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The benefits and costs of underwriters' social capital in the US initial public offerings market

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Abstract

This study explores the factors that influence the degree to which brokers in mediated markets employ their social capital to benefit either buyers or sellers in the context of underwriters' involvement in the US initial public offerings (IPO) market. This study finds that the embeddedness of the lead underwriter with institutional investors in an IPO deal network is negatively associated with IPO stock underpricing when demand for the offering is low, thereby benefiting the seller, but is positively associated with the amount of underpricing when demand for the IPO is high, thereby benefiting the buyers. High underwriter embeddedness with institutional investors also reduces the negative relationship between underwriters' reputation and underpricing.

Key words • embeddedness • initial public offering • markets • reputation • social capital

Over the last 30 years a large body of research has been accumulated exploring the role and impact of social capital in a remarkably wide variety of social contexts (Adler and Kwon, 2002 and Burt, 2000 for excellent reviews of this literature). Some theorists have focused on how social capital arises from strong, embedded ties that develop out of frequent interactions among actors in a clearly bounded network or social group (e.g. Coleman, 1990; Krackhardt, 1992; Larson, 1992; Uzzi, 1997, 1999). Others have considered the extent to which social capital arises from possessing weak, arm's-length ties that allow an actor to bridge structural holes between otherwise disconnected groups and thereby generate power, opportunities, resources and other benefits through occupying structurally advantaged positions within information flows (Burt, 1992; Granovetter, 1974). Most research on social capital generally falls into one of these two camps, although some research (Baker, 1990; Lin et al., 1981; Uzzi, 1996) has looked at how both strong ties and weak ties can be profitably combined and used to create more stable market structures.

In this study I extend the notion that both weak ties between networks and strong ties within networks can be sources of social capital in markets. Two key characteristics of much of the research on social capital in market contexts are

first that it has focused primarily on the linkages between buyers and sellers who have the opportunity to interact directly and repeatedly with each other; and second that it treats the social-structural aspects of the market as relatively constant across transactions (Baker, 1990; Larson, 1992; Uzzi, 1997, 1999). This study addresses these issues by focusing attention on mediated markets where buyers and sellers conduct their exchanges indirectly through a broker or transaction intermediary (Abolafia, 1996; Baker, 1984; Khurana, 2002; Smith, 1989), and the social structure of the deal network (Pollock et al., 2004) can change from one transaction to the next. In particular, this study focuses on a mediated market, the initial public offerings (IPO) market, where buyers may have the opportunity to participate repeatedly in the market and thus to develop strong ties with the transaction intermediary, but sellers generally participate in the market only once.[1] The potential for asymmetries in buyer and seller social capital exists in such markets because the buyers may possess strong ties to the transaction intermediary but the seller may not. The literature suggests that in such markets only the buyers would be able to develop and benefit from the trust, increased information sharing, etc. that can result from possessing embedded relationships with brokers (Granovetter, 1985). Here I develop and test theory that explores how and when sellers with weak ties to brokers in mediated markets also benefit from the strong-tie social capital developed between brokers and buyers.

Another limitation of the existing literature on social capital is that it has not paid a great deal of attention to the ways in which changes in contextual factors, such as overall demand, general market conditions or the quality of the asset being exchanged affect how different types of social capital are employed. Recent exceptions include: Podolny (1994), who explored how market uncertainty influenced the importance that organizational status played in shaping decisions over the selection of transaction partners; Gulati and Higgins (2003), who examined how different types of uncertainty influenced the extent to which investors pay attention to signals provided by ties to different kinds of actors; and Pollock and Rindova (2003) who studied how the volume and tenor of media coverage influenced investors' perceptions of IPO firm legitimacy. Pollock et al. (2004) have also developed a theoretical model discussing how variations in demand conditions may affect the characteristics of the deal network and underwriter constructs. However, little research looks at how the demand conditions and characteristics of the deal network can interact to shift the direction in which the benefits of the broker's social capital will flow. A second contribution of this study is that it examines the way in which the broader context of a market transaction influences how, and for whose benefit, social capital is employed.

I explore the theoretical issues raised in this study in the context of the US IPO market because the IPO market is a high-profile part of today's economy and it provides a very public view of the ways in which investment banks, acting as transaction intermediaries, use their social resources to shape outcomes.

The majority of research on IPOs has taken place in finance, and increasingly recognizes that social forces in markets, such as reputation, power and norms of reciprocity, can affect IPO market outcomes (Balvers et al.,1988; Benveniste and Spindt, 1989; Carter and Manaster, 1990; Megginson and Weiss, 1991). However, there is no research in finance that I am aware of which explicitly considers how the social structure of the IPO market affects market outcomes, although recent theoretical (Pollock et al., 2004) and empirical (Baum et al., 2003) work in strategy and organizations has begun to explore these issues. This study extends both the finance and strategic organizations literature by integrating social capital theory with existing IPO research in finance, in order to enhance our understanding of the social construction of value in IPO markets.

Theory development and hypotheses

Mediated markets

Before developing the hypotheses it may be helpful to provide some background information on mediated markets and the IPO market in particular. Mediated markets provide an interesting and special context for exploring how a broker's social capital shapes market outcomes. The risks of participating in some markets can be very significant. Knowledge asymmetries between buyers and sellers abound and future levels of asset performance or value may be, at best, highly uncertain, and at worst, unknowable. In addition, search costs associated with identifying potential transaction partners can be high, opportunism can run rampant and buyers may require steep price discounts to compensate them for the risks taken by participating in the transaction. Brokers, or transaction intermediaries, play an important role in such markets because they can reduce these risks to some extent and facilitate market exchange. They collect information on sellers and their offerings and share it with potential buyers with whom they maintain ongoing relationships. Although theoretical discussions of mediated markets have existed in the sociological literature for some time (Simmel, 1902), with a few exceptions (Abolafia, 1996; Baker, 1984; Finlay and Coverdill, 2000; Khurana, 2002; Smith, 1989) very little empirical research has been done on the role of transaction intermediaries in market exchange. The limited literature suggests that intermediaries develop ongoing relationships with buyers and sellers who do business through their close ties with, and trust in, the intermediary.

The IPO market

The primary market for IPOs is an interesting example of a mediated market. An IPO occurs when a privately held company sells stock on a national ex-

change for the first time. In order to begin public trading in a company's stock, the offering firm must register its stock with the Securities Exchange Commission (SEC) and undergo a rigorous process designed to provide prospective investors with all the relevant information about the company (Husick and Arrington, 1998). Despite the best efforts of the SEC to ensure that information about an offering is freely and accurately available before the initial public offering, the SEC registration process does not completely eliminate the uncertainty surrounding the prospects of a company going public. Firms involved in IPOs are usually quite young, have uneven performance records and can provide only limited historical data from which investment decisions can be made. Moreover, the very act of going public is a challenging transformational event that can divert management's attention from the basic operations of the company and create a host of unanticipated consequences for the firm and its leaders (Fischer and Pollock, 2004). There is no guarantee that a firm that was successful as a private company will manage this transformation effectively (Fischer and Pollock, 2004; Jain and Kini, 2000).

A number of different actors, such as lawyers, accountants, government regulators, venture capitalists and angel investors, are involved in the IPO process, and constitute a unique deal network for each transaction (Pollock et al., 2004). These writers, however, argue that it is the underwriter managing the offering (i.e. the lead underwriter), the underwriting syndicate and the investors who initially purchase shares in the offering that form the kernel of each deal network in the IPO market and play the greatest role in shaping the pricing and early market performance of the offering. (See Pollock et al., 2004 for a detailed description of the network structure of the IPO market.) The lead underwriter fills an important structural hole (Burt, 1992, 2000) in the IPO market, linking the offering firm to the investment community. Some underwriters lead offerings often have the opportunity to develop strong or embedded ties with those institutional investors whom they deal with regularly, while other underwriters only participate in the IPO market occasionally, and develop few, if any, strong ties with investors. In addition, even if an underwriter has a significant number of embedded ties with different investors, for a variety of reasons it may include a larger or smaller proportion of these investors in a given deal network (Pollock et al., 2004). Thus, the number of repeat buyers in the network can vary from deal to deal, even for offerings led by the same underwriter. Whether or not the underwriter has developed strong ties with investors, it is likely to have only weak-tie relationships with the offering firms, whose participation in the IPO market is generally a one-time occurrence, and who are unlikely to have made previous use of the investment bank's services in other market contexts.[2] While the underwriter may hope to eventually develop a strong tie with the IPO firm, there are no guarantees this is likely to occur (Baker, 1990; Krigman et al., 2001; Welch, 1989), and at the time of the IPO such relationships generally do not exist.

Underpricing

The uncertainty surrounding an IPO has given rise to the phenomenon known as underpricing, which is the most frequently studied IPO market outcome (see Ibbotson and Ritter, 1995 and Ritter and Welch, 2002 for extensive reviews of the literature in this area). Put simply, underpricing is the percentage difference between the initial price of the stock and the price of the stock at the end of the first day of trading. In general, offerings are priced such that IPO stock prices tend to rise on their first day of trading. Finance scholars have argued that underpricing represents forgone income to the offering firm from the IPO due to uncertainty about the firm's prospects (Benveniste and Spindt, 1989; Carter and Manaster, 1990; Loughran and Ritter, 2002; Rock, 1986; Tinic, 1988). The greater the uncertainty over the firm's future prospects, the more the stock is likely to be underpriced.

Factors that reduce investors' perceptions of uncertainty, such as the reputation of the underwriter leading the offering (Carter and Manaster, 1990; Carter et al., 1998), the reputation of the firm's auditor (Beatty, 1989), the presence of prominent board members (Certo, 2003) and alliance partners (Stuart et al., 1999; Gulati and Higgins, 2003), founder presence at IPO (Certo et al., 2001; Nelson, 2003), venture capitalist backing (Megginson and Weiss, 1991) and high volumes of media coverage (Pollock and Rindova, 2003) have all been found to reduce the amount of underpricing that an IPO stock experiences. While these studies have focused on how signaling through prominent associations (Beatty, 1989; Carter and Manaster, 1990; Gulati and Higgins, 2003; Megginson and Weiss, 1991) and the cognitive processes and limitations of investors (Pollock and Rindova, 2003) affect underpricing, no research to date has examined the influence of the social structure of the IPO market on transaction outcomes. In this study I draw on theories of social capital to explore how an underwriter uses its social resources to meet the needs of buyers and sellers as well as its own needs to make a profit and protect its market-making capabilities, and how these considerations affect the amount of IPO underpricing.

The benefits of a broker's embedded relationships

Research on social capital has suggested that strong, embedded ties can be a valuable resource in exchange relationships (Krackhardt, 1992; Lin et al., 1981). Embedded relationships can decrease opportunistic behavior (Uzzi, 1996, 1997); facilitate information transfer (Larson, 1992; Uzzi, 1996), especially when the information or knowledge is complex (Hansen, 1999); influence the acquisition and use of power (Baker, 1990); build trust between transaction partners (Uzzi, 1996, 1997); increase access to and reduce the cost of capital (Uzzi, 1999); affect the likelihood of firm survival (Fischer and Pollock, 2004; Uzzi, 1996) and reduce market volatility (Baker, 1984). These benefits result in large part from the reciprocal trust (Frank and Yasumoto, 1998; Portes and

Sensenbrenner, 1993) that is generated by embedded ties. To the extent that actors have established ongoing relationships, expectations exist that favors provided in the past will be repaid. Relationships with repeat buyers may thus be helpful to underwriters in facilitating IPO market transactions.

Institutional investors are the primary buyers in the US IPO market (Hanley and Wilhelm, 1995; Pollock et al., 2004). They have the buying power to both command an underwriter's attention and meet the underwriter's needs (Blau, 1964; Pfeffer and Salancik, 1978), and are therefore the most likely market participants to develop embedded relationships with underwriters. To the extent an institutional investor has an embedded relationship with an underwriter, it may be more likely to place greater credence in claims made by the underwriter (Uzzi, 1997), reducing its uncertainty about the IPO to some extent, and increasing the price it may be willing to pay for the stock. In addition, institutional investors that have embedded relationships with underwriters may also receive more and better information about the offering (Coleman, 1988; Granovetter, 1985; Uzzi, 1997). Underwriters are willing to provide this information to their repeat buyers because they expect to receive valuable information in return. Institutional investors can provide underwriters with 'indications of interest', which is information about how many shares they may be willing to buy at different price levels. This information is used by the underwriter to anticipate the demand for an IPO and price the offering appropriately (Benveniste and Spindt, 1989; Cornelli and Goldreich, 2001; Rock, 1986). Thus, embedded ties can serve to both reduce investor uncertainty and increase the availability of information useful to underwriters in the price setting process. As a result, underwriters can more accurately price an offering based on a greater understanding of anticipated demand, reducing the amount of underpricing the offering is likely to experience.

Given this information, one may expect underwriters to favor investors in the price setting process. However, underwriters face inducements that may counteract these tendencies. First, underwriters have a vested interest in reducing the underpricing discounts associated with setting offering prices too low because their compensation from the IPO transaction is a fixed percentage of the total offering value. The higher the initial price of the stock, the more the underwriter stands to make from the deal. Second, the underwriter also has a fiduciary responsibility to get the best price possible for the offering firm. Thus, all else equal, to the degree that an underwriter possesses embedded ties with institutional investors, and increases the availability of strong-tie social capital by including a larger proportion of these investors in the deal network for an IPO, the offering firm can expect to benefit from the underwriter's social capital. Based on the preceding arguments, the following hypothesis is proposed.[3]

HYPOTHESIS 1 Including a larger proportion of institutional investors in the deal network with whom the lead underwriter has embedded relationships will be negatively associated with IPO underpricing.

Reciprocity in context

Hypothesis 1 is a baseline hypothesis that suggests how a transaction intermediary's social capital can affect the outcome of a transaction, holding all else equal (i.e. under neutral conditions). However, contextual conditions often are not neutral (Amihud et al., 2003). It is entirely possible that variations in the context in which a transaction takes place can have a significant effect on how social capital gets used and the nature of the favors exchanged, thus leading to variations in transaction outcomes. When contextual factors are negative (i.e. market conditions are poor, or the quality of the asset being exchanged is not as high as expected, and demand is therefore low), an actor may rely on the reciprocal trust built up over previous transactions and call in chits previously acquired in order to facilitate the current transaction, thereby using its strong ties with repeat buyers to benefit the seller (Lin et al., 1981). However, when deal conditions are more positive, prior favors may be repaid, or new chits may be acquired by the granting of favors to repeat buyers (Coleman, 1990). In the IPO market the level of demand for an offering is a powerful contextual factor that can have a significant impact on how an underwriter's social capital is employed, and who benefits as a result (Cornelli and Goldreich, 2001; Ljungqvist and Wilhelm, 2002).[4]

The vast majority of IPOs are underwritten on what is known as a firm commitment basis. This means that the underwriter takes on some of the offering risk by purchasing all of the shares being sold by the IPO firm at the offering price, minus their commission, and then resells the shares at the offering price to investors.[5] Since the underwriter absorbs the cost of any unsold shares, it has a vested interest in making sure the offering is fully subscribed. If demand for a particular IPO is low, underwriters face pressures to establish a lower offering price in order to sell all the shares, generating less cash for the IPO firm and a lower commission for the underwriter. However, in such circumstances underwriters may be able to draw on their social capital, rather than resorting to severe price discounts, in order to fully subscribe the offering. Earlier research has observed cascade or herding effects in IPO markets (Amihud et al., 2003; Welch, 1992). A cascade occurs when actors, having observed the behavior of others, take the same action regardless of whether or not any private information they may hold supports the decision (Bikhchandani et al., 1992; Welch, 1992). In the context of the IPO market, once a few investors agree to purchase shares at a given price, other investors assume the early investors have some private knowledge that justifies the valuation and become more willing to purchase shares. In their study of the Israeli IPO market, Amihud et al. (2003) found that demand for offerings was either very high or the offerings were undersubscribed, with very few offerings in between, a pattern of results they attributed to cascade behavior.

Thus, if an underwriter is having trouble fully subscribing an offering, whether because of lack of interest in the company, a generally cool market or

some other reason, it may turn to its embedded transaction partners and ask them to purchase shares at a higher price, even though they may have some reservations, in order to prime the market and generate a purchasing cascade, thereby reducing the amount of underpricing the stock is likely to experience. These repeat buyers may be willing to go along, even if their probable gains from the transaction are lower than they would like, because they trust that the underwriter will reciprocate the favor when it leads to a more attractive offering in the future. This logic suggests the following hypothesis.

> HYPOTHESIS 2 Including a larger proportion of institutional investors in the deal network with whom the lead underwriter has embedded relationships will have a negative relationship with underpricing when demand for the offering is low, and a positive relationship with underpricing when demand for the offering is high.

Self-protection by investment banks

The public reputation of investment banks has long played an important role in stabilizing market transactions. Because of a lack of reliable information about companies before the Securities Acts of 1933 and 1934, the participation of a reputable bank as lead underwriter of an offering was critical for the deal to succeed (Chernow, 1997). The willingness of the bank to risk its reputational capital was an important signal to investors about the quality of the offering. Despite the far more demanding disclosure requirements that have been established over the last 70 years, recent research suggests that an underwriter's reputation still influences IPO outcomes (Beatty and Ritter, 1986; Carter and Manaster, 1990; Higgins and Gulati, 2003; Stuart et al., 1999). Earlier research on IPOs has generally found an inverse relationship between investment bank reputation and underpricing (Beatty and Ritter, 1986; Carter and Manaster, 1990; Michaely and Shaw, 1994). The typical explanation for this relationship is that a reputable underwriter certifies an offering as one of high quality, thereby reducing investors' uncertainty and increasing the initial price they are willing to pay for the stock.

Given the importance of an underwriter's reputation, it is not surprising that underwriters often take actions designed to protect and maintain this valuable asset. For example, underwriters with good reputations are more likely to place shares of IPO stocks with institutional investors who will not quickly resell, or flip, the stock (Carter and Dark, 1993; Krigman et al., 1999), which can increase stock price volatility. In addition, such prestigious underwriters take reputational considerations into account when deciding whether or not they are even willing to lead a particular offering (Ferris et al., 1992). Research on investment banks outside the specific context of IPOs has also noted banks' tendencies to take actions that protect their status and reputations (Eccles and Crane, 1988; Podolny, 1994). It therefore stands to reason that underwriters might also act to protect their reputations when pricing an offering.

Despite the voluminous research on the influence of underwriters' reputations, little work has been done to explore factors that may moderate the relationship between underwriters' reputation and market outcomes (see Gulati and Higgins, 2003 for a recent exception). Raub and Weesie (1990) suggested that reputations are developed and maintained within the context of embedded social structures. They argued that as the level of embeddedness increases within a network so do the risks associated with engaging in malfeasance and opportunistic behavior. Actors will avoid engaging in actions that could be potentially damaging to others in the network, and thus to their relationships with these actors, because the relationships provide greater long-term utility than any immediate gains that could be had by violating the group's expectations (Coleman, 1990; Frank and Yasumoto, 1998; Portes and Sensenbrenner, 1993). Portes and Sensenbrenner label this dynamic enforced trust, since 'the motivating force in this case is not value convictions, but the anticipation of utilities associated with "good standing" in a particular collectivity' (1993: 1325).

Earlier research on enforced trust has generally focused on how violations are sanctioned via the damage they do to network ties (Coleman, 1990; Portes and Sensenbrenner, 1993). However, embedded ties may also result in sanctions through the influence they have on an actor's general reputation. An actor's reputation does not depend solely on the opinions of those with whom it has had transactions directly in the past. Powerful information intermediaries such as the press (Deephouse, 2000; Pollock and Rindova, 2003; Rindova and Fombrun, 1999), market analysts (Zuckerman, 1999) and watchdog groups (Rao, 1998) also play a significant role in shaping an actor's reputation. Information intermediaries are especially influential in shaping reputation in the eyes of those who have not transacted with a focal actor previously, but are considering doing so (Benjamin and Podolny, 1999; Fombrun, 1996). In gathering the information that they use in forming and disseminating their opinions, information intermediaries are likely to place substantial weight on the information they receive from those who have strong ties with the focal actor, since they possess the well-developed relationships and experiences that allow them to know the focal actor best (Raub and Weesie, 1990; Weigelt and Camerer, 1988; Wilson, 1985). Thus, to the extent that a broker constructs a deal network that includes a larger proportion of strong ties, violating embedded partners' expectations may damage not only these relationships, but also the actor's general reputation.

In the context of the IPO market, although setting a higher stock price meets the IPO firm's expectations by generating more cash from the offering, selling shares in an IPO to investors at a price that generates low levels of underpricing is a violation of investors' expectations that some underpricing (historical averages suggest 11–15 percent, Ritter and Welch, 2002) will occur. Selling repeat buyers an offering that generates little underpricing decreases trust in the underwriter and increases uncertainty about its motivations, loyalties and competence, thereby decreasing the bank's ability to make use of its embedded

relationships in future deals. Since repeat buyers should know the bank best, they can act as opinion leaders about the bank in the broader investment community (Raub and Weesie, 1990).

Thus, highly reputable underwriters may feel greater pressure to price an IPO more conservatively when repeat buyers are involved in an offering. Even though the underwriter might have been able to get a higher price, and thus more financial capital for the offering firm, pricing an offering more conservatively increases the likelihood the IPO will provide sufficient underpricing, thereby meeting investors' expectations and protecting the underwriter's reputation. This suggests that while enforced trust may reduce the likelihood that an underwriter will act in ways that are damaging to their repeat buyers, it also increases the likelihood that it will act opportunistically with respect to sellers should it perceive its strong ties with investors are at risk. Based on this reasoning the following hypothesis is proposed.

HYPOTHESIS 3 The negative relationship between underwriter reputation and underpricing will be diminished when larger proportions of institutional investors with whom the lead underwriter has embedded relationships are included in the deal network.

Figure 1 summarizes the hypothesized relationships.

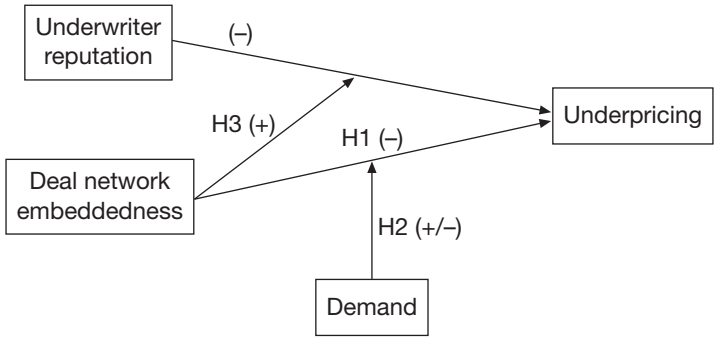

Figure 1 Summary of hypotheses

Data and method

Unless otherwise noted, the offering prospectuses filed for all US IPOs conducted in 1992 are the primary source of data for this study. The year 1992 can be considered a typical year for IPOs, since there was not an atypically large or small number of offerings, and the average level of underpricing (11.7%) and turnover in shares traded on the day of the IPO (61.8%) observed in this sample are consistent with historical averages (Ellis et al., 2000; Ritter and Welch, 2002; Tully, 2001). In addition, because the sample was selected from a period

that predates the internet stock bubble of the late 1990s, it avoids potential confounds associated with anomalies observed during this period (Aggarwal et al., 2001; Ritter and Welch, 2002). Consistent with earlier IPO research (Ritter, 1991; Welbourne and Andrews, 1996), closed-end mutual funds, real-estate investment trusts (REITS), unit offerings, spin-offs, demutualization of savings banks and insurance companies, and reverse-LBOs have been excluded from the analysis. The final sample contained 245 IPOs. Missing data reduced the sample to 225 IPOs.

Dependent variable

Underpricing

Underpricing equals the percentage change in stock price ($Price_{end}$ – $Price_{initial}/Price_{initial}*100$) on the first day the stock trades on a national exchange. The data used to calculate underpricing were drawn from the IPO prospectuses and the Center for Research on Securities Pricing (CRSP) database.

Independent variables

Deal network embeddedness

Deal network embeddedness (DNE) reflects the amount of strong-tie social capital available in the deal network for a given IPO. Institutional investor participation in past deals managed by the lead underwriter was used as the basis for determining DNE. Consistent with previous research that has generated embeddedness measures using transaction data (Baker, 1990; Fischer and Pollock, 2004; Uzzi, 1996), DNE was calculated using a Herfindahl index. First, the lead underwriter for each IPO in the sample and the institutional investors that owned stock in each IPO at the end of the quarter in which the company went public were identified.[6] I then had to determine, for each pair of underwriters and institutional investors, how frequently the two actors participated in offerings together. I could not use 1992 deal data, because this would generate a concentration ratio for most IPOs based on deals that had not yet occurred at the time of their offering. Therefore, I collected data from 1991 IPOs on all 4754 potential pairs of underwriters and institutional investors in 1992. For each pair I identified the number of 1991 deals (D_{ij}) in which underwriter i participated as a lead or co-manager of the offering and institutional investor j owned shares. I also separately identified the number of 1991 deals (D_i) that underwriter i participated in as a lead or co-manager. The concentration ratio for each 1992 deal network k (DNE_k) was then calculated using the formula $DNE_k = \sum (D_{ijk}/ D_{ik})^2$. Thus, DNE for each 1992 IPO k equals the sum of the squared proportions of 1991 deals led by bank j in which investor i participated. The data used to calculate DNE were drawn from offering prospectuses and Disclosure's Compact D SEC database.

Underwriter reputation

Following previous research (Fischer and Pollock, 2004; Pollock and Rindova, 2003), the underwriter reputation measure used in this study was based on tombstone positionings in 1991 underwriting syndicates. These syndicates included 3365 participants representing 261 different investment banks. Each underwriter's status class was reverse-coded and divided by the total number of classes reflected in the tombstone. For example, if a tombstone had three classes of underwriters, the first class was coded 1, the second class was coded .67 and the third class was coded .33. An underwriter's reputational score equaled the average of the scores across all the syndicates in which the underwriter participated multiplied by 100. Data on underwriting syndicates used to calculate underwriter reputation were drawn from Compact D, another database product from Disclosure.

Because reputable underwriters are also the most likely to possess substantial numbers of embedded ties with investors, and thus have a greater ability to construct more embedded deal networks, one potential concern is that DNE and reputation may not be empirically distinct measures. However, these two measures are only moderately correlated (.36). In order to provide a greater sense of how DNE can vary from underwriter to underwriter and deal to deal, Table 1 lists each investment bank that served as a lead underwriter in my sample and provides their reputation score, the number of deals led in 1992, the average DNE across all of their deals, the standard deviation in DNE, and the minimum and maximum DNEs for the IPOs they led. The data in this table show that although Montgomery Securities was in the top reputation tier and was the most active underwriter, leading 18 deals, its deal networks were not the most embedded, on average. Among active underwriters, Goldman Sachs had the highest average DNE score (3.5), and also constructed the most embedded deal network (5.9). Morgan Stanley also tended to include a greater proportion of repeat buyers in their deal networks than the other underwriters. Alex. Brown and Sons, which tied with Morgan Stanley as the second most active underwriter in 1992 (12 IPOs each), demonstrated perhaps the greatest relative range in DNE across its offerings, with DNE ranging from approximately .15 to 2.6. Overall, the data in Table 1 suggest that although reputable underwriters tended to be the most active and to construct more embedded deal networks, there was still substantial variation in underwriters' reputations, as well as from deal to deal for a given underwriter.

Turnover

I operationalized demand for an offering using turnover. Turnover equals the percentage of shares offered that are traded ([shares traded/shares offered]*100) on the day of the IPO (Ellis et al., 2000; Pollock and Rindova, 2003). Turnover provides an indicator of the pent-up interest in and demand for the stock (Pollock and Rindova, 2003). Although high turnover shows that investors are interested in both buying and selling a stock, I view it as a positive indicator of

Table 1 Lead underwriters and deal network embeddedness

Underwriter	Reputation	Number of deals led	Mean DNE	S. D. DNE	Minimum DNE	Maximum DNE
Montgomery Securities	100	18	0.73	0.45	0.23	1.63
Alex Brown & Sons Inc	100	12	1.29	0.63	0.15	2.57
Morgan Stanley & Co Inc	100	12	2.63	0.97	1.24	3.93
First Boston Corp	100	11	1.26	0.62	0.30	1.97
Robertson Stephens & Co	100	11	1.94	1.06	0.85	4.39
Hambrecht & Quist Inc	100	10	1.18	0.69	0.24	2.37
Shearson Lehman Brothers	100	9	1.08	0.34	0.70	1.75
Goldman Sachs & Co	100	8	3.50	1.54	2.35	5.29
Merrill Lynch Capital Markets	100	8	1.56	0.95	0.43	3.53
Smith Barney Harris Upham & Co	100	8	1.05	0.53	0.33	1.72
Kidder Peabody & Co Inc	100	6	0.93	0.36	0.60	1.36
Painewebber Inc	100	6	0.80	0.26	0.43	1.14
Bear Stearns & Co Inc	100	4	1.60	0.58	0.50	2.08
Donaldson Lufkin & Jenrette	100	4	1.07	0.36	0.55	1.34
Prudential Bache Capital Fund	100	4	0.60	0.40	0.00	0.84
Dean Witter Reynolds Inc	100	1	0.18	0.00	0.18	0.18
S G Warburg Securities	100	1	0.00	0.00	0.00	0.00
Salomon Brothers Inc	100	1	1.87	0.00	1.87	1.87
Wertheim Schroder & Co Inc	100	1	0.31	0.00	0.31	0.31
A G Edwards & Sons Inc	95	2	1.00	0.16	0.89	1.11
Oppenheimer & Co Inc	91	4	0.63	0.41	0.11	1.11
Allen & Company Inc	87	1	0.50	0.00	0.50	0.50
Kemper Securities Group Inc	83	4	0.83	0.41	0.44	1.33
William Blair & Co	70	8	0.58	0.39	0.31	1.37
Piper Jaffray & Hopwood Inc	70	6	0.48	0.24	0.06	0.80
Dain Bosworth Inc	69	1	0.20	0.00	0.20	0.20
Robinson Humphrey Co Inc	68	3	1.59	0.36	1.20	1.92
Legg Mason Wood Walker Inc	66	2	1.00	0.00	1.00	1.00
Tucker Anthony Inc	65	2	2.63	0.53	2.25	3.00
J C Bradford & Co	64	4	1.56	0.90	0.25	2.17
Cowen & Co	64	2	2.39	0.39	2.11	2.67
Advest Inc	63	1	0.00	0.00	0.00	0.00
Stephens Inc	62	1	4.00	0.00	4.00	4.00
Rauscher Pierce Refsnes Inc	60	2	1.50	0.71	1.00	2.00
Gruntal & Co Inc	60	1	0.00	0.00	0.00	0.00
Ladenburg Thalmann & Co Inc	59	3	0.19	0.11	0.13	0.31
Raymond James & Associates Inc	59	3	0.42	0.34	0.06	0.75
County Natwest Securities Ltd	58	2	0.25	0.35	0.00	0.50
Morgan Keegan & Co Inc	58	1	1.04	0.00	1.04	1.04
Principal Eppler Guerin & Turn	56	4	0.00	0.00	0.00	0.00
Furman Selz Inc	55	1	3.44	0.00	3.44	3.44
Sutro & Co Inc	54	3	0.67	0.14	0.50	0.75
First Of Michigan Corp	54	1	1.00	0.00	1.00	1.00
Stifel Nicolaus & Co Inc	54	1	0.00	0.00	0.00	0.00
Wedbush Morgan Securities	52	1	0.00	0.00	0.00	0.00
Cruttenden & Co Inc	50	1	0.00	0.00	0.00	0.00

continues overleaf

Table 1 continued

Underwriter	Reputation	Number of deals led	Mean DNE	S. D. DNE	Minimum DNE	Maximum DNE
Paragon Capital Corp	50	1	0.00	0.00	0.00	0.00
Josephthal Lyon & Ross Inc	49	2	1.00	1.41	0.00	2.00
Pauli & Co Inc	46	1	0.00	0.00	0.00	0.00
Laidlaw Equities Inc	45	2	0.00	0.00	0.00	0.00
Pennsylvania Merchant Group	45	2	0.50	0.35	0.25	0.75
Emanuel & Co	44	1	0.00	0.00	0.00	0.00
Hanifen Imhoff Inc	44	1	0.00	0.00	0.00	0.00
Commonwealth Associates	42	2	0.50	0.71	0.00	1.00
H J Meyers & Co Inc	40	1	0.50	0.00	0.50	0.50
Ras Securities Corp	40	1	0.00	0.00	0.00	0.00
Unterberg Harris	39	1	1.00	0.00	1.00	1.00
Volpe Welty & Co	39	1	1.61	0.00	1.61	1.61
John G Kinnard & Co Inc	38	2	0.00	0.00	0.00	0.00
Hampshire Securities Corp	33	1	0.00	0.00	0.00	0.00
Vantage Securities Inc	33	1	1.00	0.00	1.00	1.00
Dickinson & Co	31	1	0.00	0.00	0.00	0.00
Summit Investment Corp	27	1	0.00	0.00	0.00	0.00
Robert Todd Financial Corp	0	1	0.00	0.00	0.00	0.00
Glaser Capital Corp	0	0	0.00	0.00	0.00	0.00

demand because it usually indicates an oversubscribed offering, where demand for shares of the IPO exceeds the supply (Amihud et al., 2003; Cornelli and Goldreich, 2001).[7] Such unmet demand produces a first-day turnover that, on average, is 30 times higher than the average trading turnover in the 60 days following the IPO (Ellis et al., 2000).[8] The data used to calculate this measure were drawn from the CRSP database.

Control variables

Market conditions

The general market conditions at the time a company went public were operationalized as the total return on the NASDAQ composite index for the 30 trading days prior to the offering. Even within a single year the stock market can take dramatic swings that make the market more or less attractive. In my sample, 30-day returns on the NASDAQ composite index ranged from –8.8 percent to 17.9 percent. Additional analyses showed that on a quarterly basis the 30-day average market return equaled 6.3 percent for quarter 1, –2.9 percent for quarter 2, .92 percent for quarter 3 and 5.21 percent for quarter 4. *T*-tests showed that quarters 1 and 4 were not significantly different for one another, but all other quarter pairs were significantly different at $p < .05$ or better, suggesting that substantial variance exists in market conditions, even for a one-year period. The NASDAQ composite index was chosen because this is

the exchange where 90 percent of the companies in the sample are listed. The data used to calculate this measure were drawn from the CRSP database.

VC backing

VC backing is a dummy variable coded '1' if a company received venture financing while a privately held firm and coded '0' otherwise. Prior research has found VC backing to be negatively associated with underpricing (Megginson and Weiss, 1991).

IPO firm quality

The characteristics of the IPO firm itself can affect the demand for and performance of the offering. Following Gutterman's (1991) discussion of the factors that the investment community uses in assessing a new issue, the following firm-specific characteristics were included in the model to control for the impact of the quality of the firm going public: sales in 1991, net income before interest and taxes in 1991, average management team tenure, the percentage of the offering represented by insider selling of stock and the number of risk factors included in the offering prospectus.

Lead institutional investor size

All investors pay the same price for an IPO stock in the primary market. However, the power of the institutional investor that purchases and holds the largest share of the offering (what I will refer to as the lead institutional investor) may influence how the offering is initially valued and how much underpricing it experiences. All else equal, institutional investors would like to see lower initial valuations, thereby increasing the potential for a significant run-up in stock price when shares begin trading in the secondary market. The bigger the institutional investor (i.e. the greater the assets an investor has under its control), the greater its power and ability to influence the investment banks that rely on it to generate commissions and help stabilize the market by buying and holding the shares of stocks they underwrite (Benveniste and Spindt, 1989; Carter and Dark, 1993; Useem, 1996). Institutional investor size was measured as the total assets under management at the end of 1991 by the institutional investor that owned the largest proportion of the company's stock at the end of the quarter in which the IPO firm went public. Institutional investor size information was drawn primarily from *Nelson's Directory of Investment Managers*, and was supplemented with data drawn from *Institutional Investor* magazine's annual listing of the 300 largest investment managers, as well as the *CDA/Wiesenberger Investment Companies Yearbook*. Institutional investor ownership data was drawn from Disclosure's Compact D SEC database collection for 1992.

Total size of the offering

This measure equals the total number of shares offered during the IPO multiplied by the offering price. The size of the offering can send signals to the

market about the relative quality and stability of the offering, and is frequently used as a control when predicting underpricing (Ibbotson and Ritter, 1995). In addition, the larger the offering, all else equal, the lower the level of turnover is likely to be.[9]

Industry dummies

Systematic differences can exist between companies in different industries for both the independent and dependent variables. Different industries can also be considered hot in any one year (Ritter, 1984), which could result in systematic pricing differences for the IPOs of companies in these industries. To control for these potential effects, six industry dummy variables were included in the analysis. Consistent with prior research (Pollock and Rindova, 2003), the industry classifications used were biotechnology, software, electrical manufacturing, financial, retail and services. These categories capture the variety of industries represented in the IPO market in 1992, and take into account those industries that are represented more heavily in the IPO market than they may be in the market in general.[10]

Firm age

A firm's age at IPO was calculated as the years since incorporation. Younger firms are subject to a greater likelihood of failure for a variety of reasons (Hannan and Freeman, 1989; Stinchcombe, 1965). Since older firms typically have greater slack resources, they should have more of a probability of surviving the change from private to public status. Older firms are also more likely to have stronger financials, and may be perceived as less risky by investors. However, because they are more developed, older firms may also be perceived as providing less opportunity or potential for rapid growth than younger firms which are at an earlier stage of development.

Number of deals

This measure equals the number of IPOs in which the lead underwriter for the IPO was a lead underwriter or co-manager in 1991. Underwriters vary in the degree to which they are actively involved in the IPO market (Pollock et al., 2004). Those underwriters that participate in the IPO market more actively develop a greater number of embedded relationships, providing them with more strong-tie social capital to deploy. More active market participants may also be more dependent on the IPO market for a significant portion of their revenues, which could also affect their pricing behaviors (Pollock et al., 2004).

Deal network size

Deal network size equals the number of institutional investors who own stock in the company at the end of the quarter in which the company goes public. This measure is used as a control because deal network concentration can be affected by the size of the deal network. The larger the number of investors included in

the deal network, the less likely the underwriter will be to have embedded relationships with a large proportion of the network members.

Media coverage

Prior research has found that the volume and tenor (positive or negative) of pre-IPO media coverage can influence the level of underpricing an IPO experiences. In order to control for these effects, I followed the procedures used by Pollock and Rindova (2003) to construct measures of pre-IPO media volume and tenor (see Pollock and Rindova, 2003 for a detailed discussion of the data and methods used to construct these measures). Consistent with Pollock and Rindova (2003), I included squared terms for volume and tenor in the models, and employed the orthog command in the Stata 8.0 statistical analysis software package to reduce the correlations between the linear and squared terms by creating orthogonalized transformations of these measures (Cohen and Cohen, 1983).

Results

Table 2 presents the descriptive statistics and correlations for the variables used in the analysis. Although some variables display moderate to high levels of correlation, VIF tests performed on all of the models suggest that multicollinearity is not a problem in these analyses. The average VIF scores for the models ranged between 2.12 for the control model to 4.84 for the fully-specified model. Table 3 presents the results of the OLS regressions predicting underpricing. Because some underwriters led multiple offerings, it is possible that there may have been some correlation in the error terms across observations based on the identity of the lead underwriter. In order to address this issue, robust standard errors were calculated using the cluster command (clustering on bank ID) in Stata 8.0. The cluster command uses the Huber–White estimation technique (Huber, 1967; White, 1980) to adjust standard errors for heteroskedasticity. Model 1 presents the control model. Model 2 included DNE, and tested hypothesis 1 that DNE would be negatively associated with underpricing. The results of Model 2 indicate a positive, significant relationship between DNE and underpricing, thus failing to support hypothesis 1. Given that hypotheses 2 and 3 predict interaction effects that will have positive signs, it is possible that the negative main effect of DNE was masked when the interactions were not included in the model. Indeed, when the interaction effects were entered into Models 3–5, the main effect of DNE became negative and significant at $p < .05$ in Model 4, and $p < .01$ in Models 3 and 5. Hypothesis 1 is therefore at least partially supported.

Hypothesis 2 suggested that the demand for an IPO would moderate the relationship between DNE and underpricing, such that the former would reduce the amount of underpricing experienced when demand for the stock is low and will increase it when demand is high. Model 3 in Table 2 tests this

Table 2 Correlations and descriptive statistics

Variable	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1. Underpricing	11.68	18.81																					
2. Financy dummy	.07	.26	–.05																				
3. Biotech dummy	.09	.29	–.06	–.09																			
4. Elec. Mfg. dummy	.20	.40	–.04	–.14	–.16																		
5. Retail dummy	.18	.39	–.02	–.13	–.15	–.24																	
6. Service dummy	.20	.40	.00	–.14	–.16	–.26	–.24																
7. Software dummy	.11	.31	.19	–.10	–.11	–.18	–.17	–.18															
8. Ln firm age	2.08	.88	–.13	–.03	–.16	–.05	.24	–.20	.04														
9. VC backing	.60	.49	–.02	–.13	.13	.21	–.25	.00	.14	–.21													
10. Ln investor size	8.96	2.36	–.23	.11	.00	–.01	–.12	–.03	.04	.06	.00												
11. Ln offering value	17.01	.81	.12	.14	–.11	–.04	.04	–.09	–.03	.16	.01	.17											
12. Avg. TMT tenure	5.26	3.99	–.11	.06	–.20	–.10	.26	–.14	–.03	.79	–.31	.03	.17										
13. Insider selling	12.95	18.50	.16	.06	–.21	.06	.07	–.21	.26	.20	–.07	.04	.33	.17									
14. # Risk factors	9.93	2.98	.04	–.12	.23	.21	–.39	.13	.11	–.31	.23	–.06	–.10	–.37	–.20								
15. Ln sales1991	9.49	2.65	–.08	.08	–.53	–.11	.32	–.09	.06	.42	–.20	.17	.27	.41	.31	–.48							
16. Net income 1991	3980.00	10449.71	–.07	.33	–.22	–.08	.10	–.15	–.09	.32	–.37	.11	.40	.41	.36	–.36	.46						
17. # deals 1991	11.66	8.26	.07	–.01	–.14	.03	.06	–.07	.11	.01	.19	.08	.53	–.04	.24	.01	.22	.12					
18. Network size	15.88	11.11	.24	.08	–.14	.01	.04	–.16	.09	.21	–.05	.08	.79	.19	.43	–.14	.29	.36	.43				
19. Market conditions	2.62	6.69	.21	–.02	.13	–.05	–.11	.15	–.10	.05	.05	–.08	.27	–.01	–.06	.04	–.09	–.07	.14	.23			
20. Turnover	62.64	40.65	.45	–.20	.01	–.01	.11	–.12	.24	.02	.24	–.11	.35	–.08	.28	–.03	.01	–.17	.41	.40	.26		
21. Und. reputation	83.38	23.52	–.08	.05	–.05	.00	.05	–.19	.14	.10	.21	.21	.61	.06	.25	.01	.23	.16	.81	.49	.09	.35	
22. Deal network embed.	1.14	1.02	.23	–.04	–.04	.03	–.03	–.14	.16	.15	.05	.11	.56	.13	.30	–.04	.13	.26	.20	.67	.17	.34	.36

Table 3 OLS Regressions predicting underpricing

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
Finance dummy	3.1860	4.6170	0.5403	4.4928	1.5726
	(2.8015)	(3.0889)	(3.6777)	(3.3156)	(3.6544)
Biotech dummy	–4.0161	–4.1371	–5.3423	–5.3408	–5.8460
	(3.8749)	(3.8693)	(3.6366)	(4.2963)	(3.9736)
Elec. Mfg. dummy	–1.5222	–1.7308	–1.9059	–1.3212	–1.5739
	(3.6142)	(3.7252)	(3.6038)	(3.9408)	(3.8051)
Retail dummy	–1.9447	–2.3659	–2.7331	–3.2571	–3.2501
	(3.9507)	(4.0136)	(4.1723)	(4.0845)	(4.2100)
Service dummy	–1.0322	–1.0718	–3.1919	–2.6218	–3.6847
	(3.2664)	(3.4247)	(3.3155)	(3.3756)	(3.3333)
Software dummy	8.5002†	7.6317	3.0530	5.1659	2.5999
	(5.0677)	(5.0823)	(5.2379)	(5.1601)	(5.2062)
Firm age	–0.1272*	–0.1221*	–0.1069†	–0.1134*	–0.1050†
	(0.0612)	(0.0584)	(0.0632)	(0.0544)	(0.0592)
VC backing	–3.4979	–3.9830†	–3.7522†	–4.0282†	–3.8468†
	(2.1609)	(2.2356)	(2.1647)	(2.0873)	(2.1012)
Investor size	–0.0000	–0.0000	–0.0000	–0.0000	–0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Offering size	–0.0000	–0.0000	0.0000	–0.0000*	–0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Avg. TMT tenure	–0.2084	–0.2300	–0.1362	–0.2506	–0.1762
	(0.2783)	(0.2724)	(0.2617)	(0.2766)	(0.2670)
Insider selling	0.0030	0.0091	0.0151	0.0196	0.0207
	(0.0675)	(0.0652)	(0.0642)	(0.0652)	(0.0635)
# risk factors	0.6419†	0.6063†	0.6146*	0.4239	0.4859
	(0.3522)	(0.3472)	(0.3064)	(0.3468)	(0.3069)
Sales 1991	0.0000	0.0000	–0.0000	0.0000	–0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Net income 1991	0.0001	0.0000	0.0001	–0.0000	0.0000
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
# of deals 1991	0.3337	0.4647	0.5495†	0.4417	0.5103†
	(0.3151)	(0.3152)	(0.2974)	(0.3092)	(0.2982)
Network size	0.4876*	0.3383†	0.2223	0.2296	0.1788
	(0.1932)	(0.1876)	(0.1940)	(0.1823)	(0.1910)
Market conditions	0.2007	0.1784	0.1055	0.2479	0.1737
	(0.1780)	(0.1750)	(0.1835)	(0.1657)	(0.1808)
Turnover	0.2197**	0.2101**	0.0756	0.2044**	0.1085*
	(0.0424)	(0.0410)	(0.0563)	(0.0414)	(0.0540)
Und. reputation	–0.3440*	–0.3766*	–0.3816*	–0.4791**	–0.4513**
	(0.1584)	(0.1578)	(0.1466)	(0.1683)	(0.1597)
Pre–IPO media vol.	–1.9815**	–2.0822**	–1.9923**	–2.3382**	–2.1944**
	(0.6972)	(0.6387)	(0.5621)	(0.5235)	(0.4912)
Pre–IPO media vol. sq.	2.2670**	2.1465**	1.6891**	2.0705**	1.7619**
	(0.6769)	(0.6177)	(0.5616)	(0.5640)	(0.5347)
Pre–IPO Media Tenor	0.4834	0.6404	0.3491	0.3716	0.2427
	(0.9039)	(0.8674)	(0.9628)	(0.8646)	(0.9324)
Pre–IPO Media Tenor Sq.	1.6730*	1.7449*	1.8194*	1.6927*	1.7628*
	(0.7482)	(0.7395)	(0.8825)	(0.7958)	(0.9059)

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Table 3 continued

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
Deal network embed.		2.8939*	–5.6214**	–15.2207*	–15.8411**
		(1.4421)	(1.9410)	(6.1442)	(5.5502)
DNE × turnover			0.1135**		0.0824**
			(0.0295)		(0.0262)
DNE × und. rep.				0.2183**	0.1513*
				(0.0739)	(0.0673)
Constant	14.7880	16.9464	24.4334†	29.3079*	30.9476*
	(12.4842)	(12.4170)	(12.6012)	(14.0914)	(13.8279)
Observations	225	225	225	225	225
R^2	0.39	0.41	0.45	0.45	0.47

† significant at $p < .10$; * significant at $p < .05$; ** significant at $p < .01$

hypothesis. The interaction between deal network embeddedness and turnover was positive and significant at $p < .01$. However, in order to fully test Hypothesis 2, I needed to determine if there was an inflection point in demand beyond which the positive interaction effect overwhelmed the negative main effect of DNE. Using the method described by Schoonhoven (1981), I used the coefficients reported in Model 3 to calculate the inflection point at which demand had no effect on underpricing. This inflection point occurred when turnover equaled 49.5 percent, which is at the 43rd percentile for turnover in this sample. In addition, Figure 2 graphs the interaction using values of one standard deviation above and below the mean as the high and low conditions for both DNE and turnover. The results of both of these analyses show that when demand is low, DNE is negatively associated with underpricing, but when demand is high it is positively associated. Hypothesis 2 is therefore supported.

Hypothesis 3 suggested that the negative relationship between underwriters' reputation and underpricing would diminish as DNE increases. The results

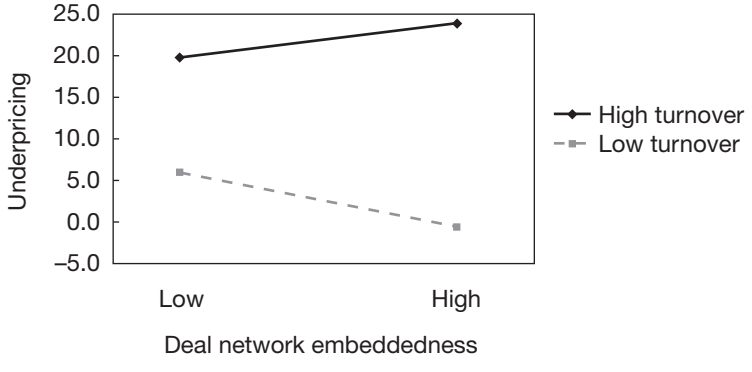

Figure 2 Deal network embeddedness × turnover

presented in Model 4 support this hypothesis. The interaction term between DNE and underwriters' reputation was positive and significant at $p < .01$. Using the coefficients reported in Model 4, I calculated the inflection point at which DNE has no effect on the relationship between underwriters' reputation and underpricing. A graph of the interaction is also presented in Figure 3. The inflection point occurred when DNE is 2.01, which is at the 85th percentile for this sample. As Figure 3 illustrates, if an underwriter has a high reputation and builds an extremely embedded deal network, the pressures to ensure a positive return for its embedded network partners can overwhelm its concerns for providing the offering firm with the highest price possible on its shares. However, in most cases, increasing levels of DNE only diminish the impact of underwriters' reputation on underpricing. Model 5 includes both interactions in the model simultaneously. The significant main and interaction effects observed in Models 3 and 4 remain robust in the fully specified model.

Discussion

Over the last 20 years the concept of social capital has become extremely popular in organization theory and sociology (Burt, 2000). Most of this research has tended to adopt either a strong-tie (Coleman, 1990; Krackhardt, 1992) or weak-tie (Burt, 1992; Granovetter, 1974) perspective, although some research has considered the value and impact of both kinds of ties simultaneously (Lin et al., 1981; Uzzi, 1996). In this study I extend the literature in this area by examining the issue of when strong and weak ties are likely to result in more beneficial outcomes, and who will receive the benefits or bear the costs. I explored this issue in the context of the mediated market for IPOs, where the underwriter brokering the transaction generally has weak ties with the IPO firms selling the stock, but may have strong ties with the investors purchasing the stock. To my knowledge there has been no research that has explored the relationship between

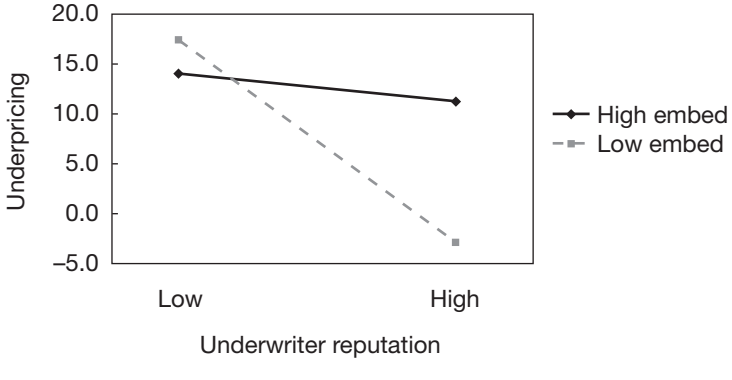

Figure 3 Underwriter reputation × deal network embeddedness

the networks of relationships an underwriter maintains with investors and IPO performance outcomes. The results of the analysis suggest that, all else being equal, IPO firms can benefit when underwriters have strong, embedded ties with investors, and that these benefits are greatest when demand for the offering is low. When demand for the IPO is high it is the repeat buyers, and not the offering firm, that benefit most from the strong-tie social capital in the deal network. The results of this study also demonstrate the complex nature of social resources, and suggest that a bank's concern with protecting its reputation can influence its market-making efforts when repeat buyers are involved in the transaction. These findings have significant implications for research on social capital, the influence of social structure on markets, and IPO research on reputation and underpricing.

Theoretical contributions of the study

One of this study's theoretical contributions is that it explicitly considers how variations in contextual factors can alter the relative value of different kinds of social ties. Prior research on social capital has not tended to take broader contextual factors into account. In this study I demonstrate that the degree to which strong ties with brokers can be beneficial or costly to buyers varies as a function of the demand for the asset exchanged. When demand is low, having strong ties with the broker can be costly, because the broker may be more likely to use the social capital available in the tie to increase the price of the asset, which benefits the seller. Conversely, when demand is high, having strong ties with the broker can provide privileged access and extra rewards to the buyers. One implication of this finding is that it suggests brokers can use their social capital to function as a kind of capacitor in volatile and uncertain markets, amplifying and dampening the effects of information and resource flows so that, at their extremes, market conditions are prevented from resulting in market failures. In other words, a broker's social capital may have a stabilizing influence on volatile and uncertain markets.

The importance of brokers' social capital in stabilizing markets is perhaps best illustrated by instances when its effectiveness breaks down. One example of this was during the latter stages and aftermath of the internet IPO market bubble during the late 1990s. One of the arguments made in this paper is that a broker's social capital will serve to ensure that it fulfills its fiduciary responsibilities to both the sellers and the buyers. The volatility and excesses observed in the IPO market at the end of the internet bubble were due in part to some underwriters abrogating their market-making responsibilities and succumbing to greed and hubris. Filling an important structural hole in the IPO market gave underwriters control over the allocation of a rare and valuable asset, that is, internet IPO stocks that could double or triple in value on the first day of trading. The power this advantaged position gave the underwriters in their relationships with investors temporarily overwhelmed some underwriters' concerns

with engendering reciprocal trust, and reduced the threats associated with enforced trust. As a result, they engaged in a variety of illegal activities with investors, such as tying arrangements, in which allocations of hot internet stocks were tied to the purchase of unrelated stocks at inflated commission rates, and laddering agreements, whereby investors agreed to purchase specific numbers of shares in an IPO on the open market in exchange for larger initial allocations. These types of activities have been held partially responsible for the extreme levels of underpricing and stock price volatility observed during this period, and are the subject of ongoing criminal and civil investigations (Labate and Luce, 2001; SEC vs. Credit Suisse First Boston, 2002). As a consequence, the IPO market suffered for some time. Although investors have recently become more willing to participate in IPOs (James, 2004), they are still very cautious regarding the IPOs they are willing to consider.

A second theoretical contribution of this study is the finding that the effects of reputation on underpricing are reduced as the proportion of embedded investors in a deal network increases. Prior research on the role of reputation in markets has not explored how the social-structural properties of a transaction can influence the impact of reputation on asset value. This study provides evidence that deploying one source of social capital can create self-protective concerns that limit the value of a different source of social capital. This suggests that focusing on single sources of social capital, or treating multiple sources of social capital in a purely additive manner, may only provide a partial picture of how these different resources intertwine to influence overall market functioning. Future research and theorizing should continue to explore the relationships among different sources of social capital and their effect on markets.

A final theoretical contribution of this study is that it demonstrates the benefits of adopting a strategic organizations approach to studying financial markets. As Baum et al. (2003) note, over the years the increasing specialization in our field has created a temptation in the management literature to counterpose economic and social accounts of market behavior in a mutually exclusive way. This creates the impression that the motivations of market actors can be easily segmented into economic and non-economic domains. The analysis presented here suggests that, although participants in mediated markets are likely to be initially motivated by rational self-interest, the social structure of the market that emerges via repeated transactions among actors over multiple deals create the conditions for the development of embedded relationships that can change the nature of market interactions (Granovetter, 1985) and help stabilize otherwise uncertain markets. In addition, as noted above, developing a greater understanding of a market's social structure can also help us to understand how and why markets can fail, leading powerful actors to corner resources in markets by engaging in unethical and illegal behaviors, and how such actions can damage the integrity of the market as a whole. Adopting a strategic organizations perspective allows for the conceptualization of a more coherent theory of IPO market activity that accommodates both economic and social forces, and

contributes to our understanding of how the social fabric of financial markets shapes and constrains the process of assigning value.

Contributions to practice

This study also has some significant implications for practitioners contemplating an IPO. First, this study suggests an additional characteristic of an underwriter – the nature of its relationships with investors, and the likelihood that it will deploy them on the firm's behalf – that the principals of a company should take into consideration during their selection process. If a company's leaders are reasonably confident that their IPO will be highly anticipated by investors, they may want to choose an underwriter that is less likely to include a large number of investors with whom it has embedded relationships in the deal network. However, if a company's leaders have reason to suspect that their offering is likely to be a difficult one, selecting an underwriter that possesses substantial strong-tie social capital that it is willing to deploy on the firm's behalf is the better choice. My findings also suggest that the conventional wisdom of hiring the underwriter with the best reputation possible needs to be tempered somewhat. The degree to which an underwriter's reputation will lead to a higher price for the offering will vary to the degree that the deal network includes a large proportion of embedded investors. Both the reputation of the underwriter and the nature of the deal network it is likely to construct must be taken into account when choosing who is to lead an IPO.

Future research directions

Like any study, this one leaves unanswered questions that create future research directions. One of these arises from the cross-sectional nature of the analysis. Although IPOs are cross-sectional events, the influence of the independent variables may change over time as the market evolves. For example, as different regulatory strictures are put in place, certain practices may be prohibited and others encouraged. Another potential issue associated with the cross-sectional nature of this study concerns the data used to construct the embeddedness measure. Although consistent with earlier research (Podolny, 1993, 1994), using only one year of data to determine the degree to which an underwriter and investor have an embedded transaction relationship may result in missing potential linkages between banks and investors who participated in transactions together in earlier years, but not in 1991. However, if a bank/investor pair truly has an embedded relationship it is unlikely that they would go a year without participating in any deals together. In addition, underwriters who are active in this market lead deals year after year. Therefore, if no linkages exist because the underwriter did not lead any offerings, it is unlikely that the underwriter would have more than an arm's-length relationship with investors. And if an underwriter did, in fact, have an embedded relationship with an investor before 1991,

but did not include the investor in any deal networks in 1991, it could be the case that the relationship had been terminated for some reason. As Uzzi (1997) has demonstrated, even embedded relationships can come to an end. Using only relationships from 1991 avoids the potential for overstating underwriter embeddedness with investors, and if anything understates the actual level of embeddedness, making this measure a conservative test of the hypotheses. However, future research examining multiple years should be conducted to determine the degree to which the relationships identified in this study are stable over time.

Another limitation associated with using only a single year of data is that the sample may not adequately reflect patterns of behavior that vary across hot and cold markets or other variations in market conditions that can only be captured by using longitudinal data collected over a number of years. However, as noted in the methods section, markets can grow hot and cold even in a single year, and the data for this sample show that even in 1992 there was substantial variation in market conditions. To the extent that variation in market conditions is restricted in this study, or market participants do not perceive that conditions have changed significantly and thus do not change their behaviors, the resulting lack of influence and variation in demand due to these factors may serve as a conservative test of the hypotheses. Nonetheless, future research conducted over longer periods of time and in other market contexts are necessary to fully explore the effect of variations in market conditions on the deployment of social capital.

A second future research direction arises from the role played in shaping pricing by third parties other than the underwriter. This includes auditors, attorneys, analysts and the SEC. A few studies in finance, for example, have examined the role of auditors' reputation in underpricing (Beatty, 1989; Balvers et al., 1988), under the assumption that a prestigious auditor certifies an offering as legitimate. Although their role in vetting the information provided in the offering prospectus is important and can help reduce investors' uncertainty, these actors do not play a direct role in valuation decisions, and thus their certifying role is outside the scope of this study. In addition, 94 percent of the companies in my sample used one of the Big Six (now Big Four) auditing firms, providing little meaningful variation along this dimension. However, future theorizing and empirical research may wish to explore the indirect role that these actors play in pricing by exploring such issues as their effect on underwriter selection and in shaping the broader institutional environment of a deal.

A third future research direction arises from the use of an *ex post* measure (turnover on the first day of trading) to operationalize demand for the offering. One possible limitation of using an *ex post* measure is the potential for reciprocal influences between the independent and dependent variables. Although the percentage of shares traded can influence underpricing, it is also possible that the price or amount of underpricing a stock experiences can influence subsequent demand. While a comprehensive *ex ante* measure of demand would be desirable

and limit the potential for reciprocal influences, the data necessary to create such a measure across a large number of banks are difficult, if not impossible, to obtain (Cornelli and Goldreich, 2001). Nonetheless, future research should continue to explore this issue in greater detail, perhaps in other market contexts where the data to operationalize an *ex ante* measure of demand are more readily available.

Another potential limitation associated with using turnover is that it is a single indicator which serves as a proxy for a variety of factors that can influence demand. However, I control for a number of these factors separately in the model. In addition, in analyses not reported here I created an instrumental variable for turnover by regressing turnover on market performance, the industry dummy variables, underwriters' reputations and dummy variables indicating the quarter in which the IPO occurred. The results of the analyses using the instrumental variable were unchanged. Research should continue to explore this issue and consider how particular environmental factors or features of transactions affect the relationship between demand, DNE and transaction outcomes.

A fourth future research direction arises from venture capitalists' (VC) involvement with some IPO firms. In this study I have assumed that sellers have weak ties with the brokers, but I do not test this assumption directly. Indeed, over time venture capitalists invest in many companies that go public, and thus may have the opportunity to develop relationships with particular investment banks. As a consequence, VCs may also possess embedded relationships that may affect underpricing. However, it is unclear what a VC's pricing preference may be, and thus it may be difficult to observe patterns of central tendency based on their involvement. For example, if a VC intends to cash out some or all of its stock via the IPO, it will wish to see the initial price set as high as possible, minimizing underpricing. However, if the VC does not intend to liquidate its position until some later point in time (due to a lock-up provision that prevents it from selling, or for some other reason), it might prefer that the stock experience more substantial underpricing in order to stimulate investors' attention on the stock that can enhance the value of the offering once the lock-up expires. In addition, scholars have suggested that some VC's will grandstand (Gompers, 1996; Lee and Wahal, 2004), using higher levels of IPO underpricing as a mechanism to attract investments in their next venture capital fund. These studies suggest that smaller and younger venture capital firms may be more likely to use underpricing in this way. Thus, it is not clear how VCs would try to use their embedded relationships to influence underwriters. It is also unclear how underwriters would react if they have embedded ties with both VCs and investors and both sets of actors were making conflicting sets of demands. Future research should continue to expand the range of network relationships considered in determining how social structure affects market outcomes and explore these issues in greater detail.

Finally, this study only focuses on one important market outcome, the underpricing of the IPO. Another important outcome under the control of

the underwriter is the allocation of shares among investors. Prior research in finance (Carter and Dark, 1993; Hanley and Wilhelm, 1995) suggests that investment banks may act strategically when determining the size of a particular allocation, as well as when deciding who receives allocations of this often scarce and valuable resource. Future research on IPOs and mediated markets in general should continue to explore how market mediators identify and involve particular buyers, and how their reputations, embedded networks and power to allocate desired resources intertwine to shape the dynamics of mediated markets.

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Notes

1 Although firms can conduct secondary offerings of stock, the secondary market is in many ways different from the IPO market. For example, the information about the company based on its history of stock price performance and active trading in the stock continues throughout the offering process. In addition, investors can gain additional information via required public filings, executives' quarterly conference calls with analysts and the activities of companies' investor relations departments. Thus, although a firm can conduct many offerings of stock, it only goes public once. In addition, research (Welch, 1989) suggests that the majority of firms that go public never conduct a secondary stock offering.

2 It is possible that IPO firm executives or financiers, such as venture capitalists, may have a prior relationship with an underwriter. However, as will be discussed in greater detail later in the article, it is not immediately clear what these actors' preferences are likely to be. In addition, to the extent that this assumption is violated in the data, it may serve to make the analysis a conservative test of the hypotheses, because the VCs would be putting countervailing pressures on the underwriter to set a higher stock price, which would result in less underpricing.

3 The logic underlying this hypothesis assumes that underwriters uphold their fiduciary responsibilities. At times, however, underwriters may stand to benefit even more from an offering if they and the investors engage in illegal practices such as tying arrangements that provide kickbacks to the underwriter. The implications of the potential for such practices are addressed in the discussion section below. However, it is assumed here that such behaviors are not the norm.

4 A variety of factors can affect the demand for an offering, including the characteristics of the firm being taken public, the attractiveness of the industry (Gutterman, 1991; Ritter, 1984), the characteristics of the underwriter leading the offering (Carter and Manaster, 1990), and general market conditions (Ibbotson and Jaffe, 1975; Ritter, 1984). Rather than attempting to develop hypotheses regarding each of these characteristics, I control for these various underlying factors and use a more direct measure of investor demand to test hypothesis 2. Demand can capture the effects of differing levels of investor uncertainty, which has been

explored as a moderating factor in other recent research (Gulati and Higgins, 2003), as well as the effects of those aspects of an offering that can affect pricing about which investors may feel reasonably certain.

5 The alternative is to conduct a 'best efforts' offering, whereby the underwriter agrees to make its best effort in selling all of the shares, but the offering firm bears the risk that the offering will not be fully subscribed.

6 Although data on institutional investor holdings at the time of the IPO would have been preferable, these data are not publicly available. The best data available are on institutional shareholdings at the end of the quarter in which a company goes public. However, prior research suggests that the overwhelming majority of institutional investors that purchase shares at IPO still hold these shares at the end of the quarter in which a company goes public (Hanley and Wilhelm, 1995).

7 While measures such as indications of interest from institutional investors prior to the IPO might be preferable as a measure of market demand, this information is not publicly available, and is closely guarded by investment banks. In addition, it does not necessarily reflect the demand that may exist among individual investors, who vie with institutional investors for shares in the offering once the stock begins public trading.

8 Some of the investors receiving initial allocations may continue to hold on to their shares once the stock begins trading, resulting in a restriction in the number of shares available for trade and limiting the ability to observe higher turnover. Observing high turnover under these conditions will be due to active trading in the restricted set of shares, making turnover a conservative indicator of market demand.

9 In analyses not reported here the initial offering price and total number of shares offered were included separately as controls. The results of the analysis did not change.

10 In analyses not reported here OLS regressions were re-run excluding the industry dummies, instead of using a robust standard error specification clustering on 2-digit SIC codes. The results of the analysis did not change.

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