

## **Cutting The ‘Gordian Knot’: Director Ownership, Underpricing, And Stock Liquidity In IPO Firms**

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Initial public offering (IPO) activity has increased over the years (Reuer and Shen, 2003). Globally, between 2005 and 2011, firms raised \$1.36 trillion from 9,067 IPOs (Ernst and Young Report, 2012). In the United States alone, IPO proceeds amounted to \$315 billion from 1,187 offerings during 2001-2012 (Ritter, 2013). Scholars have largely focused on the complexities that owners of these private firms face when they go public, such as the differing goals of multiple actors (like venture capitalists, underwriters, IPO firm’s board of directors, and investors) and the information asymmetry and uncertainty that accompany a new issue (Arthurs *et al.*, 2008; Ritter and Welch, 2002). Several streams of research attempt to address these complexities and their effects on IPO performance using corporate governance, upper echelons, social influence, and innovation perspectives (Certo *et al.*, 2009).

Specifically, the corporate governance perspective suggests that the IPO provides an important context to understand the implications of governance mechanisms such as board structures, ownership, and compensation patterns for post-IPO performance. One short-term measure that has been widely studied in both the management and finance literatures (e.g., Arthurs *et al.*, 2008; Certo *et al.*, 2003; Ritter and Welch, 2002) is underpricing, or the decision to set an offer price lower than the expected closing price of the issue after the first day’s trading, which results in a transfer of wealth from pre-IPO owners to first-day investors. Arthurs *et al.* (2008), for example, find that IPO underpricing can be curbed when board insiders monitor the process, thereby reducing the amount of money left on the table.

This study employs a signaling perspective to add to the corporate governance literature on IPOs. Its first contribution to this literature is to introduce stock liquidity, or the ease of trading a security (Amihud and Mendelson, 1988), as an important but hitherto ignored measure of IPO performance. This is relevant because “going public is the most fundamental form of increasing liquidity” (Amihud and Mendelson, 1988: 8). Liquidity reflects the presence of continuous trading and a balance in the number of buyers and sellers in capital markets at a given time (Demsetz, 1968). There are

countless advantages of having a liquid stock. Stock liquidity associated with trading has an important role in empirical asset pricing, market efficiency, and corporate finance (Goyenko *et al.*, 2009). Liquidity reduces the transaction costs of future equity issues (Ibbotson and Ritter, 1995), decreases required returns while increasing firm value (Amihud and Mendelson, 1986), and allows IPO investors to enhance the value of their equity holdings (Brau and Fawcett, 2006). Liquidity in equity markets helps incorporate more information into stock prices (Holmstrom and Tirole, 1993) and also enables investors to build large positions (Maug, 1998), thereby increasing the effectiveness of external governance mechanisms such as takeovers and proxy contests (Tadesse, 2004). Liquidity also enables pre-IPO owners to cash out of the business when they want to. This study thus adds to the IPO literature by introducing stock liquidity as an important dependent variable.

The current study also adds to the board ownership literature at IPOs. Governance research in the IPO context has examined how underpricing is influenced by board ownership structures (e.g., Arthurs *et al.*, 2008). Previous research also finds that large owners have access to private, value-relevant information gained by monitoring, which is associated with reduced stock liquidity (Heflin and Shaw, 2000; Schnatterly *et al.*, 2008). This paper integrates these two streams of research and applies them in the IPO context to argue that very high board ownership can be a double-edged sword. Specifically, it finds that while the immediate underpricing problem can be resolved when outside directors' pre-IPO holdings are large, the latter is also associated with reduced post-IPO liquidity. However, no significant association is found between inside director equity and liquidity, a finding that is explained later.

Finally, this study adds to the underpricing literature at IPOs by highlighting a potential *benefit* of underpricing. Current IPO studies in management focus on how governance structures can be designed to reduce the losses arising out of underpricing. In other words, these studies look at underpricing as a cost that needs to be curtailed by "leaving less money on the table." This study, by finding a strong positive relation between underpricing and post-IPO stock liquidity, instead highlights a "positive" implication of underpricing. This finding potentially explains why IPO underpricing continues to persist despite good internal governance, and offers a more nuanced understanding of the underpricing choices pre-IPO owners face.

The rest of the paper proceeds as follows. The following two sections apply a signaling perspective to develop theory and hypotheses that link board ownership, underpricing, and liquidity. The subsequent section describes the data and sample, measures, and analyses. This is followed by a presentation of the main results and a discussion of the results. The concluding section includes practical implications of the study, its limitations, and avenues for future research.

## THEORY

Signaling theory (Akerlof, 1970; Heil and Robertson, 1991; Spence, 1973, 1974) is used here as the theoretical frame of reference. Signals are defined as "those observable characteristics attached to the individual that are subject to manipulation by him" (Spence, 1973: 357). In other words, signals should be both observable and alterable. Powerful signals create a "separating equilibrium," whereby only high-quality firms obtain increased pay-offs from pursuing a signaling strategy (Spence, 1973). Signals also

improve the visibility of the IPO firm among investors, analysts, and the media (Pollock and Gulati, 2007), and are used by the investing public to form the basis for firm reputation (Fombrun and Shanley, 1990). Signals often involve certification by third parties after a detailed and exhaustive due-process examination (Ndofor and Levitas, 2004). Finally, IPO firms can use signals to obtain “strategic legitimacy” (Higgins and Gulati, 2006).

The use of signals to address problems of information asymmetry typical of IPOs has been quite popular in that research stream (Brau and Fawcett, 2006; Leland and Pyle, 1977; Sanders and Boivie, 2004). Specifically, studies have looked at signaling using corporate governance mechanisms like stock-based incentives (Sanders and Boivie, 2004), board structures (Arthurs *et al.*, 2008; Certo, 2003), and ownership (Certo *et al.*, 2003). Other signaling research has used perspectives like upper echelons (e.g., signaling by top management team – Higgins and Gulati, 2006), social influence (e.g., signaling by venture capitalists, investment banks, and alliance partners – Stuart *et al.*, 1999), and innovation (e.g., signaling by R&D expenditures and patents – Heeley *et al.*, 2007). Indeed, both retained director equity and underpricing have conventionally been considered to be important signals at the time of an IPO. As Grinblatt and Hwang mention in the abstract of their widely-cited article, “both the fraction of the new issue retained by the issuer and its offering price convey to investors the unobservable “intrinsic” value of the firm and the variance of its cash flows.” (1989: 393).

Now, managerial ownership in general signals a re-alignment of the divergent interests of owners and managers (Jensen and Murphy, 1990). Director ownership, in particular, is seen as a key signaling mechanism during an IPO (Downes and Heinkel, 1982). Retained director ownership at IPO is usually seen as a positive signal that reduces underpricing (Certo *et al.*, 2003), improves post-IPO operating performance (Jain and Kini, 1994), and provides greater legitimacy to the IPO firm (Higgins and Gulati, 2006). However, retained director equity may not always convey a signal of quality, and may, at very high levels of ownership, actually become a negative signal that points to entrenched, risk-averse IPO insiders (cf. Connelly *et al.*, 2010; Morck *et al.*, 1988; Wright *et al.*, 1996).

Coming to underpricing, Allen and Faulhaber (1989) suggest that it acts as a signal for high-quality IPO firms, which are able to recoup the costs associated with this signal through subsequent seasoned offerings. It helps to attract uninformed investors who otherwise fear the “winner’s curse,” i.e., ending up with all the unattractive shares while competing with the informed for the attractive offerings (Rock, 1986). The effects of the underpricing signal persist in the post-IPO period, usually resulting in an over-subscription of future offerings (Brennan and Franks, 1997; Pollock and Gulati, 2007) and a higher number of analysts following the IPO firm (Rajan and Servaes, 1997). The underpricing signal is also highly visible as it entails an extreme price reaction that attracts initial investor attention and leaves a sweet taste in their mouths (Welch, 1989).

## HYPOTHESES

Director ownership is seen as an important signaling mechanism that reduces agency costs for IPO firms (Downes and Heinkel, 1982). For example, ownership may signal greater board legitimacy, which enables firms to influence investor perceptions and raise the required capital (Higgins and Gulati, 2006), because investors are more

willing to buy IPO shares backed by the equity commitment of board members. IPO directors who hold large ownership stakes also signal their greater ability and incentive to monitor investment banks, thereby reducing the money left on the table due to underpricing (Arthurs *et al.*, 2008). Equity ownership is also a signal of psychological attachment to the organization, and the alignment of owner interests with firm interests (Jensen and Meckling, 1976).

*Inside* directors are seen to have expert firm-specific knowledge and are perceived to be innovative and insightful with regard to directing firm strategy. For example, Kroll *et al.* (2007) argue that board insiders with ownership send out the signal that they possess valuable tacit knowledge regarding the IPO venture, and therefore the ability (due to knowledge) and the incentive (due to ownership) to monitor. Baysinger and Hoskisson (1990) point out that inside directors are seen to have a clearer understanding of environmental uncertainty and the intrinsic worth of the firm, and therefore a better ability to assess the value of the newly floated enterprise. Along these lines, Certo *et al.* (2001) discuss the signaling role of inside directors with equity in reducing underpricing in founder-managed firms, arguing that investment banks do not apply any founder bias discount (which increases underpricing) to insider-dominated boards. Therefore, it is likely that greater inside director equity will be associated with lesser underpricing.

Similar to inside directors, *outside* directors with equity stakes send a strong signal to potential IPO investors about their financial incentives and identification with the IPO firm that make them more vigilant monitors (Filatotchev and Bishop, 2002). Similar to inside directors, their presence provides a strong signal of firm quality, thus enhancing the credibility of the IPO firm. For example, Anderson *et al.* (2004) argue that external parties such as creditors rely more on the financial statements of firms with mostly independent directors, and this credibility should give IPO firm management greater bargaining power in its dealings with underwriters (e.g., for the underpricing decision). Also, as with inside directors, outside directors cannot sell their stake and exit the IPO firm before the expiry of the lock-up period.<sup>1</sup> Finally, outside directors' experience, resource-acquisition abilities, and reputation may act as signals of overall board quality, resulting in reduced underpricing.

Integrating these ideas, the following hypothesis is suggested:

*Hypothesis 1: Greater inside director equity and greater outside director equity are associated with lower underpricing.*

The obvious benefits of liquidity mean the objective of pre-IPO owners in any post-IPO setting is to ensure greater stock liquidity (Pham *et al.*, 2003). Many factors could influence liquidity, such as firm age, firm size, and performance, etc., but here the focus is on underpricing, which is unique and specific to the IPO context. Underpricing should have implications for liquidity both in the short and long-term. That is because liquidity begets liquidity; higher initial liquidity attracts more investors and results in persistently higher levels of liquidity in the long run.

There are several mechanisms through which underpricing affects stock liquidity. First, the underpricing signal mitigates the IPO firm's lack of legitimacy (Pollock and

<sup>1</sup> The lock-up period is a provision common to most IPOs that specifies that directors and other owners cannot sell their shares in the open market before a certain time after IPO, usually six months.

Rindova, 2003) and provides an incentive that attracts uninformed investors who might otherwise fear the winner's curse due to the high-level of information asymmetry in IPO firms (Rock, 1986). While underpricing cannot remove the allocation bias against uninformed investors (since the informed still buy the most underpriced offerings), the uninformed can now expect, on average, to at least break even (Jenkinson and Ljunqvist, 2001). Therefore, in the short run, both informed and uninformed investors are attracted by this signal, resulting in higher post-IPO stock liquidity.

Second, underpricing signals an extreme initial price reaction that is highly visible to investors. These high initial returns not only send signals about underlying firm quality to uninformed investors, but also leave a sweet taste in their mouths (Allen and Faulhaber, 1989; Welch, 1989). This results in positive investor sentiments in the early days after an IPO and creates enthusiasm about the firm that can last in the long-run due to the "cascades" effect that operates in IPO markets (Pollock *et al.*, 2008). The cascades perspective on social influence in IPO markets suggests that later investors exhibit a herd mentality by following their early peers' investment decisions irrespective of peer status, either to gain a fragile information advantage ("information cascades"), or to reduce cognitive effort by relying on a subset of information that is widely available to the majority ("availability cascades") (Pollock and Gulati, 2007; Pollock *et al.*, 2008). This suggests that early investor interest created by the underpricing signal generates a self-sustaining pattern of long-term demand that ensures continued high stock liquidity in the post-IPO period.

The underpricing signal also ensures oversubscription of shares (Brennan and Franks, 1997), and so current owners can discriminate against large applicants in the allocation process and ensure a dispersed ownership pattern. Greater breadth and diffusion lead to active post-IPO trading and increased liquidity (Booth and Chua, 1996). Reese (1998) argues that underpricing incentivizes potential investors to reveal their honest interest in the offering, and finds that underpriced IPOs have significantly higher trading volumes well after the IPO.

Finally, the underpricing signal induces greater analyst following (Rajan and Servaes, 1997), likely triggering greater coverage among other analysts via information cascades (Rao *et al.*, 2001). The role of analysts as information intermediaries who legitimize the firm, act as product critics, reduce transaction risks, and eventually facilitate market exchange and stock liquidity, is particularly important in mediated markets such as IPOs that are characterized by knowledge asymmetries, high search costs, and increased opportunism (Pollock, 2004; Pollock and Rindova, 2003). These arguments lead to the following hypothesis:

*Hypothesis 2: Greater IPO underpricing is associated with higher post-IPO stock liquidity.*

In an IPO, undiversified pre-IPO owners, such as inside and outside directors with equity, are likely to possess greater value-relevant private information than diversified investors like institutional owners (Lakonishok and Lee, 2001). Furthermore, director ownership at IPO is typically much higher than it is for publicly traded firms (Corwin *et al.*, 2004). This combination of access to private information and high ownership levels becomes particularly relevant in the unique information asymmetry context of the IPO,

and motivates scholars to focus attention on the intended and unintended signaling effects of pre-IPO director ownership.

Research indicates that block ownership reduces stock liquidity (Bolton and Thadden, 1998; Heflin and Shaw, 2000; Schnatterly *et al.*, 2008). This reduction in stock liquidity occurs because block ownership can change the firm's information environment, or its trading activity level, or both (Brockman *et al.*, 2009).

IPO firms suffer from the liability of market newness as there is little publicly available information about firm quality and prospects. In this information asymmetric setting, when IPO inside directors are large owners, it signals access to private value-relevant information, and market-makers react to the possibility of loss when dealing with these informed owners by increasing bid-ask spreads (which are a proxy for information risks) (Glosten and Milgrom, 1985). Given the key role of market-makers in IPO markets as transactional intermediaries (Pollock *et al.*, 2004), such actions result in increased transaction costs, reduced market exchange, and an impairment of stock liquidity. Therefore, high director ownership in an information asymmetric setting such as the IPO signals possession of private information, which makes risk-averse market intermediaries increase the cost of transacting, reducing post-IPO stock liquidity.

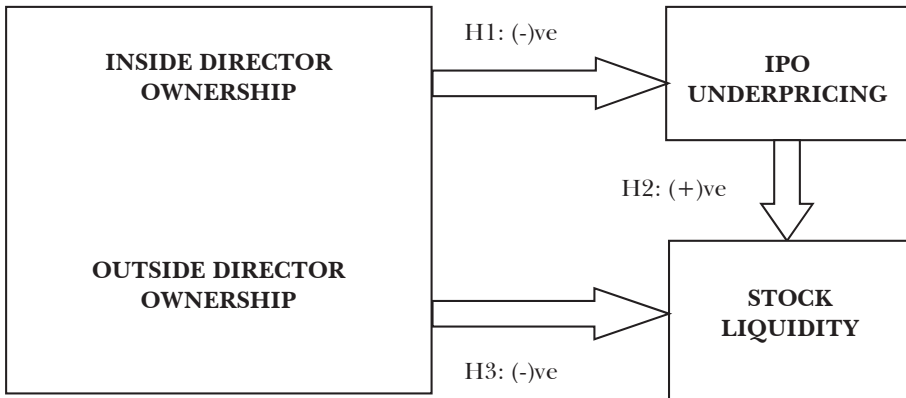
Greater director ownership also reduces the IPO firm's trading activity (in terms of trading volume, turnover, number of trades, and trade size) relative to a diffusely owned firm (Brockman *et al.*, 2009). If a significant number of shares are not in play, the trading costs increase as these costs are now spread over fewer trades, reducing stock liquidity (Rubin, 2007; Stoll, 2000). Along similar lines, Bolton and Thadden (1998) suggest that when firms have concentrated ownership (e.g., a controlling block), it reduces the number of shareholders who trade in the firm's stock, which too reduces stock liquidity. In sum, IPO firms with large director ownerships experience reduced stock liquidity, due either to the cautious reactions of market-makers when dealing with informed insiders, and/or due to reduced trading activity, which leads up to the following hypothesis:

*Hypothesis 3: Greater inside director equity and greater outside director equity are associated with lower post-IPO stock liquidity.*

The integrated model resulting from these three hypotheses is presented in Figure 1, and then empirically tested in the following sections.

Figure 1

## Relationships among Board Ownership, IPO Underpricing, and Stock Liquidity



## METHODS

## Data and Sample

Data is primarily hand-collected from the EDGAR database that contains the prospectuses filed with the Securities and Exchange Commission (SEC) by the 493 firms that undertook IPOs in the U.S. between 2001 and 2004. This is supplemented with data from Compustat and the Center for Research in Security Prices (CRSP), both of which are available via the Wharton Research Data Services (WRDS) database. Other data sources include Jay R. Ritter's website (Ritter, 2013), FactSet, and the 13F filings within the Thomson Financial database in WRDS. Seventy-six firms in the sample had missing data, which yielded a final sample of 417 firms.

The sample years, which avoid the bubble years of 1999-2000, are fairly representative of a typical IPO year for several reasons. First, the annual average number of IPO issues during the 2001-2004 period is a little more than a hundred, which is significantly lower compared to the ten years or so preceding 2001 (which is expected, given the "bubble" years leading up to 2001), but very similar to the annual average of around one hundred during the 2005-2012 period. More importantly, the characteristics of individual IPO issues were also not much different. For example, the mean underpricing for the current sample (2001-2004) is 26 percent, comparable to the mean underpricing of around 22 percent between 1990 and 2013 (Ritter, 2013). For three-year buy-and-hold returns too, this sample (with an average buy-and-hold return of 43 percent) is comparable to periods like 1990-1994 (with an average of 46 percent) but not to the bubble period of 1999-2000 (average loss of 53 percent). The sample composition is also fairly representative of the larger population of US IPOs. For example, technology IPOs constitute 36 percent of all IPOs during the entire 1980-2010 period; the corresponding figure for 2001-2004 is 32 percent. Similarly, the percentage

of IPOs that are backed by venture capital was 35 percent in the 1980-2010 period, and 37 percent in this sample. Thus, the current sample is fairly representative of the population of IPOs in terms of annual average issues, issue composition, and the return characteristics of the average IPO.

### Dependent Variables

*Underpricing.* This is the first dependent variable, defined as the first-day closing price less the offer price, divided by the offer price (Certo *et al.*, 2003). *Liquidity.* Following Amihud (2002), an illiquidity (i.e., inverse of liquidity) measure is computed (Amihud, 2002; Goyenko *et al.*, 2009). This is a low-frequency (e.g., daily) price impact proxy that shows the absolute (or percentage) price change per dollar of daily trading volume, defined as  $Illiquidity = Average [ |r_d| / Volume_d ]$ , where  $|r_d|$  is the absolute return on a stock on day  $d$ , and  $Volume_d$  is the daily volume in dollars. Illiquidity is calculated using daily stock returns and dollar volumes for all “trading” days during each of the three years starting the day after the date of the IPO (i.e., days 1-250, 251-500, and 501-750 - see Appendix A for an illustration). For greater clarity when presenting the tables, liquidity is used instead of illiquidity (where  $liquidity = 1 / illiquidity$ ).

### Independent Variables

Three independent variables are used to test the hypotheses. *Inside director equity* indicates the proportion of total shares owned by the inside directors at the time of the IPO. *Outside director equity* is the proportion of total shares owned at the time of the IPO by outside directors, that is, directors who are not executives of the company. Following Arthurs *et al.* (2009), affiliated directors (relatives, customers, former employees, lawyers, bankers, and suppliers) are excluded from the definition of outside directors.<sup>2</sup> *Underpricing* (which is a dependent variable) is also used as an independent variable in Table 3.

### Control Variables<sup>3</sup>

*Firm size.* This is the natural logarithm of assets of the IPO firm (Arthurs *et al.*, 2008) and is obtained from Compustat. The greater information typically available about larger firms reduces information asymmetry, affecting both underpricing and liquidity. *Firm age.* Older firms usually perform better than younger firms, both prior to and after an IPO. Firm age is calculated as the difference in years between the date of IPO and the firm’s founding date. *Risk factors.* These are risks that may affect post-IPO firm value.

<sup>2</sup> The sample therefore comprises two types of outside directors: venture-backed and non-venture-backed. Venture-backed outside directors either own or have full voting power for the shares held by the venture capital firm. Following Baker and Gompers’s (2003) definition of outside directors as comprising quasi-outside directors (similar to affiliated directors, who are excluded) and truly independent outside directors (including public and professional directors, private investors, and venture capitalists), both venture-backed and non-venture-backed outside directors are classified as outside directors, and the sum of their combined ownership stakes is used to calculate outside director ownership (see also Kroll *et al.*, 2007).

<sup>3</sup> While most control variables are common to both “underpricing” and “liquidity,” the “mean (post-IPO) market return” control variable does not influence underpricing, and is therefore excluded in the underpricing model (Table 2).



Following Welbourne and Andrews (1996), a summated scale that runs between 1 and 11 is used. These reflect eleven risk factors that include new products, limited years of operation, inexperienced management, etc. *Firm performance*. Return on assets is used as a proxy for firm performance (Michaely and Shaw, 1995). Since performance can be negative, instead of taking the natural log the top and bottom one percent values are winsorized in order to deal with outliers. *Dilution*. This is a measure of investor optimism that captures such aspects as intangible assets that drive a wedge between the book value and the market value of a firm's stock (Rasheed *et al.*, 1997). This affects the amount of underpricing (Arthurs *et al.*, 2008) and is measured as the difference between offer price and book value, scaled by the offer price (Bruton *et al.*, 2010).

*Underwriter reputation*. Underwriter reputation signals the quality of the IPO issue, affecting investor demand and post-IPO performance (Brau and Fawcett, 2006; Loughran and Ritter, 2004). Underwriter reputation scores are based on the index developed by Carter and Manaster (1990) and Carter *et al.* (1998). When an underwriter reputation ranking for a year is unavailable, the ranking for the immediately preceding year is used. *Leverage*. Debt limits managerial discretion, reduces agency problems by acting as a disciplinary mechanism (Jensen and Meckling, 1976), and therefore influences post-IPO performance (Rasheed *et al.*, 1997). Leverage, defined as the ratio of total debt to total assets, is therefore the next control variable. *Founder on board*. Both underpricing and post-IPO performance may be affected by the presence of the founder on the board (Certo *et al.*, 2001; Fahlenbrach, 2009). Using an indicator variable to denote founder status is common in both management and finance research (Anderson and Reeb, 2003; Certo *et al.*, 2001). A variable that equals 1 if the founder is on the board at the time of IPO, 0 otherwise, is therefore constructed. *Technology dummy*. Performance may vary by industry technological intensity (Lowry and Murphy, 2007), and to account for this, high technology industries are denoted using a dummy variable.<sup>4</sup>

*Market returns*. Stock liquidity and market returns are closely related (Amihud, 2002), and therefore this study controls for market returns using the returns, including all distributions, on a value-weighted market portfolio. *Board size*. Board size affects short-term IPO performance and is therefore used as a control variable (Finkle, 1998). *Blockholders*. This represents the total ownership of blockholders other than institutional owners (comprising venture capitalists and angel investors that are not directors). *Largest institutional investor*. The ownership percentage of the largest institutional investor (comprising mutual funds, pension funds, banks, etc.) is also controlled for, in line with studies (e.g., Schnatterly *et al.*, 2008) that point out that it is only the largest institutional investor that holds a significant information advantage that may affect bid-ask spreads and stock liquidity. *All other institutional investors*. Again, following Schnatterly *et al.* (2008), the total ownership of all other institutional investors is used as a separate control variable. *Year and industry fixed effects*. Dummy codes that represent the firm's one-digit SIC classification are used to control for industry (Barth *et al.*, 1999), while the year fixed effects are accounted for by including four year dummies.

<sup>4</sup> Following Loughran and Ritter (2004), high technology industries are defined as industries with SIC codes 3571, 3572, 3575, 3577, 3578 (computer hardware), 3661, 3663, 3669 (communications equipment), 3671, 3672, 3674, 3675, 3677, 3678, 3679 (electronics), 3812 (navigation equipment), 3823, 3825, 3826, 3827, 3829 (measuring and controlling devices), 3841, 3845 (medical instruments), 4812, 4813 (telephone equipment), 4899 (communications services), and 7371, 7372, 7373, 7374, 7375, 7378, and 7379 (software).

Table 1  
Descriptive Statistics and Correlations

| Variable                          | Mean  | S.D.  | 1     | 2     | 3     | 4     | 5     | 6     | 7      | 8     | 9     |
|-----------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|--------|-------|-------|
| Underpricing                      | 0.26  | 0.69  | 1     |       |       |       |       |       |        |       |       |
| Liquidity1 (year1) (log)          | 3.84  | 1.81  | 0.22  | 1     |       |       |       |       |        |       |       |
| Liquidity (year 2) (log)          | 3.99  | 1.88  | 0.24  | 0.97  | 1     |       |       |       |        |       |       |
| Liquidity (year 3) (log)          | 4.12  | 1.93  | 0.25  | 0.95  | 0.99  | 1     |       |       |        |       |       |
| Firm size (log)                   | 4.98  | 2.01  | 0.08  | 0.49  | 0.49  | 0.51  | 1     |       |        |       |       |
| Firm age                          | 19.62 | 25.94 | 0.09  | 0.20  | 0.21  | 0.22  | 0.44  | 1     |        |       |       |
| Risk factors                      | 4.79  | 1.39  | -0.06 | -0.06 | -0.09 | -0.09 | -0.09 | -0.04 | 1      |       |       |
| Firm performance                  | 0.75  | 20.38 | 0.13  | 0.37  | 0.38  | 0.38  | 0.28  | 0.20  | -0.012 | 1     |       |
| Dilution                          | 0.73  | 0.50  | 0.19  | 0.10  | 0.01  | 0.13  | -0.04 | 0.04  | 0.04   | 0.15  | 1     |
| Underwriter reputation            | 7.96  | 1.52  | 0.03  | 0.45  | 0.44  | 0.44  | 0.35  | 0.15  | 0.02   | 0.12  | 0.14  |
| Leverage                          | 0.27  | 0.62  | -0.03 | 0.07  | 0.05  | 0.02  | -0.03 | -0.01 | -0.02  | 0.12  | 0.07  |
| Founder on board                  | 0.46  | 0.50  | -0.06 | -0.17 | -0.18 | -0.18 | -0.35 | -0.33 | 0.14   | -0.12 | -0.01 |
| Technology dummy                  | 0.23  | 0.42  | -0.11 | -0.12 | -0.15 | -0.15 | -0.30 | -0.14 | 0.06   | -0.04 | -0.01 |
| Market returns                    | 0.001 | 0.002 | 0.08  | 0.01  | -0.01 | -0.01 | -0.01 | 0.04  | -0.01  | 0.03  | 0.10  |
| Board size                        | 7.30  | 2.28  | -0.01 | 0.12  | 0.13  | 0.14  | 0.31  | 0.25  | 0.01   | -0.02 | -0.14 |
| Blockholders                      | 14.09 | 14.86 | 0.06  | 0.01  | 0.01  | 0.01  | 0.04  | -0.04 | 0.05   | 0.02  | 0.12  |
| Largest institutional investor    | 8.16  | 9.77  | 0.05  | -0.11 | -0.10 | -0.11 | 0.06  | 0.04  | -0.03  | 0.06  | 0.13  |
| All other institutional investors | 38.94 | 22.34 | 0.08  | 0.23  | 0.23  | 0.23  | 0.23  | 0.11  | -0.04  | 0.14  | 0.01  |
| Inside director equity            | 12.70 | 23.74 | -0.10 | -0.11 | -0.10 | -0.11 | -0.22 | -0.13 | 0.07   | 0.05  | 0.05  |
| Outside director equity           | 20.17 | 35.16 | -0.12 | -0.12 | -0.11 | -0.11 | -0.14 | -0.06 | -0.03  | -0.04 | 0.26  |

Table 1 (continued)

| Variable                          | 10    | 11    | 12    | 13    | 14    | 15    | 16    | 17    | 18    | 19    | 20 |
|-----------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----|
| Underpricing                      |       |       |       |       |       |       |       |       |       |       |    |
| Liquidity1 (year1) (log)          |       |       |       |       |       |       |       |       |       |       |    |
| Liquidity (year 2) (log)          |       |       |       |       |       |       |       |       |       |       |    |
| Liquidity (year 3) (log)          |       |       |       |       |       |       |       |       |       |       |    |
| Firm size (log)                   |       |       |       |       |       |       |       |       |       |       |    |
| Firm age                          |       |       |       |       |       |       |       |       |       |       |    |
| Risk factors                      |       |       |       |       |       |       |       |       |       |       |    |
| Firm performance                  |       |       |       |       |       |       |       |       |       |       |    |
| Dilution                          |       |       |       |       |       |       |       |       |       |       |    |
| Underwriter reputation            | 1     |       |       |       |       |       |       |       |       |       |    |
| Leverage                          | -0.12 | 1     |       |       |       |       |       |       |       |       |    |
| Founder on board                  | -0.14 | 0.05  | 1     |       |       |       |       |       |       |       |    |
| Technology dummy                  | 0.05  | -0.12 | 0.15  | 1     |       |       |       |       |       |       |    |
| Market returns                    | -0.07 | -0.08 | 0.01  | 0.01  | 1     |       |       |       |       |       |    |
| Board size                        | 0.16  | -0.12 | -0.16 | -0.06 | -0.01 | 1     |       |       |       |       |    |
| Blockholders                      | 0.23  | -0.02 | -0.12 | 0.01  | -0.04 | -0.04 | 1     |       |       |       |    |
| Largest institutional investor    | 0.13  | -0.01 | -0.07 | -0.04 | 0.03  | 0.04  | 0.05  | 1     |       |       |    |
| All other institutional investors | 0.10  | -0.01 | -0.03 | -0.14 | -0.05 | 0.10  | -0.08 | 0.60  | 1     |       |    |
| Inside director equity            | -0.23 | -0.01 | 0.33  | 0.03  | 0.04  | -0.14 | -0.21 | -0.09 | -0.07 | 1     |    |
| Outside director equity           | 0.14  | 0.09  | -0.02 | 0.06  | 0.05  | 0.01  | 0.04  | 0.18  | -0.02 | -0.21 | 1  |

Notes: All correlations greater than or equal to |0.10| are significant at  $p < 0.05$ ; raw mean for firm size (assets in million dollars) = 2194.

**Table 2**  
**Results of Linear Regression Analyses for Underpricing**

|                                   | <b>Model 1</b>      | <b>Model 2</b>      |
|-----------------------------------|---------------------|---------------------|
| <b>Controls</b>                   |                     |                     |
| Firm size                         | -0.061              | -0.058              |
| Firm age                          | 0.034               | 0.020               |
| Risk factors                      | -0.076 <sup>†</sup> | -0.083 <sup>†</sup> |
| Firm performance                  | 0.062 <sup>*</sup>  | 0.064 <sup>*</sup>  |
| Dilution                          | 0.051 <sup>*</sup>  | 0.057 <sup>*</sup>  |
| Underwriter reputation            | -0.048              | -0.029              |
| Leverage                          | -0.087 <sup>*</sup> | -0.071 <sup>*</sup> |
| Founder on board                  | -0.004              | 0.002               |
| Technology dummy                  | -0.078              | -0.085              |
| Board size                        | 0.054               | 0.068               |
| Blockholders                      | -0.010              | -0.019              |
| Largest institutional investor    | -0.096 <sup>*</sup> | -0.063 <sup>†</sup> |
| All other institutional investors | 0.097               | 0.076               |
| <b>Explanatory Variables</b>      |                     |                     |
| Inside director equity            |                     | -0.070 <sup>*</sup> |
| Outside director equity           |                     | -0.173 <sup>*</sup> |
| Constant                          | 0.720 <sup>†</sup>  | 0.842 <sup>*</sup>  |
| R <sup>2</sup>                    | 34.87               | 37.26               |
| Adjusted R <sup>2</sup>           | 31.06               | 33.24               |
| $\Delta R^2$                      |                     | 2.39 <sup>*</sup>   |

*Notes: Standardized coefficients and robust standard errors are used; industry and year dummies are not reported for brevity; \*\*\*  $p < 0.001$ , \*\*  $p < 0.01$ , \*  $p < 0.05$ , <sup>†</sup>  $p < 0.10$ ;  $n = 417$ .*

**Table 3**  
**Results of Linear Regression Analyses for Underpricing & Stock Liquidity**

|                                   | Model 1 (Year 1)    | Model 2 (Year 2)    | Model 3 (Year 3)    |
|-----------------------------------|---------------------|---------------------|---------------------|
| <b>Controls</b>                   |                     |                     |                     |
| Firm size                         | 0.360***            | 0.351***            | 0.388***            |
| Firm age                          | -0.043              | -0.021              | -0.029              |
| Risk factors                      | 0.001               | -0.014              | -0.022              |
| Firm performance                  | 0.192**             | 0.200***            | 0.196***            |
| Dilution                          | 0.044*              | 0.047*              | 0.031 <sup>†</sup>  |
| Underwriter reputation            | 0.340***            | 0.333***            | 0.321***            |
| Leverage                          | 0.068**             | 0.041*              | 0.019               |
| Founder on board                  | -0.018              | -0.017              | -0.011              |
| Technology dummy                  | -0.110 <sup>†</sup> | -0.096 <sup>†</sup> | -0.101 <sup>†</sup> |
| Market returns                    | -0.002              | -0.002              | -0.012              |
| Board size                        | -0.011              | -0.021              | -0.010              |
| Blockholders                      | -0.040              | -0.036              | -0.036              |
| Largest institutional investor    | -0.178***           | -0.143***           | -0.126**            |
| All other institutional investors | 0.173***            | 0.156**             | 0.139**             |
| <b>Explanatory Variable</b>       |                     |                     |                     |
| Underpricing                      | 0.185***            | 0.206***            | 0.218***            |
| Constant                          | -1.260 <sup>†</sup> | -1.608*             | -1.251 <sup>†</sup> |
| R <sup>2</sup>                    | 48.87               | 47.57               | 47.58               |
| Adjusted R <sup>2</sup>           | 45.74               | 44.35               | 44.36               |
| ΔR <sup>2</sup>                   | 2.92***             | 2.77***             | 3.10***             |

*Notes: Standardized coefficients and robust standard errors are used; industry and year dummies are not reported for brevity; \*\*\* p < 0.001, \*\* p < 0.01, \* p < 0.05, <sup>†</sup> p < 0.10; n = 417 for years 1 and 2, and 416 for year 3.*



## Analyses

Ordinary least squares (OLS) estimates are used to test the hypotheses. Table 2 presents the results of the corporate governance variables of interest and underpricing. Tables 3 and 4 present the results where the dependent variable is stock liquidity. A variance inflation factor (VIF) test for multicollinearity does not indicate any severe cases, while a Cook's distance test confirms that there are no extreme outliers. However, evidence of heteroscedasticity is found both graphically and using the Breusch-Pagan test (Breusch and Pagan, 1979), and therefore the Huber robust correction for heteroscedasticity is incorporated in the regressions.

## RESULTS

The means, standard deviations, and correlations among variables in the proposed model are presented in Table 1. The "raw" mean liquidity value is 0.27, comparable to that of Amihud (2002). The average level of underpricing (26%) is somewhat higher than that of Arthurs *et al.* (2008) or Certo *et al.* (2001), but less than what Field *et al.* (2013) find. The outside director ownership level retained after IPO is 20%, roughly equivalent to Arthurs *et al.*, (2008)'s 22%. However, the inside director equity level (13%) is much lower than that found by these authors (33%). On the other hand, the aggregate director ownership (33%) is the same as that found by Field *et al.* (2013). The board size of 7.3 in the sample is also similar to the median of seven found by these authors. However, these studies refer to various US IPO samples. For example, among other studies that examine the US IPO market, Arthurs *et al.* (2008) consider the period 1990-1994, Certo *et al.* (2001) consider 1990-1998, while Field *et al.* (2013) consider 1996-2008. On average, however, it is fair to say that the descriptive statistics for the main variables are comparable to some of these studies situated in different time-periods.

Table 2 contains the underpricing models. Hypothesis 1 predicted a negative relation between inside director ownership and underpricing. This prediction is supported (Table 2, Model 2,  $\beta = -0.07$ ,  $p < 0.05$ ), contrary to the findings of Filatotchev and Bishop (2002). Hence, inside director ownership is associated with lower underpricing. Also, in line with conventional theory, Hypothesis 1 predicted a negative relation between outside director ownership and underpricing. This prediction too was upheld (Table 2, Model 2,  $\beta = -0.17$ ,  $p < 0.05$ ). All underpricing models in Table 2 are highly significant.

Tables 3 and 4 contain the results of the liquidity models; the dependent variable is Amihud's (2002) liquidity measure. The average liquidity estimates based on all trading days between the day of the IPO and one, two, and three years after IPO are used. Hypothesis 2 predicted a positive relationship between underpricing and liquidity. The hypothesized positive effect of underpricing on liquidity finds strong support in all the models (Table 3,  $\beta = 0.19$ , 0.21, and 0.22 in Models 1, 2, and 3 respectively;  $p < 0.001$  for all models). Regarding the proposed negative relation between inside director equity and outside director equity, and liquidity (Hypothesis 3 – see Table 4), there is no evidence to conclude that higher inside director equity is associated with lower liquidity. However, there is strong support for the negative effects of outside director ownership on liquidity (Table 4,  $\beta = -0.09$ , -0.09 and -0.08 in Models 1, 2, and 3

respectively;  $p < 0.05$  for all models). All liquidity models are highly significant. In sum, Hypothesis 1 and 2 are upheld in full, while Hypothesis 3 is partially upheld.

In addition to the hypothesized relationships, the regression analyses reveal some interesting insights based on the control variables used in the models. In the underpricing models, the results show that leverage reduces underpricing, confirming that debtholder monitoring at IPO reduces managerial discretion to leave money on the table. IPO performance (measured using return on assets) is positively related to underpricing, indicating strong investor demand for the shares of well-performing IPO firms. The amount of dilution is also positively associated with underpricing, suggesting that the amount of premium that investors are willing to pay above book value is a strong, early indicator of high investor optimism on day one of the IPO (that results in high underpricing). Finally, underpricing and firm risk are negatively related, confirming that underpricing is a signal of better quality (less risky) ventures.

In the liquidity models in Tables 3 and 4, firm size, underwriter reputation, performance, dilution, leverage, and institutional ownership are all associated with higher liquidity, while technology dummy and ownership of the largest institutional investor negatively influence liquidity. Larger firms have higher market capitalization (Levine and Schmukler, 2006), which expectedly yields a positive size-liquidity relationship. Prestigious underwriters not only play a certification role but also engage as price-stabilizers and liquidity-providers in the post-IPO market (Ellis *et al.*, 2000), therefore increasing stock liquidity. It also stands to reason that there is greater investor demand, and therefore greater liquidity, for high-performing IPO stocks as well as stocks for which investors show an early interest (high dilution). However, the positive leverage-liquidity relation is less obvious, and shows that investors put a premium on the monitoring role played by debtholders while discounting the higher risks of bankruptcy associated with leveraged firms. Liquidity is generally lower for R&D-intensive firms (Boone and Raman, 2001), explaining the negative coefficient on the technology dummy. Finally, the opposite effects for largest and all other institutional ownership are in line with prior research, as discussed later.

## DISCUSSION OF RESULTS

It was hypothesized that both inside and outside director equity at IPO are associated with lower underpricing, and this hypothesis is supported by the findings. As in Arthurs *et al.* (2008), the presence of outside directors at IPO signals greater credibility for the IPO firm, enabling pre-IPO owners to leave less money on the table (i.e., lower underpricing) as investors will be willing to pay more if they perceive an IPO firm to be of a higher quality. These results are in contrast with studies that suggest outside directors are largely ineffective as governance mechanisms during an IPO (Certo *et al.*, 2001). Reduced underpricing also provides evidence of the effectiveness of inside director equity as a signal of IPO firm quality. Together, these results provide evidence that IPO director ownership at IPO is an important corporate governance mechanism that resolves the first-day underpricing problem.

There is strong and consistent support in all the models for the positive effects of underpricing on stock liquidity. This is an interesting finding, as previous research has focused on identifying internal governance mechanisms that reduce the underpricing problem. These findings highlight an ignored *benefit* of underpricing, and also provide



a rationale as to why underpricing persists despite good internal governance. In other words, this finding provides a nuanced approach to understanding the underpricing conundrum, by highlighting the benefits of underpricing that have been previously ignored. Given the advantages associated with enhanced stock liquidity, future research needs to consider these trade-offs more explicitly.

These findings also highlight that outside director equity as a governance mechanism is a mixed blessing. While outside director equity resolves the immediate problem of underpricing, it creates a long-term problem of reduced stock liquidity. Specifically, outside director equity is associated with reduced liquidity in each of the three years following the IPO. The drop in liquidity is caused because of the reduction in the number of shares available for trade, and more importantly, because market-makers react cautiously to the presence of entrenched directors presumably with access to private information (Schnatterly *et al.*, 2008). Outside director equity during an IPO is much higher than for a publicly traded firm, and so these results are expectedly consistent with large firm studies (Bolton and Thadden, 1998; Heflin and Shaw, 2000) that predict a negative association between blockholdings and liquidity. However, this relationship has rarely been studied in the IPO context.

On the other hand, this study does not find a significant association between inside director equity and liquidity, an equally important finding that suggests that inside and outside directors' equity positions convey different signals to post-IPO investors. This could have at least two possible explanations. First, because inside director ownership is typically lower than outside director ownership, inside directors may not be in a position to change either the information environment of the post-IPO firm or the trading activity level of its investors (the two mechanisms that cause a reduction in liquidity, as argued in Hypothesis 3). For example, the relatively lower equity positions would suggest that, compared to outside owners, inside owners lack the economies of scale that make it cost-effective enough to incentivize them to access private information (cf. Schnatterly *et al.*, 2008). Therefore, because inside directors may not acquire private information, or hold enough shares to alter trading volumes, their holdings do not affect post-IPO liquidity.

Second, while outside directors represent sundry outside interests, inside directors who are usually part of the original founding team are more likely to be perceived by investors as having a personal commitment to the firm and an ongoing interest in its long-term viability. Besides, inside directors are generally better able to understand investor expectations (Sanders and Carpenter, 2003), and have a shared vision and a tacit understanding of firm resources that enhance their credibility in the eyes of investors and increases firm value post-IPO (Kroll *et al.*, 2007). Insider equity is also found to be positively linked to firm innovation (Hoskisson *et al.*, 2002) and value-enhancing managerial decisions (Bethel and Liebeskind, 1993). These assertions are also in line with the larger corporate governance literature that suggests that ownership ensures an alignment of interests between firm executives (including managers and directors) and investors (e.g., Jensen and Murphy, 1990), though very large ownership stakes (as is the case with *outside* directors) may convey signals of entrenchment and inefficiency to post-IPO investors (cf. Wright *et al.*, 1996).

In sum, unlike outside directors, inside directors genuinely concerned about the IPO firm's success have enough incentives not to acquire or trade upon private information. Indeed, studies have found that while outside directors are keen to exit the

IPO after the expiry of the lock-up period (Brav and Gompers, 2003), inside directors sell their stakes only gradually (Brennan and Franks, 1997). In other words, even if inside directors have the necessary information, they do not seek immediate gains by trading on that information. These characteristics of inside directors ensure that investors do *not* react negatively to their presence by increasing bid-ask spreads or decreasing their trading volumes (actions that would reduce liquidity), and explain the non-significant association between the inside director signal and post-IPO liquidity.

These findings about owner identity being a crucial component of the large owner-liquidity relation are also evident from the associations between other ownership-related control variables and stock liquidity. Thus, no significant association is found between the equity stakes of blockholders (like venture capitalists and angel investors) who do not have board seats, and liquidity. The market thus treats outsider owners without board seats differently from outside owners with board seats, presumably because access to private information is easier for owners who are also board members. Similarly, in line with the findings of previous studies like Schnatterly *et al.* (2008) and Rubin (2007), total institutional ownership (except the largest owner) is found to be *positively* related to liquidity. This positive association reflects the “institutional” effect (Rubin, 2007), wherein transient institutional investors resort to frequent trading, driving up overall liquidity. However, the largest institutional investor has a negative association with liquidity, again in agreement with Schnatterly *et al.* (2008) who find that only the largest institutional investor is perceived to have access to private information gained through monitoring.

## CONCLUSION

As IPO activity continues to increase, scholars have tried to understand the complexities and the problems associated with IPOs. In the process, they have focused on finding corporate governance solutions to the underpricing problem using a variety of theoretical lens, such as signaling (see Jenkinson and Ljunqvist, 2001, for a review). This paper builds on current research on IPO underpricing that investigates the relationship between governance variables such as board ownership and underpricing by extending the implications of both governance factors and underpricing and then linking them simultaneously to a much ignored factor, namely, stock liquidity. Given the previously cited advantages associated with stock liquidity, this study first highlights a potential intractable problem resulting from the relationship between underpricing and liquidity. In addition, the study also provides evidence that outside director ownership at IPO which is associated with reduced underpricing is also negatively associated with the liquidity of the IPO stock. Thus, the assumed benefits of ownership, though apparent in the short-run, are less clear in the long-run.

The issues raised in this paper have several key implications for the practicing manager. For example, managers need to appreciate that governance dynamics differ between large and small firms, and therefore corporate governance prescriptions that work well in the mature firm context where ownership is dispersed and boards typically own only a small fraction of the stock may not apply to contexts like IPOs that are more volatile and dynamic, characterized by the interplay of the differing goals of multiple interested parties, and an acute paucity of credible information. Formal governance mechanisms like boards, ownership, or compensation may not be as efficacious or may

work differently in the IPO context, and managers need to think deeply if informal, social controls involving trust, personal commitment, and involvement are more effective than conventional regulatory or normative mechanisms in addressing such unique governance concerns.

Another managerial implication of this study relates to the underpricing conundrum mentioned earlier. As highlighted in Hypothesis 1, presence of *pre-IPO owners* such as inside and outside directors can help reduce the amount of underpricing, thereby allowing these owners the possibility of maximizing their returns from the IPO offering by leaving the least possible money on the table. On the other hand, Hypothesis 2 explained the positive association between underpricing and post-IPO liquidity, thereby explicating how a higher amount of underpricing benefits *post-IPO owners* by ensuring a liquid market for the IPO stock. This naturally raises the question: why do pre-IPO owners engage in underpricing (26 percent in the current sample) that helps post-IPO owners when they could selfishly maximize their own wealth upfront by reducing underpricing further, or even doing away with it altogether?

The answer to this conundrum lies in the fact that on average pre-IPO owners, including directors, sell around 33 percent of their pre-IPO holdings during the IPO offering, while around 63 percent of these holdings are locked up and become available for sale at least six months after the offering (Field and Hanka, 2001). Besides, even post lock-up, not all shareholder groups will immediately cash out of the IPO (Brennan and Franks, 1997). In other words, there is considerable overlap in the identity, and therefore the interests, of pre and post-IPO owners. Moreover, as explicated in Hypothesis 2, underpricing also confers other benefits. For example, it legitimizes the firm in the eyes of potential investors and acts as a signal of firm quality. In sum, while reduced underpricing enables pre-IPO owners to maximize wealth upfront, increased underpricing enables pre-IPO owners (a lot of whom are also post-IPO owners) to ensure stock liquidity, in addition to other benefits. Therefore, the practical implication for pre-IPO directors is that they need to trade-off the marginal costs of greater underpricing against its marginal benefits, and to decide the final quantum of underpricing based on their share retention plans in the post lock-up period. Empirically testing this conundrum based on post-IPO ownership retention data is outside the ambit of the current study, but can be a fruitful area for future IPO research.

### Limitations

This study is not without limitations. As mentioned earlier, it does not examine changes in outside director ownership after the IPO, or more particularly, after the expiration of the lock-up period. Nearly all IPOs feature a lock-up agreement that usually bars insiders such as equity-owning directors from selling their stakes for 180 days after the IPO (Cao *et al.*, 2004), and firms vary in the extent to which directors sell after the lock-up period. Hence, the impact of subsequent changes in outside director ownership on underpricing and post-IPO liquidity is not accounted for in this study.

Another limitation of the study is the possible presence of other omitted determinants of underpricing and liquidity, and allied endogeneity issues. This can be so even though a large number of variables are controlled for, and the results of preliminary tests (e.g., a Durbin-Wu-Hausman test – Hausman, 1978) confirm the absence of endogeneity. For example, Field and Karpoff (2002) suggest that IPO firms

have in place at least one takeover defense when they go public and these defenses decrease the subsequent likelihood of acquisition. Such pre-IPO takeover defenses (like poison pills and staggered boards) may also influence underpricing and post-IPO stock liquidity by changing the scope for board monitoring as well as the pattern of post-IPO investor reactions to these signals of managerial expropriation.

Another limitation is that this study, by design, is based in the US context. While traditionally the US held the preeminent position in the global IPO market both in terms of number of deals signed and capital raised, in recent years there has been a decline in US IPO activity. In terms of deal volume, for example, the annual average number of US IPOs declined from 310 during 1980-2000 to 99 during 2001-2012 (Ritter, 2013). On the other hand, emerging economies, led by China, have witnessed rapid growth in entrepreneurial activity as well as increased market capitalization, and stock exchanges like Shanghai, Shenzhen, and Hong Kong have flourished. Similarly, while the recent financial turmoil led to a sharp dip in the amount of capital raised on European bourses, these countries too have been showing growing signs of recovery and together accounted for about 18 percent (USD 30 billion) of the total capital raised globally through IPOs in 2011. This shift in the center of gravity can naturally raise questions about the applicability and relevance of this study in a globalized context.

### Future Research

There could be many avenues for future research. One line of research can study the effects of stock liquidity on managerial decisions. For example, prior studies have investigated the role of stock market liquidity as a decision variable to determine firm payout policies (Banerjee *et al.*, 2007), an idea that might be extended to study how liquidity impacts managerial choices regarding capital structure, investment projects, new stock issuance, and so on. Also, because liquidity decreases the cost of raising new capital (Amihud and Mendelson, 1986), future studies could also examine its implications for corporate strategy decisions, including product diversification, R&D expenditures, and mergers and acquisitions policy. Studies can also investigate the role of stock liquidity as a moderator. Current studies have researched the effects of internal liquidity (also called available slack, or simply cash) on firm performance (e.g., Kim and Bettis, 2013). Therefore, an interesting line of inquiry might be to explore if external stock liquidity moderates the association between internal liquidity and performance.

On a related note, the role of liquidity as an external governance mechanism was implicated in this study. Following the seminal work by Holmstrom and Tirole (1993), there is a stream of literature in finance that characterizes stock liquidity as an important market monitoring mechanism that effectively captures the notion of external corporate governance (Bushman and Smith, 2001; Edmans, 2009; Faure-Grimaud and Gromb, 2004). The basic idea is that in liquid markets informed traders resort to private trading of the firm's stock at prices that reflect its true or fundamental value. This correct pricing (valuation) of a firm's stock in liquid capital markets not only keeps managers vigilant by acting as a direct measure of their performance but also prompts external owners (like institutional investors) to monitor the firm when prices drop too low. Finally, stock liquidity can also activate the market for corporate control (e.g., by facilitating disciplinary events like hostile takeovers), as buyers will know the real premium they are paying over true firm value, and will be able to build large positions fairly quickly

(Tadesse, 2004). Empirically investigating these governance roles of liquidity might be a rewarding area of future inquiry.

In conclusion, the current study provides evidence that IPO underpricing, along with pre-IPO outside director ownership, may determine how liquid the IPO firm's stock will be in the long run. It finds that while high outside director equity resolves the short-term underpricing problem, it also creates a long-term problem by reducing post-IPO stock liquidity. One can infer that extant management research has not fully solved the puzzle of IPO underpricing, primarily because it has looked only at pieces of a larger problem. By integrating ideas from the management and finance research streams and refocusing attention to a period up to three years after the IPO, this study is able to provide a fuller picture of the linkages among director ownership, underpricing, and stock liquidity during this very crucial transition period in a firm's life.

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**Appendix A**  
**Calculating the Amihud (2002) liquidity measure for two firms**

| Date     | Absolute Daily Return (1) | Closing Price (2) | Volume (3) | Daily Dollar Volume (4)={2}*{3} | Liquidity {(1)/(4)}*(10 <sup>6</sup> ) | Average for 250 Trading Days |
|----------|---------------------------|-------------------|------------|---------------------------------|--|------------------------------|
| 11/16/01 | 0.0815155                 | 8.00              | 1310858    | 10486864                        | 0.0077731                              |                              |
| 11/19/01 | 0.005                     | 8.04              | 205950     | 1653838                         | 0.0030196                              |                              |
| 11/20/01 | 0.0012438                 | 8.0299997         | 80585      | 647097.5                        | 0.0019221                              |                              |
| 11/21/01 | 0.0373599                 | 7.73              | 839587     | 6490007.5                       | 0.0057565                              |                              |
| ...      | ...                       | ...               | ...        | ...                             | ...                                    |                              |
| 11/07/02 | 0.0140846                 | 0.72              | 120267     | 86592.24                        | 0.162654                               |                              |
| 11/08/02 | 0.125                     | 0.63              | 59742      | 37637.46                        | 3.32116                                |                              |
| 11/11/02 | 0.1587302                 | 0.53              | 31200      | 16536                           | 9.599069                               |                              |
| 11/12/02 | 0.1509435                 | 0.61              | 90019      | 54911.59                        | 2.748846                               | 1.461082                     |
| 12/16/04 | 0.054768                  | 49.110001         | 7839900    | 385017494                       | 0.0001422                              |                              |
| 12/17/04 | 0.0792099                 | 53.00             | 4762500    | 252412500                       | 0.0003138                              |                              |
| 12/20/04 | 0.0830189                 | 48.599998         | 6105900    | 296746731                       | 0.0002798                              |                              |
| 12/21/04 | 0.0251028                 | 47.380001         | 3210500    | 152113493                       | 0.000165                               |                              |
| ...      | ...                       | ...               | ...        | ...                             | ...                                    |                              |
| 12/06/05 | 0.0094834                 | 40.450001         | 871700     | 35260265.7                      | 0.000269                               |                              |
| 12/07/05 | 0.011372                  | 40.91             | 499600     | 20438635.9                      | 0.0005564                              |                              |
| 12/08/05 | 0.0070888                 | 41.200001         | 870400     | 35860480.7                      | 0.0001977                              |                              |
| 12/09/05 | 0.0240292                 | 40.209999         | 842700     | 33884966.2                      | 0.0007091                              | 0.0005266                    |

*Notes: Computation of average yearly liquidity for a firm is shown. The yearly average is based on all transactions for 250 trading days after the day of the IPO. Amihud's measure is used to compute daily liquidity. Note that while this measure actually computes "illiquidity," the results presented use the inverse of this measure and therefore represent liquidity instead of illiquidity. "Price" denotes closing price while "absolute daily return" is the absolute value of the daily holding period return. Data are obtained from the Center for Research in Security Prices (CRSP).*

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*Liquidity in IPO Firms* ..... 130  
Palash Deb

Current management research on IPOs has examined how board composition and ownership structures affect IPO underpricing, while largely overlooking their implications for the long-term stock liquidity of the IPO firm. This is a significant oversight, given the many benefits to IPO issuers from having a liquid stock (e.g., reduced cost of capital, increased external monitoring, etc.). This study theoretically integrates the literatures on board ownership, underpricing, and stock liquidity using a signaling perspective, and finds that while the monitoring and incentive effects of high outside director equity help reduce underpricing (thereby solving a short-term problem by leaving less money on the table), they also reduce stock liquidity during the three years following the IPO (thereby creating a long-term problem). Underpricing is found to be positively associated with liquidity, suggesting that there are expected benefits from underpricing that need to be traded off against the upfront costs of leaving more money on the table. Finally, while the inside director equity-underpricing association is expectedly negative, there is no evidence to suggest that inside director equity affects post-IPO liquidity. Taken together, these findings convey a fuller picture of the long-term implications of underpricing and board ownership at IPO for stock liquidity, an important yet underrated measure of a firm's stock market performance.

*Conditions of Organizational Learning* ..... 157  
Vishal K. Gupta, Dev K. Dutta, and Xiujian Chen

Do dynamic capabilities help firms gain competitive advantage? Prior research has noted that notwithstanding the increasing popularity of the dynamic capabilities framework, conceptualization of capabilities is often abstract and intractable, while empirical studies often do not articulate a clear trail of logic from capabilities to superior firm performance. To address these shortcomings, a model linking an important managerial capability – entrepreneurial orientation (EO) – with business performance in a single-industry setting is conceptualized and empirically validated. Time-series-cross-section analyses is used to test hypothesized relationships on panel data obtained from annual reports of large, publicly-traded US-based retailers. EO capability is found to have a substantial positive impact on firm performance, and this relationship is seen to be enhanced in the presence of organizational learning. These findings offer support for the view that dynamic capabilities are associated with heterogeneity in firm performance and help firms attain competitive advantage.

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