



## Liquidity and initial public offering underpricing



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### ABSTRACT

Using eight measures of liquidity, and addressing the potential endogeneity of initial returns, we find underpricing generally increases the secondary market liquidity of IPOs over the first year of trading, irrespective of the horizon over which liquidity is measured. For two model specifications over the eight measures, fifteen regressions display signs consistent with higher underpricing increasing liquidity and thirteen of these are statistically significant. We also find higher initial returns are significantly negatively correlated with the probability of informed trade. Furthermore, the liquidity effects of underpricing survive the lockup date, suggesting they are not quickly dissipated.

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### 1. Introduction

Issuers may seek a number of potential benefits from going public. Zingales (1995) views the decision to go public as a step in the process whereby the original owners ultimately sell their company. Consistent with this view, empirical studies show that less diversified private controlling shareholders have more to gain from taking their firms public and are more willing to accept a lower price for their shares (Bodnaruk et al., 2007; Mantecon and Poon, 2009) and that greater liquidity allows the opportunity to trade retained shares on more favorable terms (Aggarwal et al., 2002; Cao et al., 2004). Boot et al. (2006) argue that managers trade-off greater autonomy when private versus a lower cost of capital resulting from liquid investor stakes when public.

Even if the ultimate liquidation of insider holdings is not the primary purpose of the IPO, higher liquidity may be beneficial. Brau and Fawcett (2006) find that CFOs indicate that the primary motivation for going public is to finance acquisitions. Hsieh et al. (2011) suggest firms interested in becoming acquirers pursue an IPO to reduce valuation uncertainty. A more liquid secondary market should provide a more precise valuation signal (in the Bayesian

sense) and enhance the efficiency of the firm's acquisition strategy and, hence, firm value. Mantecon and Poon (2009) find that firms that are more likely to use stock in a subsequent acquisition have higher IPO underpricing. Firms may also undertake an IPO to raise investment financing. Aslan and Kumar (2011) find that firms with high investment financing needs, lower information production costs, greater size, and high industry market-to-book ratios are more likely to go public and that capital investment and profitability increase substantially after the IPO. A more liquid secondary market would make subsequent financing less costly. Butler et al. (2005) showed that more liquid SEOs pay lower gross fees to investment banks. Finally, the evidence continues to mount that increased liquidity reduces the required return to investors, thus increasing the price that investors are willing to pay for shares (see e.g., Amihud and Mendelson, 1986; Brennan and Subrahmanyam, 1996; Eleswarapu, 1997; Datar et al., 1998; Chordia et al., 2000; Gibson and Mougeot, 2004; Liang and Wei, 2012).

If access to liquid ownership shares is important to issuers going public, then issuers would want to take steps that increase the liquidity of their shares in the secondary market. Booth and Chua (1996) suggest how this could be achieved. Issuers underprice to promote oversubscription, which allows broad initial ownership, and, in turn, increases secondary-market liquidity. If underpricing does, in fact, boost secondary market liquidity, then we have an additional explanation for why rational issuers do not get upset about money left on the table at the offering. A number of studies examining spread and volume based liquidity

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measures find evidence consistent with the conjectures of Booth and Chua (see e.g., Pham et al., 2003). The work of Mantecon and Poon (2009) suggests that incentives to boost liquidity will be greater when the benefits of liquidity to insiders are greater, such as when their stakes are higher.

While the literature has generally been supportive of the Booth and Chua argument regarding a positive relationship between underpricing and subsequent secondary market liquidity, it has often ignored the potential endogeneity of initial returns with respect to expected liquidity. This issue was raised by Ellul and Pagano (2006) who argued that initial returns would be negatively related to the level of expected secondary market liquidity. That is, investors are compensated for the expected illiquidity of a new issue through a greater initial price discount. Note that Ellul and Pagano model the relationship between expected liquidity and initial returns, while Booth and Chua conjecture underpricing increases “actual” liquidity through stimulating broad ownership. Thus, in Ellul and Pagano’s model, initial returns are endogenous with respect to expected liquidity. Consequently, any test of whether underpricing increases actual liquidity must test for, and if necessary control for, the potential endogeneity of initial return with respect to expected liquidity. Ellul and Pagano (2006) find a positive relationship between the expected proportional effective spread, the probability of informed trading, and the adverse selection component of the spread and IPO underpricing over the four weeks following the offering using data from the London Stock Exchange from June 1998 to December 2000. This suggests that controlling for endogeneity is potentially important.

It is, however, unclear what Ellul and Pagano’s results on probability of informed trade and the adverse selection component of the spread say about the relation between underpricing and general liquidity levels. These two variables measure the extent of informed trading, what Stoll (2000) calls “informational frictions,” rather than liquidity *per se*, what Stoll terms “real frictions.” Easley and O’Hara, along with various coauthors (e.g. see Easley et al., 2002, 2010), have argued “information risk” has a separate effect on asset valuation from general “liquidity risk.” Theoretically, there is no reason to suppose these are correlated. In models such as Kyle (1985), the informed trader scales his trading in response to the liquidity of the market so that his trades represent a constant proportion of trading volume. Thus, in the Kyle model, the proportion of informed trading (which would influence the probability of informed trading and the adverse selection component of the spread) would be uncorrelated with the underlying liquidity of the issue. Empirically, Easley et al. (2002) find a negative correlation (i.e. probability of informed trade is positively correlated with spreads and negatively correlated with turnover). Ellul and Pagano’s (2006) interpretation of their own results effectively assumes a negative correlation.<sup>3</sup>

Given that the empirical literature has generally ignored the potential endogeneity suggested by Ellul and Pagano and given the nature of their own empirical evidence, a valid question remains whether a positive relationship between initial returns and subsequent liquidity does indeed exist once one addresses the potential endogeneity of initial return. It is that question that this paper addresses. We form a sample of U.S. firm-commitment initial public offerings that were marketed by the bookbuilding method over the period 1988–2009.<sup>4</sup> We use eight measures of liquidity to test for the relationship between initial

public offering underpricing and subsequent secondary market liquidity. We explicitly test endogeneity of initial return in each liquidity regression and, based on the test results, we use two stage least squares (2SLS) regression in the models where initial return is shown to be endogenous and use ordinary least squares (OLS) in the models where initial return is found to be exogenous. We introduce an instrumental variable for initial return that is equal to one if the offering and first aftermarket trade occur on a Monday. Jones and Ligon (2009) find that Monday offerings have substantially higher initial returns. There is no theoretical reason to believe that the day of the offering affects average liquidity over the full year following the offering directly and we find little empirical relation to trading volume. We test the relevance of other potential instruments through significance tests and for validity through the exclusion restriction test (Hansen’s J test).

Liquidity is difficult to define. However, by using many measures of liquidity that capture real and informational frictions to differing degrees, we hope to have a clearer understanding of the relation between initial returns and liquidity. We include spread based measures and measures related to the price impact of a trade, which incorporate both real and informational frictions. We also include measures (turnover and the average number of trades) that are purely volume related and measure strictly real frictions. We construct these measures over different horizons to determine any effect of horizon on measured liquidity. We also find that construction of spread based measures and measures related to the Kyle lambda can effectively be done with either transaction level or daily data without significantly changing the results. Finally, in an extension of our analysis, we consider a measure that is related to the Easley et al. (2002, 2010) PIN measure and, hence, is a measure of informational frictions.

By addressing the endogeneity of initial returns, we hope to better observe the underlying relationship between underpricing and liquidity. Our evidence suggests that the endogeneity of initial returns with respect to liquidity is not of particular importance for the broad cross-section of U.S. IPO markets over long horizons. We also find that, in general, after addressing any remaining endogeneity, there is a positive relationship between IPO underpricing and subsequent secondary market liquidity. So, one of the benefits of underpricing may indeed be higher secondary market liquidity.

If initial owners such as entrepreneurs or venture capitalists value liquidity because they intend to liquidate their stakes at lockup, then underpricing would need to boost liquidity after lockup to be valuable to such owners. We test for statistical differences between the relationship of initial returns and liquidity pre- and post-lockup for a subsample of firms with 180 day lockup periods and find that the relationship between initial returns and liquidity is generally even greater after lockup expiration. In addition to consideration of these alternative six-month periods, we also test the robustness of our results by measuring liquidity over the four weeks following the offering, which is consistent with the period considered by Ellul and Pagano (2006).

The results suggest that one reason an issuer may tolerate underpricing is that it generates higher subsequent liquidity for the issuer’s shares. It also has implications for the empirical link between underpricing levels and apparent long-run underperformance. As evidenced in Eckbo and Norli (2005), if liquidity is a priced factor, IPOs may appear to underperform in the long-run because they are more liquid than non-issuing firms matched on size and book-to-market.

The next section states our hypotheses. Section 3 discusses the empirical approach and the data. Section 4 discusses the primary results. Section 5 considers extensions including the probability of informed trade analysis and the pre-lockup versus post-lockup results. Section 6 concludes.

<sup>3</sup> They find a positive correlation between underpricing and the probability of informed trade and the adverse selection component of the spread and the variation in these measures, which they interpret as implying lower liquidity.

<sup>4</sup> Engelen and van Essen (2010) find that the structure of the offering (bookbuilding, fixed price, auction, or hybrid) as well as the governing law of the issuer’s country affect the level of underpricing.

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