisms measure indexes the amount of status the firm's VC investors and board directors bring to the firm. We expect increasing status to decrease the likelihood of withdrawal in both networks.

It is important to note the differences between our pipes and prisms measures. While degree and eigenvector centrality are often highly correlated, our emphasis on attention weighted degree centrality results in more separable measures. When a pre-IPO firm's second-degree relations (partners of its VC investors or directors) increase, the attention-weighted degree measure decreases, because it is constructed to capture the amount of focus the pre-IPO firm receives from its first-degree partners (investors and directors). On the other hand, when a pre-IPO firm's second-degree relations increase, the eigenvector centrality of the firm is likely to increase, particularly if those second-degree partners are themselves prominent. As a result, one would expect these pipes and prisms measures to be negatively correlated. However, the amount of correlation could vary considerably, and would depend on how much the number of second-degree partners increases as a function of the number of first-degree partners. Different networks have different norms and rules for attachment. For example, while board size can vary highly, even low status firms must have a full complement of board members; thus director focus (pipes) and status (prisms) should not be expected to strongly correlate.

4.3.5. Measuring the potential for influence: peers

We measure the potential for social influence by identifying partners that themselves have prior experience with an IPO withdrawal. Pre-IPO companies whose partners have more collective withdrawal experience are more likely to view withdrawal as a legitimate alternative to realizing an IPO. In order to calculate this

measure we draw on information on IPO withdrawals from the full time series of electronically available SEC filings (1993–2005). We identify a VC firm as having experienced an IPO withdrawal if a portfolio company in which it invested in the prior five years[12] filed a form RW with the SEC. We operationalize this variable as the total number of investors in a portfolio company that have withdrawal experience.

In contrast, a director has relevant experience when he or she has served on the board of another pre-IPO high technology company that withdrew its prospectus during the preceding five years. The distribution of directors with withdrawal experience among sample firms is highly skewed. Fully 103 of the firms we observe have a director who has experienced a prior technology withdrawal, while just 18 have two or more such directors. We thus operationalize our director experience measure as a dummy variable indicating whether the focal firm has any directors who have experienced an IPO withdrawal. We expect both director and investor experience with IPO withdrawals to increase the likelihood a technology company will step away from its IPO.

4.4. Control variables

All models include control variables for characteristics of the sample firms, the offering and key features of the market context, as well as yearly fixed effects.[13] We constructed a variable for firm age (logged) using Loughran and Ritter's (2004) founding year data. Founding year is defined as the year of initial incorporation. For spin-offs, founding year is defined as the founding of the division. Missing data was collected directly from the IPO prospectus using the same criteria. From the prospectus, we also collected data on industry and geographical location. We control for industry by constructing four dummy variables for the five general sectors that comprise our sample. The small analytic services sector which encompasses contract laboratory, testing, and engineering research firms serves as our reference category in all reported models. Data on location was used to construct a dummy variable for firms headquartered in the two states, California and Massachusetts, that are home to the greatest concentration of both venture capital and high-technology firms (cf. Saxenian, 1994; Powell et al., 2002).

We also control for the financial characteristics of the issuing firm, since such factors may influence both the reservation value of insiders and financial backers and signal the firm's potential value to investors in the public market (Busaba et al., 2001; Zhao, 2005). Firms with greater (or any) revenues tend to be less uncertain investment objects and receive higher valuations. The literature also proposes a positive association between debt and withdrawals since organizations that carry significant debt have access to alternative sources of capital (Busaba et al., 2001). We control for these effects by including logged measures of revenue and debt from the financial information reported in the IPO prospectus.

A second set of variables control for characteristics of the offering. From the SDC New Issues database, we obtained data for the planned primary use of the proceeds. The data was verified in the IPO prospectus. We also used the firms' IPO prospectus to collect data for firms not included in the SDC New Issues database. Prior research has shown that companies that plan to use the proceeds for recapitalization are more likely to withdraw the offering since they often have alternative financing (Busaba et al., 2001; Zhao, 2005; Dunbar and Foerster, 2008). Thus we recoded the data into a binary indicator for debt payment. Prior research on IPOs has also paid extensive attention to the endorsement, or certification, effect of underwriters. We control for this effect by including the Carter and Manaster (1990) underwriter reputation score (updated by Carter et al., 1998; Loughran and Ritter, 2004). The measure is based on the underwriter's position in tombstone announcements and it aims to capture the hierarchical structure of investment banking (Podolny, 1993; Jensen, 2003). We code missing values as zero assuming that underwriters that are not covered by the ranking have low reputation. Similarly, self-underwritten IPOs are assigned an underwriter reputation of zero since those firms do not benefit from any underwriter status effects.

Finally we control for features of the market for technology IPOs. Because competition for the attention of stock market investors is an important factor in IPO success (Gulati and Higgins, 2003) and because competition among similar actors increases social comparison processes (Burt, 1997; Pollock et al., 2008), we also include a variable that captures the number of firms in the same SIC that are at risk for IPO or withdrawal. We next calculate a retrospective measure of market uncertainty, which we measure using the number of S-1s that were withdrawn in the 90 days prior to a company's own S-1 filing date. Control variables are highly inter-correlated and their inclusion in these models introduced untenable levels of multicollinearity. We thus orthogonalize all control measures. Tables 2 and 3 present descriptive statistics and correlations for untransformed measures.

4.5. Model specification

We present findings from models that use a probit specification to estimate the likelihood that a pre-IPO firm will withdraw its IPO. We include only those firms that either realized their IPO or withdrew to remain independent and privately owned. Continued independence after withdrawal represents the clearest case of a pre-IPO company choosing a costly alternative to its stated preference because in these circumstances a withdrawn offering leads neither to debut on public equity markets nor to liquidity through private merger or acquisition. We run all models with robust standard errors on the subsample of organizations that received at least one VC investment and did not withdraw their IPO due to bankruptcy, merger, or acquisition. All continuous independent variables are mean centered.

5. Findings

The models reported in Table 4 estimate the probability of IPO withdrawal from 1997–2000.

Firm, offering, market condition controls, and yearly fixed effects exert stable and largely unsurprising influences on the likelihood of withdrawal. When yearly variation is accounted for, increasing numbers of withdrawals in the prior quarter have a significant and positive effect on the likelihood a firm will withdraw its IPO. Likewise, and in line with past findings (Busaba et al., 2001) firms that indicate they will use part or all of their IPO revenues to pay down accumulated debt have a greater likelihood of withdrawal. Firms with greater revenues are marginally less likely to withdraw their IPOs, a finding that is somewhat surprising as firms with stronger financial track records typically expect (and receive) higher valuation at IPO.

We suspect that this relatively weak effect may be a function of our sample. In this time period it was quite common for technology companies to pursue public offerings with little or no record of financial success and few revenues. We also find surprising the relatively weak role that underwriter status plays in explaining

[12] For S-1s filed in 1997, we are forced to shorten that time period to four years because SEC filing data is left censored at 1993. This difficulty was experienced with calculations for both the syndicate and the interlock networks. Our findings are robust to using a four year window for all experience calculations.

[13] Because our data structure does not include repeated observations of the same firms across years, fixed firm effects are inappropriate.

Table 2
Descriptive statistics.

Variables		Mean	S.D.	Min	Max
(1)	Withdrawal	0.152	0.360	0	1
(2)	Underwriter reputation (Sqrt)	2.888	0.187	1.761	3.017
(3)	Competition (Sqrt)	4.869	2.130	1	9.274
(4)	Age (logged)	1.880	0.624	0	4.533
(5)	Debt (logged)	2.628	1.119	0.265	7.531
(6)	Withdrawals, past 90 days (Sqrt)	4.178	1.565	1	9
(7)	Revenue (logged)	2.161	1.333	0	7.393
(8)	State cluster	0.563	0.497	0	1
(9)	Industry: drug and biotech	0.091	0.287	0	1
(10)	Industry: hardware	0.223	0.417	0	1
(11)	Industry: medical/lab devices	0.075	0.264	0	1
(12)	Industry: software and Internet	0.525	0.500	0	1
(13)	Year 1998	0.130	0.337	0	1
(14)	Year 1999	0.360	0.480	0	1
(15)	Year 2000	0.358	0.480	0	1
(16)	Proceeds to pay debt	0.108	0.311	0	1
(17)	Average VC eigenvector centrality *(VC Prisms)*	0.000	0.027	−0.048	0.111
(18)	Average director eigenvector centrality *(Int Prisms)*	0.000	0.349	−0.068	5.280
(19)	Attention weighted degree centrality, VC Net *(VC Pipes)*	0.000	0.650	−0.499	5.369
(20)	Attention weighted degree centrality, Interlock Net *(Int Pipes)*	0.000	1.642	−3.697	8.470
(21)	VC withdrawal experience *(VC Peers)*	1.947	1.904	0	10
(22)	Director withdrawal experience *(Int Peers)*	0.267	0.443	0	1
(23)	VC Pipes × Prisms	−0.004	0.015	−0.092	0.055
(24)	Int Pipes × Prisms	−0.035	0.420	−7.201	1.591
(25)	Int Peers × Pipes	−0.031	0.748	−2.497	4.970
(26)	VC Peers × Prisms	0.025	0.061	−0.138	0.308

the likelihood of withdrawal. The underwriter status variable has a marginally significant and positive effect on the likelihood of withdrawal, but only in models 4 and 7, which include the full range of measures and contingencies for both interlock and VC networks. There are few robust industry effects. Medical Device companies are marginally more likely to withdraw than are firms in the Analytic Services sector, which is our omitted category. With the exception of underwriter status, control effects are qualitatively stable across specifications.

Consider Model 7, which estimates effects for all hypothesized direct effects and interactions. An initial look at this model suggests partial support for several of our hypotheses. Generally speaking, our arguments are more strongly supported in the VC network than in the interlock network. Hypothesis 2, which predicted that stronger status signals sent through network 'prisms' would decrease the likelihood of withdrawal, holds in the VC network but not in the interlock network. Hypothesis 1, which made a similar prediction that increased access to valuable information and resources through more exclusive network 'pipelines' would decrease the likelihood of withdrawal, also plays out for VC networks but not for interlock networks. This model offers no support for our third hypothesis. Connections to either investors or directors who have experienced a prior IPO withdrawal have no significant effect on the likelihood of withdrawal.

Already it is clear that different, potentially relevant, networks exert different effects. Indeed, we find it very surprising that there are so few effects to be found for the director network. One possible explanation for the lack of effects is that outside directors have less input into strategic decisions about IPOs than do VC investors. Outside directors, for instance, may play a primarily advisory role and have relatively little financial stake in a particular IPO, while venture capitalists are very hands on and often have a great deal invested. Another, complementary explanation is that VC and director interests are largely aligned as lead VCs exert some degree of control over board membership and often occupy directorships.[14] Of course some suggest that directors play a purely symbolic role in modern public corporations (Davis and Robbins, 2005), which might also explain the surprising lack of "director" effects on this very important decision. The differences between these two networks become even more apparent when we consider hypothesized contingencies.

Hypothesis 4 predicts a positive interaction between pipe and prism mechanisms in the interlock network because the obligations directorships place on individuals suggest that as the average status of a company's directors increases, their ability to transfer timely and appropriate information and resources will decrease. In the terms we use above, as increasing connections tax the ability of individual directions to attend to ego, the competitive benefits of information flows through partners diminishes. Here we expect any positive effects of status signaling to be offset as diffuse attention of directors hampers the timely flow of valuable information.

While care should be taken in interpreting a significant interaction where no predicted direct effects are found, positive and significant effects in Models 4 and 7 are very suggestive. More attention should be paid to the possibility that the kinds of obligations ties place on alters and limitations on alters' ability to attend effectively to all their partners can create conditions where positive network effects dampen each other.

In similar vein, Hypothesis 5 predicts a negative interaction between pipe and prism mechanisms in VC network because the standard business practices of VCs make it possible for very well connected investors to also attend very closely to individual portfolio companies. Unlike the director network, increasing visibility in the VC network should increase access to valuable information and resources and the joint effect of pipes and prisms will be to make the likelihood of withdrawal even more remote. In the terms we mobilize earlier, the quality of attention VC made possible by the structure of VC partners results in a situation where advantages available to ego through pipe and prism effects are cumulative. Here we expect the competitive advantages associated with status signals to amplify those that accrue to information flows as

[14] Indeed, our interlock pipelines measure would have had a positive and significant effect on a two tailed test, suggesting that as a firms' directors focus their attention more exclusively on ego by maintaining fewer simultaneous directorships at other public companies, the likelihood of withdrawal increases.

Table 3
Bivariate correlations.

Variables		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)
(1)	Withdrawal	1.000																									
(2)	Underwriter reputation (Sqrt)	0.051	1.000																								
(3)	Competition (Sqrt)	0.056	0.164	1.000																							
(4)	Age (logged)	0.000	−0.136	−0.005	1.000																						
(5)	Debt (logged)	−0.012	0.166	0.012	0.083	1.000																					
(6)	Withdrawals, past 90 days (Sqrt)	0.125	0.025	0.103	−0.013	0.133	1.000																				
(7)	Revenue (logged)	−0.072	0.032	0.017	0.314	0.596	−0.001	1.000																			
(8)	State cluster	−0.085	0.028	−0.039	−0.038	−0.060	−0.046	−0.135	1.000																		
(9)	Industry: drug and biotech	0.016	−0.178	−0.329	−0.034	−0.058	0.046	−0.135	−0.017	1.000																	
(10)	Industry: hardware	−0.079	0.039	−0.263	0.091	0.203	0.007	0.251	0.076	−0.169	1.000																
(11)	Industry: medical/lab devices	0.066	−0.081	−0.354	0.058	−0.136	0.019	−0.164	0.116	−0.090	−0.153	1.000															
(12)	Industry: software and Internet	0.034	0.129	0.779	−0.066	−0.041	−0.063	0.037	−0.133	−0.332	−0.564	−0.300	1.000														
(13)	Year 1998	0.146	−0.026	−0.223	−0.013	0.031	−0.040	0.135	−0.095	0.015	−0.065	−0.011	0.092	1.000													
(14)	Year 1999	−0.215	0.063	0.242	−0.061	−0.040	−0.352	−0.033	0.067	−0.140	−0.059	−0.161	0.289	−0.290	1.000												
(15)	Year 2000	0.184	0.081	0.162	0.034	0.106	0.494	−0.087	−0.002	0.118	0.032	0.067	−0.222	−0.289	−0.559	1.000											
(16)	Proceeds to pay debt	0.090	−0.129	−0.036	0.064	0.104	−0.070	0.152	−0.080	−0.011	0.035	−0.018	0.018	0.119	−0.009	−0.171	1.000										
(17)	Average VC eigenvector centrality *(VC Prisms)*	−0.070	0.186	−0.048	−0.033	−0.046	0.000	−0.027	0.222	−0.004	0.046	0.031	−0.051	0.005	−0.008	−0.006	−0.080	1.000									
(18)	Average director eigenvector centrality *(Int Prisms)*	0.019	−0.026	−0.047	−0.060	0.103	0.000	0.091	−0.046	−0.023	0.001	−0.035	0.026	0.344	−0.134	−0.046	0.048	0.017	1.000								
(19)	Attention weighted degree centrality, VC net *(VC Pipes)*	−0.051	0.024	−0.070	0.036	−0.059	0.022	−0.168	0.139	0.085	0.069	−0.025	−0.105	−0.043	−0.029	−0.013	−0.066	−0.213	−0.006	1.000							
(20)	Attention weighted degree centrality, interlock net *(Int Pipes)*	0.142	0.016	−0.026	0.096	0.056	−0.042	0.001	−0.206	0.055	−0.027	−0.036	−0.020	−0.008	−0.053	0.044	0.017	−0.177	−0.061	0.086	1.000						
(21)	VC withdrawal experience *(VC Peers)*	−0.059	0.137	−0.024	−0.003	−0.065	0.072	−0.121	0.247	0.033	0.090	−0.023	−0.112	−0.041	0.040	0.067	−0.095	0.474	0.037	0.197	−0.109	1.000					
(22)	Director withdrawal experience *(Int Peers)*	−0.034	0.014	0.011	0.070	−0.003	0.132	−0.102	0.099	0.070	0.012	−0.002	−0.086	−0.130	0.005	0.153	−0.050	0.058	0.019	0.115	−0.043	0.318	1.000				
(23)	VC Pipes × Prisms	−0.004	−0.002	0.075	0.009	0.080	0.109	0.111	−0.073	−0.103	0.056	−0.062	0.040	−0.007	−0.070	0.068	0.026	−0.270	−0.025	−0.261	−0.068	0.041	0.064	1.000			
(24)	Int Pipes × Prisms	0.040	0.047	0.045	0.004	−0.045	−0.005	−0.057	0.067	0.020	−0.004	0.018	−0.018	−0.213	0.077	0.051	0.014	−0.022	−0.775	0.000	−0.092	−0.053	−0.015	0.040	1.000		
(25)	Int Peers × Pipes	0.014	0.005	−0.036	0.102	0.026	−0.010	0.056	−0.115	0.022	−0.024	0.035	−0.020	0.012	0.037	−0.032	−0.070	−0.099	−0.046	0.071	0.456	−0.088	−0.069	−0.056	−0.021	1.000	
(26)	VC Peers × Prisms	0.003	0.128	−0.073	0.013	−0.046	−0.001	−0.047	0.216	−0.011	0.072	0.040	−0.090	0.008	0.012	−0.027	−0.085	0.714	0.081	−0.157	−0.118	0.605	0.082	−0.139	−0.088	−0.091	1.000

Table 4
Probit models on the likelihood of withdrawal.

Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Control variables							
Underwriter reputation (Sqrt, orthogonalized) (SE)	0.091 (0.082)	0.112 (0.083)	0.117 (0.085)	0.141^{+} (0.083)	0.119 (0.085)	0.133 (0.086)	0.147^{+} (0.083)
Competition (orthgonalized)	0.087 (0.074)	0.067 (0.073)	0.074 (0.074)	0.083 (0.077)	0.075 (0.075)	0.087 (0.076)	0.091 (0.078)
Age (logged, orthogonalized)	0.048 (0.085)	0.038 (0.085)	0.033 (0.085)	0.017 (0.086)	0.034 (0.085)	0.02 (0.086)	0.011 (0.087)
Debt (logged, orthogonalized)	−0.044 (0.083)	−0.051 (0.084)	−0.073 (0.087)	−0.07 (0.089)	−0.075 (0.087)	−0.066 (0.088)	−0.063 (0.090)
Withdrawals, past 90 days (Sqrt, orthogonalized)	0.240** (0.074)	0.251*** (0.073)	0.279*** (0.075)	0.300*** (0.075)	0.290*** (0.074)	0.303*** (0.074)	0.309*** (0.074)
Revenue (logged, orthogonalized)	−0.129 (0.083)	−0.127 (0.084)	−0.146^{+} (0.088)	−0.164^{+} (0.089)	−0.152^{+} (0.089)	−0.135 (0.089)	−0.147^{+} (0.089)
State cluster (orthogonalized)	−0.169* (0.078)	−0.136^{+} (0.079)	−0.078 (0.087)	−0.068 (0.087)	−0.073 (0.087)	−0.078 (0.090)	−0.076 (0.090)
Drugs/biotech (orthogonalized)	0.041 (0.076)	0.046 (0.076)	0.057 (0.080)	0.051 (0.081)	0.06 (0.080)	0.064 (0.083)	0.056 (0.082)
Hardware (orthogonalized)	−0.106 (0.080)	−0.104 (0.079)	−0.093 (0.081)	−0.086 (0.082)	−0.092 (0.081)	−0.089 (0.082)	−0.086 (0.082)
Med/lab devices (orthogonalized)	0.128^{+} (0.069)	0.127^{+} (0.069)	0.133^{+} (0.070)	0.129^{+} (0.071)	0.132^{+} (0.070)	0.131^{+} (0.070)	0.128^{+} (0.071)
Software/Internet (orthogonalized)	−0.014 (0.076)	−0.005 (0.076)	0.011 (0.077)	0.001 (0.079)	0.003 (0.077)	0.003 (0.077)	0.005 (0.078)
Year 1998 (orthogonalized)	0.327*** (0.080)	0.353*** (0.083)	0.355*** (0.083)	0.367*** (0.083)	0.354*** (0.082)	0.366*** (0.085)	0.367*** (0.086)
Year 1999 (orthogonalized)	−0.270** (0.091)	−0.284** (0.089)	−0.281** (0.090)	−0.297** (0.092)	−0.276** (0.090)	−0.285** (0.092)	−0.306** (0.094)
Year 2000 (orthogonalized)	0.111 (0.081)	0.115 (0.081)	0.109 (0.082)	0.102 (0.084)	0.112 (0.083)	0.127 (0.084)	0.114 (0.084)
Proceeds to pay debt (orthogonalized)	0.192** (0.070)	0.194** (0.071)	0.190** (0.070)	0.186* (0.073)	0.191** (0.070)	0.193** (0.072)	0.185* (0.075)
Independent variables							
Average VC eigenvector centrality *(VC Prisms)*		−5.058^{+} (3.130)	−5.708* (3.310)	−10.418** (3.808)	−4.975 (3.949)	−10.619* (4.571)	−15.765** (5.309)
Average director eigenvector centrality *(Int Prisms)*		−0.18 (0.199)	−0.098 (0.169)	0.132 (0.296)	−0.086 (0.169)	−0.174 (0.166)	0.092 (0.289)
Attention weighted degree, VC net *(VC Pipes)*			−0.270* (0.163)	−0.563** (0.200)	−0.249^{+} (0.173)	−0.183 (0.172)	−0.513* (0.246)
Attention weighted degree, Interlock net *(Int Pipes)*			0.133 (0.047)	0.144 (0.049)	0.131 (0.048)	0.140 (0.053)	0.153 (0.054)
VC Pipes × prisms				−16.777* (7.831)			−15.259* (9.016)
Int Pipes × Prisms				0.651* (0.371)			0.682* (0.375)
VC withdrawal experience *(VC Peers)*					−0.016 (0.056)	−0.08 (0.063)	−0.007 (0.072)
Director withdrawal experience *(Int Peers)*					−0.093 (0.186)	−0.055 (0.189)	−0.091 (0.191)
Int Peers × Pipes						−0.065 (0.131)	−0.055 (0.135)
VC Peers × Prisms						5.315** (2.095)	4.159* (2.091)
Constant	−1.212*** (0.089)	−1.229*** (0.089)	−1.268*** (0.094)	−1.352*** (0.103)	−1.215*** (0.147)	−1.254*** (0.146)	−1.421*** (0.178)
Observations	453	453	453	453	453	453	453
Adjusted *R*-squared	0.149	0.157	0.181	0.2	0.182	0.197	0.211

$^{+}$ $p < 0.1$.
* $p < 0.05$.
** $p < 0.01$.
*** $p < 0.001$ (one-tailed tests for independent variables, two-tailed tests for controls).

prominent VC partners send stronger signals while being able to channel more and better information to ego. Models 4 and 7 support this contention.

Finally, consider our hypotheses about the conditions under which partners' experiences of withdrawal will become salient in a pre-IPO firm's decision making. The lack of support we find for Hypothesis 3 suggests that having directors or investors who are experienced with IPO withdrawals by itself is not sufficient to influence a technology firm's decision to withdraw. In Hypotheses 6 and 7 we expand our arguments about the distinctive features of director interlock and VC syndication networks to make predictions about the conditions under which each of these types of partners' experience with other IPO withdrawals will become salient enough to influence ego's decisions. We rely on the idea that increasing dependence on a partner makes their views and experience more influential to ego to predict that having the more exclusive attention of directors will increase interlock network peer effects on the likelihood of withdrawal (H6). By the same token we predict that having higher status investors will increase the VC network peer effects on the likelihood of withdrawal (H7).

Hypothesis 6 is not supported in our models. In keeping with our thoughts about the surprising lack of support for other interlock network hypotheses, we believe that this is related to the advisory nature of outside directors' role in the strategic direction of the firm. Hypothesis 6 may not be supported because more exclusive attention to a focal company may not be the most important source of a director's power and thus of the salience of their experiences. Instead, we suggest that other processes may determine the influence of directors in privately held firms such as those in this sample. For example, directors who own significant shares of stock may be more clearly influential in decision-making. Likewise, independent directors may be more salient in decision making on boards where CEOs do not also hold the position of chairman, by virtue of the directors' increased authority and independence. Because our conceptual focus is on blends of network mechanisms, we test neither of these possibilities.

Hypothesis 7 does find support in Model 7. As the status of VC investors increases, increasing experience with prior withdrawals makes technology companies more likely to withdraw an IPO. In other words, prism-like status effects make the experience of venture capitalists more influential. The blend of prism and peer effects apparent in the VC network suggests that higher status financiers are better able to turn experience with IPO withdrawal toward withdrawal, continued independence and the possibility of a later IPO. The negative reputational consequences of withdrawal might be buffered by the work of experienced and high status investors. Nevertheless, in the VC network status increases influence, resulting in a situation where having partners who are experienced with alternatives and whose other connections more clearly signal one's value to potential investors actually makes it less likely that a company will realize an IPO despite having expressed a strong preference to do so.

In Table 4, we find mixed support for our direct effect hypotheses and three of our four hypotheses about network blends are supported. VC status increases the salience of financiers' experience with alternatives to IPO. Increased status and access to information via the more exclusive attention of partners are complementary in the VC network but work at cross purposes in the interlock network. The picture here is complicated but supports our overarching claim that the practical effects of networks result from blends of mechanisms that moderate one another differently depending on the character of the partners and ties that make up a particular structure. Different networks exert disparate effects on behavior and outcomes because they mix mechanisms in distinct ways.

6. Discussion

We present graphs of predicted probabilities of withdrawal from Model 7 as a means to ground our discussion of the larger implication of theorizing mechanism blends. We begin by considering the clearest instance where two distinct networks manifest different blends of pipe and prism effects. Fig. 1 presents the predicted probabilities of withdrawal for each quintile of our attention weighted degree (pipes) and eigenvector centrality (prisms) mechanisms for the VC syndication network. Predicted probabilities of withdrawal for each quintile were calculated with control variables and other continuous independent variables held at their means[15] and discrete independent variables held at their medians. Fig. 2 does the same for the interlock network, with predicted probabilities of withdrawal for each quintile of the interlock attention weighted degree and interlock eigenvector centrality variables.

In these figures, higher values suggest a greater likelihood that a young technology company will withdraw its IPO. Fig. 1 tells an interesting story. Companies with the lowest status VCs (the histogram cluster on the left) see an increasing likelihood of withdrawal as those VCs have fewer other active investments. The tallest bar in this figure represents a 23% probability of withdrawal, which is for firms whose relatively low average status financiers attend most exclusively to ego. In contrast, the bars in the rightmost histogram cluster, which represent companies with the backing of the highest status VCs, show the opposite effect. As the attention of higher status VCs gets more exclusive, it becomes increasingly likely that a technology firm will realize its IPO. The shortest black bar in Fig. 1 reflects this scenario, with a less than 1% likelihood of withdrawal. Put more simply, the pre-IPO companies that are most likely to withdraw their IPOs are those with low status investors that buy stakes in relatively few other companies. In contrast, those least likely to withdraw are high status VCs that attend relatively exclusively to their portfolio companies. Here pipe and prism effects amplify each other.

For companies with low VC status (leftmost histogram cluster), the difference between having investors with exclusive attention versus those whose efforts are spread across many investments is about a 4.5% increase in the likelihood of withdrawal (from 18.8% to 23.3%). When VC backers have high status (the rightmost histogram cluster) however, the difference between VCs in the 1st quintile for exclusive attention and in the 5th quintile is a 5% lower likelihood of withdrawal. The clear message of Fig. 1 is that in the syndicate network, increasing VC status (prism effects) makes investor attention (pipes effects) beneficial for a portfolio company's ability to achieve its stated goals. In contrast, decreasing status makes the same level of attention detrimental, increasing the probability that a technology company will forgo its IPO after filing a prospectus.

The story is different in the interlock network,[16] where the thin reed of individual directors' capacity for engagement with the focal firms leads to tradeoffs between status and attention. Fig. 2 reports the predicted probability of withdrawal for pre-IPO companies for each quintile of our interlock status (prisms) and weighted degree (pipes) measures. All control variables and other independent variables are set to their means and medians.

In Fig. 2, a significant interaction between pipes and prisms measures in the interlock measures reinforces differences between the effects exerted by director and VC connections. Increasing status in the interlock network from the 1st to 5th quintile changes the likelihood of withdrawal by only a small amount when the

[15] Note that control variables are orthogonalized. The results of orthogonalization are continuous mean-centered variables, even for controls that were count variables.

[16] Though we note that an unhypothesized positive direct effect of VC pipes dominates this figure, so caution should be taken in its interpretation.

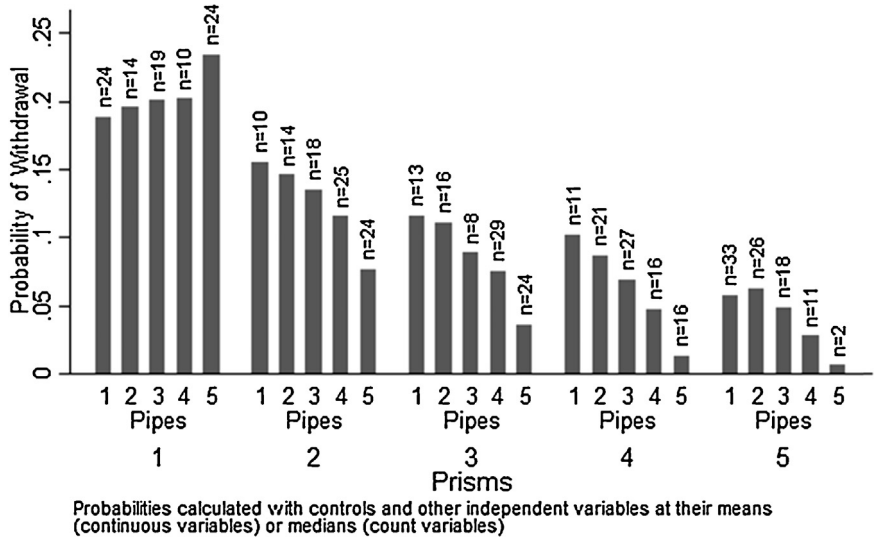

Fig. 1. Predicted probability of withdrawal by quintile of attention weighted degree centrality (VC network) (pipes) and average VC eigenvector centrality (prisms).

attention of directors is constant. What is suggestive here is the difference between this image and Fig. 1. Here, having more directors who serve exclusively on ego's board increases the likelihood of withdrawal at all status levels. However, consider the lowest two quintiles of director exclusivity. As average director status increases, the rate of withdrawal decreases by a small amount. On the other hand, at the highest level of director exclusivity, increases in status instead result in higher withdrawal rates. Where pipes and prisms work conjointly in the VC syndicate network, our evidence suggests that they work at cross purposes in the director interlock network, further supporting the spirit of our effort to conceptualize different networks in terms of the obligations ties exert on participants of different capacities to meet them. More generally, in some networks, the character of participants and the obligations of relationships lead increases in status to impose tradeoffs on access to information. In other networks, different configurations allow increasing status to amplify the competitive benefits gained via search through networks.

Our results also suggest that the prior relevant experiences of investors have a greater effect on portfolio companies when their increased status makes those experiences more salient. Consider Fig. 3, which reports the predicted probability of withdrawal across quintiles of VC status and experience with IPO withdrawal. In both figures, the lowest quintile of peers represents companies whose investors have no experience with withdrawal. The second quintile represents organizations with one experienced investor, the third quintile represents those with two experienced investors, and the fourth quintile represents those with three experienced investors. Finally, the fifth quintile contains firms with four or more withdrawal experienced VC backers.

When investors have no withdrawal experience, increasing status decreases the likelihood of withdrawal. Portfolio companies whose withdrawal-inexperienced VCs occupy the lowest status quintile (the leftmost bar in the leftmost histogram cluster of Fig. 3) have approximately a 21% probability of stepping off the IPO market. In contrast, those with inexperienced VCs in the high status quintile (the leftmost bar in the rightmost histogram cluster) have about a 2% chance of withdrawing their IPO. When the possibility of influence is low, then, increasing status makes withdrawal less likely.

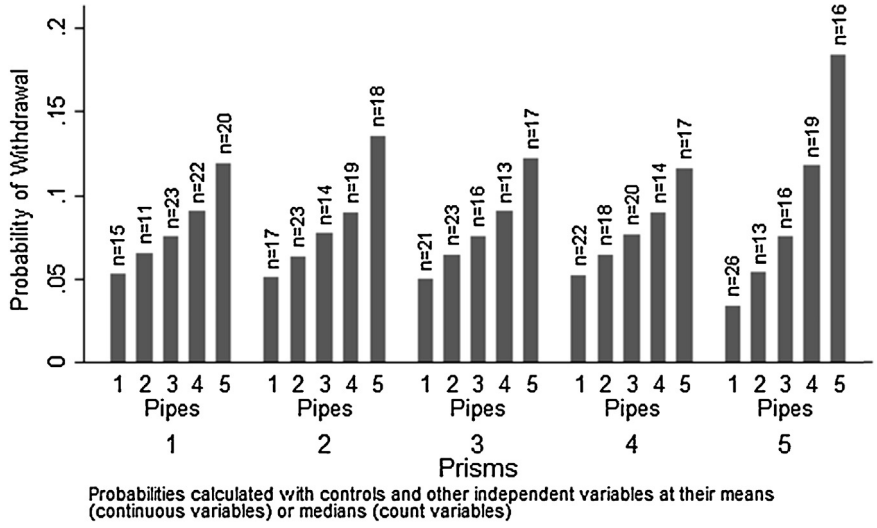

Fig. 2. Predicted probability of withdrawal by quintile of attention weighted degree centrality (interlock net) (pipes) and average director eigenvector centrality (prisms).

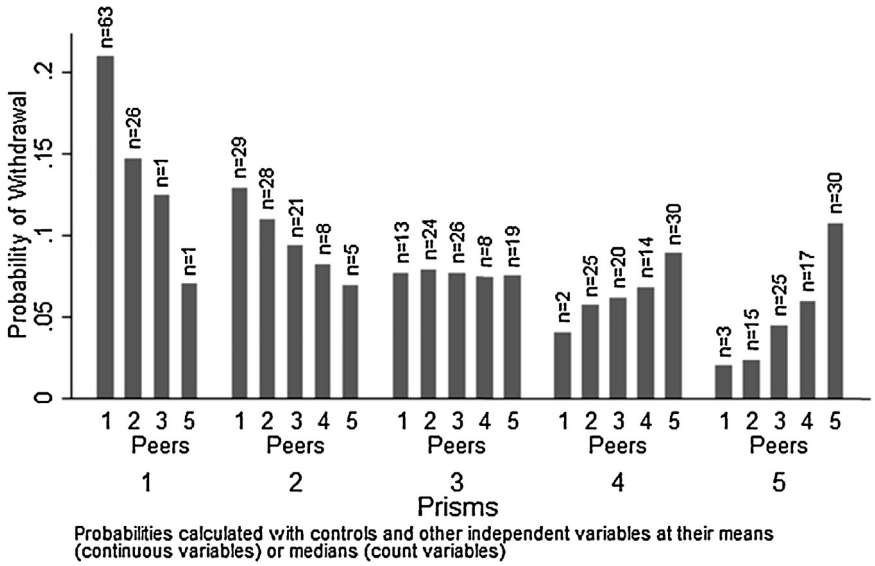

Fig. 3. Predicted probability of withdrawal by quintile of VC withdrawal experience (peers) and average VC eigenvector centrality (prisms).

7. Conclusions and implications

These findings imply stronger support for the idea that blends of network mechanisms shape organizational decision-making than they do for the direct effect hypotheses about how similar positions in different networks make corporations more competitive and thus better able to achieve their goals. The strongest conclusion to be drawn from this work is that network effects on the same outcome can differ dramatically depending on the mix of partners and activities that make up a structure.

It is fairly clear that in the VC syndicate network, prism effects are the dominant note in the blend of mechanisms. Here, increasing status alters the character of both information transfer and influence. Growing status increases beneficial resource and information flows from partners to ego, because the typical organizational arrangements of VC partnerships make it possible for their increased network reach and experience to be turned to the service of particular portfolio companies. These claims are complicated by the dual market structure of the field and the associated likelihood that venture capitalists of different statuses may actively favor M&A markets as a route to liquidity for their investments. Under such conditions, VC experience with withdrawal may not reflect the possibility of influence away from ego's preferred course as much as it indexes financiers' ability to accomplish the goal of cashing out, which may well be shared by insiders at a pre-IPO technology company. In future research, more attention should be paid to differentiation in the goals and types of expertise of partners such as VC backers. We note, however, that this need is reflective of one of the important ideas we propose; that network effects for ego are often as much or more a function of alters' needs and foci as they are of ego's preferences and strategies.

If prisms are the clear top note of the mechanism blend that characterizes the VC syndicate network, the mix of processes in the interlock network is muddier. The attention of directors clearly matters, but our findings suggest tradeoffs across status and information mechanisms in this context that are not apparent for VCs.

Pipes and prisms work and blend differently in the two networks we examine and the difference appears to stem from the burdens increasing network reach puts on the ability of partners to convey relevant and timely information to ego. We also found that partners' experiences with withdrawals alone have little effect on the actions of ego. The influence mechanism, however is not moderated by attention (the pipes mechanism) as we expected for directors. It may well be that organizational and interpersonal rather than network factors make directors' experiences more salient to the corporations on whose boards they serve. Both formal authority and the diversity and dynamics of the board room may be more important than status or attention in explaining when influence flows through interlocks. Future research should strive to more closely integrate these three levels of analysis.

Our paper highlights the potential power of a theory of network multiplicity that emphasizes the different ways in which distinct empirical structures blend and combine characteristic social mechanisms. Identifying key mechanisms and specifying how they will mix in differently configured networks is a first step toward nailing down the sources of contingent network effects and the systematic differences that underpin the complicated implications of simultaneous positions held in multiple structures. Focusing on mechanism blends driven by differences in the capacities of partners and types of activities that make up particular structures also has implications for how we understand, theorize, and study networks in a variety of settings.

First and most important, our findings challenge the idea that networks are resources that can be used in fairly straightforward ways by egos anxious to attain particular goals. As we noted earlier, the time period immediately before IPO is one in which organizations like those we study have the most control over their network, yet our findings suggest that there are circumstances where salutary positions allow partners to exert influence that makes accomplishing one's goals less likely. This is apparent in the tradeoffs we find between pipes and prisms in the interlock network and in the complicated relationship between status (prism) and influence (peers) we find in the VC syndicate network.

In the VC network, it is clearly the case that gaining a connection to high status partners increases visibility and information access but also comes at the cost of autonomy as the very benefits of connection to high status alters increase ego's dependence and thus make partners' concerns more salient and telling. A key implication of our findings is that the effects networks exert can have little to do with the uses to which ego tries to put them. Partners matter immensely and our theories have done too little to examine the ways in which characteristics of alters shift the likelihood

and effects of ties ego seeks to forge. Our work suggests that studies concerned with mapping and explaining the dynamics of tie formation and network evolution should find ways to attend to the goals and characteristics of both parties to a potential tie; the impact of particular connections depends on the activities of both parties.

In short, this work has three key implications for studies of network dynamics and effects. First, emphasizing mechanism blends implies a need to map and characterize the variety of processes through which observed connections translate into behaviors and outcomes. We emphasize three – information and resource transfer (pipes), status signaling (prisms) and social influence (peers) – but other mechanisms may be at work in the structures that are our focus and processes we do not consider here may be the key to the functioning of other types of relevant networks.

Second, our findings further support a move toward a more behavioral and contingent form of network theorizing. Rather than attempting to identify how networks influence action and outcomes across settings, we believe our findings imply the need to focus on specifying the conditions under which particular mechanisms and mixes dominate in specific structures and contexts. In other words, both our theories and our research should move away from more structural approaches and toward deeper, more naturalistic and empirically grounded studies of networks in context. As noted in the introduction to this paper, there is a tension between this need for contextualization and the need for generalizable theory. Finding an appropriate balance requires explicitly considering the dynamics of the empirical context during theory development, as was done in this paper. All networks are not alike, and even the same structures may exert different effects as changing conditions alter the mix of mechanisms that make relationships efficacious for those that participate in them. In addition to changing the focus of our theorizing, this idea suggests the need for more and deeper qualitative studies of how people and organizations understand, adapt, inhabit, and use their networks.

Third, our emphasis on social influence and the possibility of tradeoffs among pipe and prism mechanisms underscores the idea that networks are equivocal strategic resources. Whether desired ties form or not is as much a function of the needs of alters as it is of ego, and the effects different network positions exert can depend on matters far outside of ego's control. It is thus difficult if not impossible to unequivocally read an organization or individual's goals from their positions in particular networks. Even when actors manage to occupy what they take to be salutary positions, the link between structural location and desired outcomes can be an attenuated one.

Taken together, these implications suggest that approaches that take contingent and blended network mechanisms as their starting point have great potential to illuminate the ways in which savvy actors use (or are used by) their multiple networks in particular settings. Mechanism blends can help explain why different networks exert different effects, why the effects of some networks change as their contexts shift, and why even the most successful strategic actors can sometimes find themselves hamstrung by their connections. In short, we believe that focusing on mixes of mechanisms is a necessary step toward a richer and higher fidelity theory of networks. Such a theory is necessary if we are to integrate increasing concerns with network variability and dynamics that have come to characterize the field with an analytic emphasis on individual and collective action and outcomes.

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