Ownership Concentration and Firm Value: New Evidence from Owner Stakes in IPOs

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Abstract

We revisit the relationship between ownership concentration and firm value using hand-collected data on the stakes of owner-managers before and after IPOs. We instrument for the reduction in stake using market returns on the three months before IPOs. Short-run market returns are plausible instruments since owners engage in market timing by selling more when prior returns are high, but high short-run returns are unlikely to directly affect firm value years after the IPO. As predicted by agency theory, a large reduction in ownership concentration at the IPO is negatively related to valuation. Future asset growth is lower in low-stake firms.

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Many firms around the world are simultaneously controlled and managed by their owners (La Porta, Lopez-de-Silanes, and Shleifer, 1999; Morck, Wolfenzon, and Yeung, 2005; Bennedsen, Nielsen, Perez-Gonzalez, and Wolfenzon, 2007). The main conflict of interest in this case is between the owner-manager and minority shareholders, rather than between professional managers and a dispersed set of shareholders (Jensen and Meckling, 1976; Shleifer and Vishny, 1997; Pagano and Roell, 1998; Faccio, Lang, and Young, 2001). Owner-managers with less than full-ownership face a classical incentive problem: They appropriate all the benefits of perquisites or earnings diversion (Bertrand, Mehta, and Mullainathan, 2002), but suffer less than the full monetary cost of these actions. Owner-managers with small stakes are thus more tempted to consume private benefits at the expense of market value. This incentive problem implies that ownership concentration and firm value should be positively related, as emphasized by Jensen and Meckling (1976).

Despite the strong theoretical arguments, the empirical evidence on the relationship between ownership concentration and firm value is mixed at best (Demsetz and Villalonga, 2001). Many obstacles persist in this vast literature, including the absence of large changes in ownership in the data, and the endogeneity of ownership structures. In this paper we revisit the relationship between ownership concentration and firm value in the context of Initial Public Offerings (IPOs). The study of ownership and valuation around IPOs allows us to address some of the previous empirical challenges, while at the same time provide novel economic insights.

We hand collect data on the stakes of owner-managers immediately before and after IPOs for close to 1,200 firms in European markets between 1990 and 2013. This setup has several advantages to examine the relationship between ownership and firm value. First, most IPOs involve a large change in ownership. For example, the average stake reduction of the owner-manager in our sample is 13%. As argued by Fahlenbrach and Stulz (2009), and Zhou (2001), many empirical strategies (e.g., firm fixed effects) have little power to identify the relationship between ownership and firm value because other changes in ownership are frequently small. Second, the IPO setup, in particular in Europe with high-stakes owner-managers, better resembles Jensen and Meckling's

paradigm. There is no delegation of control in our setup, so we can identify a pure incentive effect. Management is typically delegated in large and mature firms, which are the focus of the past empirical literature, and hence entrenchment effects also enter the analysis (e.g., Morck, Shleifer, and Vishny, 1988).

Most importantly, the IPO setting allows us to develop an instrumental variables strategy for the stake being sold. Finding plausible exogenous variation in ownership is crucial since endogeneity has been the main obstacle in this literature (Demsetz and Lehn, 1985). For instance, one can imagine that owners of firms with relatively poor prospects, and therefore with lower firm value, are less able to sell large stakes. This induces a downward bias in the OLS coefficient of a regression of firm value on owner stakes. Fabisik, Fahlenbrach, Stulz, and Taillard (2020) argue that this type of omitted variable bias can explain the negative relationship between firm value and ownership that is typically observed in U.S. firms.

Our main regression relates the *reduction* in the stake of the owner-manager at the IPO with subsequent firm value, measured by Tobin's q at the end of the three years that follow the IPO. We exclude the short period immediately following the IPO to avoid distortions in valuation due to frictions in the going public process (e.g., underpricing, sentiment of retail investors, underwriters' price stabilization, and others). In the spirit of Bernstein (2015), we use the returns on the market index over the 3 months before the IPO as instrument for the stake reduction. While Bernstein (2015) uses recent market returns to instrument for the decision to complete or withdraw the IPO, we use returns to instrument for the simultaneous decision of how many shares to sell at the IPO. Consistent with random assignment of the instrument in our sample of completed IPOs, we do not find differences in pre-IPO characteristics according to market returns (i.e., there is balance in the instrument).

The instrument must be relevant for the instrumental variables (IV) estimation to work (it must also be valid as we explain below). In our setup, relevance means that 3-month market returns must have a significant impact on the stake reduction at the IPO. As shown by Graham and Harvey (2001) and Brau and Fawcett (2006), managers closely watch recent returns when deciding to raise equity. Managers try to time the

market and issue in certain windows of opportunity when valuations are high, or, equivalently, when the expected returns of IPO investors are low (Baker and Wurgler, 2000; Ritter and Welch, 2002; Pastor and Veronesi, 2005; Henderson, Jegadeesh, and Weisbach, 2006). Variation in the expected returns of IPO investors can have rational and irrational underpinnings. For the instrument to be relevant, we just need that managers try to time the market, not that they successfully identify periods of low expected returns.

In the data we find that owner-managers sell almost an additional 1% of ownership when 3-month returns before the IPO are 10% higher. The magnitude of this first-stage effect is reasonable. For example, the implied stake reduction is only 7% larger than the average stake reduction in the sample. The impact of past returns on the stake reduction can be seen *within* industries, markets, and years since the first stage controls for fixed effects along these dimensions, while also controlling for multiple pre-IPO firm characteristics. Hence, it is not the case that the instrument is picking up a selection of firms along industries, markets, or years, nor along observable firm characteristics such as size, profitability, and others.

In the second stage of the IV estimation, the coefficient on the stake reduction implies a fall in Tobin's q of 8.6% in response to the first-stage reduction in stake of 1%. The effect is stable across the three years after the IPO, without a tendency to revert nor increase. The IV estimate is larger (in absolute sense) than the OLS estimate, which can be expected from mitigation bias in OLS. The impact on valuation is large but comparable to other costs of going public. For example, it is comparable in money terms to listing and underwriting fees for the median firm in the sample (Abrahamson, Jenkinson, and Jones, 2011). Together with the fact that learning from experience is hard in this setup, since going public is infrequent, it suggests that an effect of this magnitude can survive in equilibrium (Jiang, 2017).

Beyond being relevant, the instrument must be valid, or, equivalently, obey the exclusion restriction. In our case, the exclusion restriction means that 3-month prior market returns do not have an impact on future firm value, except through their effect on ownership. We cannot test this assumption directly, because even if the exclusion

restriction holds, the reduced-form regression coefficient that relates future firm value with 3-month market returns should be negative and significant (the reduced-form effect is approximately the first-stage effect times the second-stage effect). The problem is that a negative coefficient in the reduced-form regression is also potentially consistent with other channels.

We tackle the existence of these other channels in two ways: placebo tests and predictability tests. First, we conduct "placebo" tests. We use as placebo instruments the market returns just outside the pre-IPO window previously defined. For instance, we show that returns between months t-6 and t-3, and between months t and t+3 have no effect on the stake reduction at the IPO. Crucially, these returns also do not have any explanatory power either for future firm value in reduced-form regressions.

Next, we exploit additional hand-collected data of a placebo sample where controlling shareholders are not owner-managers. This sample includes shareholders such as banks, venture capitalists, other companies doing spin-offs, and the state. These other shareholders are interesting because they differ from Jensen and Meckling's owner-managers: they are likely to have different objective functions, they are bound by different contractual constraints when selling equity, and perhaps they do not engage in market timing. In fact, we find that the stakes sold by these other controlling shareholders are not affected by 3-month prior returns. In reduced-form regressions, we do not see that the instrument has any effect on firm value for firms in this placebo sample. The results for the placebo sample speak against the idea that 3-month returns have a direct impact on firm value, and hence that the exclusion restriction fails, because it is hard to justify that previous returns belong to the structural equation for owner-managers, but not for other controlling shareholders. Similarly, it is hard to argue that the instrument is proxying for some form of selection on unobservables for the case of owner-managers, but not for the case of other shareholders. Overall, these placebo tests show that there are no reduced-form effects on firm value when the first stage effect is absent. Hence, there is no effect on firm value when the ownership decision is unaffected, which is consistent with the exclusion restriction.

Second, we conduct predictability tests. If 3-month market returns capture variation in the expected returns of investors, then they should be included in the structural equation for firm value, and the exclusion restriction would not hold. Although 3-month returns are not among the known predictors of future returns (Campbell and Thompson, 2008), it is still possible that managers are able to identify periods of low expected returns (rational or not) and sell more equity accordingly. Movements in expected returns imply predictability of future *changes* in firm value. In particular, 3-month market returns should predict future changes in firm value with a negative sign, i.e., a reversal. In the data we find that there is a reversal in firm value, but that the reversal is quick. There is no predictability using 3-month pre-IPO returns beyond the end of the IPO year. One could say that there is variation in expected returns, but also that it is short-lived. The unpredictability of changes in firm value beyond the end of the IPO year implies that pre-IPO returns are not proxying for variation in expected returns *at the horizon that is relevant for our tests*, and hence that the exclusion restriction holds.

The short-run predictability mentioned above affects all types of IPOs, but only owner-managers engage in the type of market timing described by our first stage. In other words, all IPOs ride a similar valuation wave, but owner-managers do it aggressively by selling more or less depending on the strength of the wave, while other shareholders do it passively. Market timing, and its predicted reversal, does not imply that the long-run values of firms that sell more are lower than the long-run values of other firms. Prices should revert to fair values after predictability vanishes, but not to values below fair. Agency theory, instead, predicts that firm value should be below fair in low concentration firms. Owner-managers partly inflict this loss of long-run value on themselves, although this is not necessarily evidence of myopic or irrational behavior (Malmendier and Tate, 2005; Ben-David, Graham, and Harvey, 2013). In Jensen and Meckling (1976)'s model, owners derive utility from both private benefits and market values. Managers can be aware that the reduction in stake comes at the expense of long-run value, but they may be perfectly content with it because they are compensating with the extraction of more private benefits from a larger firm.

Additional results speak about the mechanism that explains the agency discount in firms with lower ownership concentration. The stake reduction is associated with lower asset growth after the IPO (using the same IV setup), which suggests that agency costs are related to lower incentives to invest. This goes against the idea that owners who raise more money at the IPO waste the extra cash in empire-building, and hence it favors the quiet life hypothesis (Bertrand and Mullainathan, 2003). Post-IPO cash holdings are unrelated to the stake reduction, also suggesting that IPO proceeds are not kept as idle capital. We do not find evidence of lower profitability after the IPO, which could be one of the predictions of Leland and Pyle (1977)'s model of ownership and asymmetric information. Also, as mentioned earlier, there are no differences in ex-ante characteristics, including pre-IPO profitability, according to market returns. Hence, the instrument is not separating "good" from "bad" firms in the language of asymmetric information models. Finally, we find no effect of the stake reduction on a firm's leverage, which suggests that valuation effects are not related to changes in capital structure or potential conflicts with debtholders.

Our main contribution lies within the literature on ownership concentration and firm value (see Demsetz and Lehn, 1985; Stulz, 1988; Morck, Shleifer, and Vishny, 1988; McConnell and Servaes, 1990; Himmelberg, Hubbard, and Palia, 1999; DeMarzo and Urosevic, 2006; Fahlenbrach and Stulz, 2009; Coles, Lemmon, and Meschke, 2012; Fabisik, Fahlenbrach, Stulz, and Taillard, 2020). We provide an estimation of the causal effect of ownership on firm value, which has proven elusive in other setups. Exogenous variation in ownership structures is extremely rare in practice. Still, there are a few exceptions. For instance, Becker, Cronqvist, and Fahlenbrach (2011) use the presence of wealthy individuals in a firm's geographic area to instrument for large shareholders. Slovin and Sushka (1993) use the sudden death of large shareholders as a source of exogenous changes in ownership. Despite the novelty of these approaches, Edmans and Holderness (2017) conclude that valid instruments or natural experiments for ownership structures are rare at best. By focusing on the moment of a firm's birth into public markets, our IV strategy can contribute to an area where identification is hard to achieve.

Jensen and Meckling (1976)'s model is a good characterization of our sample of owner-managers who plan to run their firms for the foreseeable future. Hence our results can be interpreted as an estimation of the agency costs of owner-managers with less than full ownership. Our IV estimates complement estimates of agency costs from structural models (Hennessy and Whited, 2007; Page, 2018). Overall, we contribute by providing an estimate of the magnitude and causes of agency costs, which are relevant not only for equity investors but also for other stakeholders such as creditors and employees (in particular those receiving equity compensation).

The rest of the paper is organized as follows. Section 1 describes the data. Section 2 presents OLS results and explains the identification strategy behind our IV estimation. Section 3 reports the main IV results, placebo and predictability tests, and auxiliary results. Section 4 concludes.

1. Data Sources and Summary Statistics

Our sample covers 33 stock markets spread over 19 European countries between 1990 and 2013. We first identify IPOs from *Thomson ONE* (formerly *SDC*) and information provided by stock exchanges. We collect details on the firm that goes public such as the IPO date, the market where shares are issued, and the firm's industry, among other characteristics. Having identified IPO firms, we then check by hand their respective prospectuses. We obtain prospectuses from *Thomson ONE* (formerly *Thomson Research*), *Bloomberg*, the websites of companies, and stock exchanges. We focus on the largest shareholder, whose identity the prospectuses are mandated to disclose, and the ownership stake before and after the IPO (derived from the shares offered at the IPO). From the prospectuses, we also collect firms' financials before the IPO. For subsequent years we collect data on firm financials (stock prices, assets, profitability, etc.) from *Datastream*. Finally, we get market return data at the monthly level from *Compustat Global*.[1]

[1] We use the nominal return on each country's main FT index (e.g., FTSE100 for the U.K.), except for Norway (MSCI index), and Greece (Athens Stock Exchange Index).

Our main sample consists of 1,184 IPOs controlled by owner-managers (i.e., founders, CEOs, directors, or families), and with valuation data up to the end of the second full year following the IPO. These firms closely follow the paradigm in Jensen and Meckling (1976), where the owner intends to run the business for the foreseeable future. We also collect data on 986 IPOs controlled by other large shareholders. These shareholders are financial intermediaries (banks, venture capitalists), other companies (e.g., spin-offs), or the state (i.e., privatizations), who often have different objective functions, investment horizons, and contractual constraints when selling shares. Figure 1 Panel A shows the number of IPOs of each type of IPO across time.[2] Panel B shows the average year-end Tobin's q across IPOs of each type each year. As previously documented (Ritter and Welch, 2002), periods with many IPOs coincide with valuation booms like the one seen in the late 1990s. The mid-2000s, before the subprime crisis, also show many IPOs, although with less extreme valuations when compared to the late 1990s. IPOs of firms with owner-managers and other IPOs share similar aggregate dynamics.

The IPO prospectus allows us to see the ownership stake of the controlling shareholder before the IPO, and what the controlling shareholder retains immediately after the IPO. We define the ownership stake as the fraction of common shares outstanding in the hands of the controlling shareholder.[3] Figure 2 shows averages of the pre-IPO stake, the post-IPO stake, and the stake reduction (the difference between pre and post) by year in our main sample of owner-managers. The pre-IPO stake is close to 50% throughout the sample. The post-IPO stake bounces around 40%, which implies that the average reduction in stake is approximately 10%. We see no discernible upward or downward trend in these averages across time. Figure 3 shows the histogram of pre- and post-IPO stakes. The distribution of pre-IPO stakes has minor spikes at 50% and 100%, but it is overall well balanced. The distribution of post-IPO stakes is shifted

[2] Figures A.1 and A.2 show the distribution of IPOs by industrial sector and market. Only 2.4% of the IPOs in our sample represent cross-country listings.

[3] The company going public offers common stock in nearly all cases. Dual class shares are very infrequent, although other control-enhancing mechanisms may exist (pyramidal structures, shareholder agreements, takeover defenses, etc.). Regardless of these mechanisms, owners typically retain a large fraction of common stock after IPOs (see, for example, Roosenboom and Schramade, 2006)

towards the left of the figure, as can be expected, with more mass concentrated in the 20%-40% range than the pre-IPO distribution.

Most firms begin with IPO-related activities, such as selecting an underwriter, around 6 months before the planned IPO date.[4] In European markets, a draft prospectus is submitted to the stock market regulator between one and two-and-a-half months before the IPO. The marketing phase of the IPO (presentation to analysts, investor education, roadshow, and book-building) is typically compressed during the four weeks before the IPO date. In Europe, price ranges and deal size (the number of shares being offered) are decided around 1 to 2 weeks from the IPO date before book-building starts (Ljungqvist and Wilhelm, 2002). In the U.S., firms can adjust price ranges and the number of shares sold in case of strong investor demand, even in the week leading up to the IPO via filing an amendment to the original prospectus (Ang and Brau, 2003). These amendments are very infrequent in Europe. Hence, the decision on how many shares to sell at the IPO is mostly finalized between 1 and 2 weeks before the IPO date.[5]

Figure 4 shows the timing conventions for our main variables. Year t=0 is the year of the IPO. From the prospectus we measure the stake before the IPO and immediately after the IPO. Lockups typically ensure that the stake of the controlling shareholder cannot change for 1 to 2 years after the IPO. Pre-IPO owners are subject to longer and mandatory lockup periods in Europe than the standard and voluntary lockup period of 180 days in the U.S. (Goergen, Renneboog, and Khurshed, 2006). Beyond lockup restrictions, empirical studies show that ownership dynamics after IPOs are slow (Helwege, Pirinsky, and Stulz, 2007; Foley and Greenwood, 2010), and that they rely strongly on market liquidity (Fabisik, Fahlenbrach, Stulz, and Taillard, 2020). Control is rarely handed over in IPOs, particularly in Europe. In the 3 months leading up to the IPO, we record the return on the country index where the IPO is being listed. Returns are computed up to the end of the previous month, so there is no overlap with the IPO itself.

[4] See Espinasse (2014, p. 85) for the typical timeline of an IPO process.

[5] The market only knows for sure how many shares have been sold about 20 days after the IPO when the stabilization period ends. During this stabilization period the underwriter might have to buy back some of the shares under the Greenshoe option (typically 10-15% of the shares on offer in the IPO) in case the stock price drops below the IPO price.

At the end of years t=0, 1, and 2, we measure firm value using Tobin's q (the market value of equity plus the book value of debt, all divided by the book value of assets). To illustrate the timing conventions, consider the following example: an IPO on the 15th of May of 2010 is matched with market returns from the close of January through the close of April of 2010. We then measure Tobin's q at the end of December of 2010, 2011, and 2012.

Since we focus our tests on valuation at the end of years t=0, 1, and 2, we are effectively excluding the short period that follows an IPO. Valuation in the first few months after listing can be noisy for several reasons. First, the first-day return or underpricing, which has been studied by a vast literature, is on average large (Ritter and Welch, 2002). Derrien (2005) and Cornelli, Goldreich, and Ljungqvist (2006) argue that underpricing reflects the sentiment of retail investors. For example, Baker and Wurgler (2006) include average IPO underpricing in their index of investor sentiment. Second, early valuations can be affected by the intervention of underwriters. Price stabilization by underwriters can be a way to alleviate short-run price pressure. Third, valuations can be noisy because information about the firm arrives only sparsely as analyst coverage begins. Most of these forces are stabilized after a few weeks or months.

Table 1 shows summary statistics for the main variables in our analysis. Variables are reported in chronological order along the IPO timeline. Here we discuss only a few selected variables. Detailed description of all variables is reported in the appendix. Through the prospectus we have access to pre-IPO firm characteristics, which include (log) book assets, leverage (book debt over book assets), return on assets (ROA=EBITDA/book assets), and a dummy for IPOs that are backed by venture capital.[6] Approximately 26% of IPOs in our main sample of owner-managers have backing from venture capital investors. The stake reduction at the IPO is 13% on average. This reduction can be made by issuing new shares (dilution) or through the sale of old shares owned by the controlling shareholder (secondary sales). The firm raises fresh capital when issuing new shares, while firm capital stays the same and the owner cashes out

[6] Leverage is relatively high in this sample because many IPOs have small book equity from accumulated losses before listing.

when selling old shares. As seen in Table 1, most of the stake reduction is done through dilution (10% on average), and only a small part through secondary sales (3% on average). Tobin's q in this table is the average of year-end q across t=0, 1, and 2. Since our main tests are cross-sectional tests, we use the average to smooth out valuation differences across years. However, we also examine year-by-year valuations in some of our analyses and find very similar results. Mean (median) Tobin's q is 3.68 (2.48), which is high compared to other listed firms, because IPOs are skewed towards small-growth firms.

2. Estimating the Relationship between Concentration and Firm Value

a. The Relationship between Concentration and Firm Value in OLS Regressions

The main relationship of interest in the literature is between firm value and the ownership stake:

$$Firm\ Value_i^{post} = \alpha\ Stake_i^{post} + \rho' X_i^{pre} + \mu_j + \mu_m + \mu_t + \vartheta_i \qquad (1)$$

By definition, firm *i*'s value ($Firm\ Value_i^{post}$) is observed only after the company is listed. The post-IPO stake ($Stake_i^{post}$) is the main explanatory variable. The pre-IPO controls included in vector X_i^{pre} are log-assets, ROA, leverage, and a dummy for VC-backed IPOs. Fixed effects are included at the industry level (μ_j), market level (μ_m), and calendar-year level (μ_t). Industries are defined at the 3-digit SIC level. The industry level fixed effects allow us to control for the industrial composition of different stock markets. Different lockup restrictions and free-float requirements motivate the market-level fixed effects. Year fixed effects are necessary to capture calendar effects common to all IPOs (e.g., Gompers and Lerner, 2003). Standard errors (ϑ_i) are clustered at the market-by-year level.

The estimation of a linear relationship between ownership and firm value has a long tradition in the finance literature (see Demsetz and Villalonga, 2001). Many authors add quadratic terms for the stake or a piecewise linear specification for different segments of the stake distribution (Morck, Shleifer, and Vishny, 1988). Some authors also consider a log-linear specification where firm value is measured with the log of Tobin's q. This is particularly relevant for newly listed firms, which have high valuation ratios, and is, therefore, our preferred specification. The other advantage for interpretation is that the coefficient on the stake is a semi-elasticity when using log-Tobin's q.[7]

Table 2 shows the results for regression (1) in our main sample of owner-managers. As dependent variable we use the log of the average Tobin's q at the end of years t=0, 1, and 2. Column 1 shows that an increase of ten percentage points in the post-IPO stake implies a 3.64% increase in Tobin's q (*t*-stat 2.6). In column 2, we find no evidence of a quadratic relationship between ownership and firm value. A negative quadratic term could showcase an entrenchment effect, i.e., a lower likelihood of successful takeovers when stakes are high (see Stulz, 1988; Morck, Shleifer, and Vishny, 1988; McConnell and Servaes, 1990; Himmelberg, Hubbard, and Palia, 1999; Coles, Lemmon, and Meschke, 2012). Our setup is likely to be free from entrenchment effects because management has not been delegated yet.

In column 3 we try a piecewise-linear specification similar to the one in Morck, Shleifer, and Vishny (1988). We split the distribution of the post-IPO stake in three segments: below 20%, between 20% and 50%, and above 50%. These thresholds are motivated by definitions of control thresholds in the previous literature (e.g., La Porta, López-de-Silanes, Shleifer, 1999). We find that the relationship between the stake and Tobin's q is positive throughout the different segments. The magnitude and statistical significance are strongest for stakes above 50%. This may explain the failure of the previous literature to find a positive and monotonic relationship because average concentration is lower in other settings (e.g., mature firms). Figure 5 shows the average q for 25%-intervals of the post-IPO stake, and the positive relationship is clearly present.

[7] Our main results are not affected if we use a simple linear specification.

These results highlight one of the advantages of the IPO setup since the literature has not been able to find a robust relationship between ownership and firm values in OLS, even before endogeneity concerns are considered.

In column 4 of Table 2, we run a similar OLS regression where we split the post-IPO stake according to the identity $Stake_i^{post} \equiv Stake_i^{pre} - \Delta Stake_i$. In words, the post-IPO stake is equal to the pre-IPO stake minus the reduction in the stake at the time of the IPO. We find a positive coefficient on the pre-IPO stake and a negative coefficient on the stake reduction at the time of the IPO, so both effects suggest that more concentration is associated with higher market value. However, despite having the same directional implication, the coefficient on the stake reduction is larger in magnitude than the coefficient on the pre-IPO stake. Hence, the cross-sectional impact on firm value of recent changes in concentration is higher than the effect of baseline levels of concentration.

In columns 5-6 of Table 2, we further split the stake reduction into reduction through dilution with new shares and the secondary sale of old shares. We find that most of the effect comes from dilution, which can be expected since dilution is responsible for the lion's share of the stake reduction in Table 1. The effect of secondary sales is not statistically significant.

b. The Endogeneity Problem and IV Setup

Endogeneity is the main obstacle to properly estimate equation (1). The literature typically focuses on simultaneity bias, in particular, when considering the relationship between ownership and firm value in mature firms. Demsetz and Lehn (1985) argue that the market for control makes the ownership structure converge to the appropriate structure for each particular firm (i.e., shifting control to the most productive user of the assets), and hence that no systematic relationship between concentration and firm value should be apparent in the data. Regressions of firm value on ownership like equation (1) should thus give a coefficient close to zero. The argument rests on a frictionless market for control. However, simultaneity is less of a concern with

IPOs. Owner-managers are endowed with all control rights, and most of them plan to run the firm for the foreseeable future. Transfers of control at the IPO or in the first few years are rare. Management is rarely delegated too. Hence, the nascent interaction of these firms with public markets does not imply a quick convergence to a long-run market-mediated equilibrium. As shown by Helwege, Pirinsky, and Stulz (2007), and Foley and Greenwood (2010), ownership dynamics post-IPO are slow.

Reverse causality in equation (1) is a more pressing concern in the IPO setting. Owners of firms that receive high valuations are more prone to sell large stakes. This is less of a problem in Europe than in the U.S., since in U.S. IPOs the deal size can be adjusted even during the book-building period as precise information about demand is received. Omitted variable bias is a related concern. For instance, firms that have strong prospects, which are typically hard to observe for the econometrician, receive high market valuations and, at the same time, face strong demand for their shares. Both reverse causality and omitted variables suggest a positive correlation between firms with high valuations and large reductions in ownership stakes. This bias can be so strong that Fabisik, Fahlenbrach, Stulz, and Taillard (2020) argue it can explain the negative - instead of positive- relationship between valuation and ownership concentration observed in U.S. firms. Overall, because of the various sources of endogeneity we can expect a bias towards zero in the negative coefficient on the stake reduction estimated through OLS (column 4 Table 2).

One suggestion that this type of endogeneity is pervasive is shown in Table 3. We split the sample according to the median stake reduction, and we compute averages of the different firm characteristics for each subsample. The pre-IPO ROA of firms in the high-stake-reduction sample is 4.7 percentage points higher than in the low-stake-reduction sample. If profitability differences are persistent, this can be an indicator that high-stake-reduction firms have better prospects than low-stake-reduction firms.

We also compute averages that are adjusted for year, market, and industry fixed effects. The regression model in equation (1) removes fixed effects, so the sample averages that are adjusted for fixed effects are more indicative of the regression results. For visual clarity and comparison to previous columns in Table 3, we then add to the

purged data the average for each variable (this does not affect the comparison between samples). As seen in the last column of Table 3, the adjustment for fixed effects does not materially affect the differences in pre-IPO characteristics across subsamples. In particular, the pre-IPO ROA of firms in the high-stake-reduction sample is still 3.7 percentage points higher than in the low-stake-reduction sample. Overall, sorting by the stake reduction produces meaningful differences in firm characteristics that suggest potential endogeneity.

In order to tackle the endogeneity problem head-on we need an instrument for the stake reduction at the IPO ($\Delta Stake_i$). The instrument that we propose is the return on the market index on the three months prior to the firm's listing ($Ret3_m^{pre}$). Our strategy treats the baseline component of ownership ($Stake_i^{pre}$) as exogenous as it is potentially determined long-before the IPO. The reduction in stake is, instead, immediately related to the going public decision and clearly endogenous. In short, our 2SLS system is as follows:

$$1st\ Stage: \Delta Stake_i = \omega\ Ret3_m^{pre} + \theta\ Stake_i^{pre} + \pi' X_i^{pre} + \mu_j + \mu_m + \mu_t + \varepsilon_i \quad (2)$$

$$2nd\ Stage: Firm\ Value_i^{post} = \beta\ \Delta Stake_i + \gamma\ Stake_i^{pre} + \rho' X_i^{pre} + \mu_j + \mu_m + \mu_t + \epsilon_i \quad (3)$$

In the first stage, we explain the stake reduction with $Ret3_m^{pre}$ and the other variables included in the second stage. Bernstein (2015) uses a similar instrument to explain the going public decision itself. If market returns are poor in the pre-IPO period, then some firms decide to withdraw the IPO. Instead of the binary choice to complete or withdraw the IPO, we focus on the size of the stake reduction. In other words, Bernstein (2015) deals with the extensive margin of the problem while we focus on the intensive margin. To the extent that the instrument is valid for the extensive margin, then the selection of firms into the completed status (our sample) is as good as random assignment. We compare the magnitude of the stake reduction induced by the instrument *within* the sample of completed IPOs. The extensive and intensive margins are decided simultaneously, so the same instrument can be valid for both margins. It is important to

note that the left-hand-side variable is different in both approaches since Bernstein (2015) is interested in innovation and not in firm value (which cannot be measured in firms that withdraw their IPOs).

c. IV Assumptions

c.1 Relevance and Instrument Balance

The instrument is potentially relevant because the literature shows that managers sell more equity after strong market returns (Baker and Wurgler, 2000; Ritter and Welch, 2002; Henderson, Jegadeesh, and Weisbach, 2006). For example, Graham and Harvey (2001) show that more than 60% of surveyed CFOs say that (i) the magnitude of equity undervaluation/overvaluation, and (ii) recent stock price increases (or selling if price is "high"), are important factors when issuing equity. Bancel and Mittoo (2009), and Brau and Fawcett (2006), also report that overall stock market conditions are closely watched by CFOs when issuing equity. Market timing is an important motivation for equity issues, although it is neither the sole nor the most important motivation quantitatively speaking (Kim and Weisbach, 2008; DeAngelo, DeAngelo, and Stulz, 2010).

The tendency to sell more equity after strong returns is labeled as market timing since managers and owners are, in principle, taking advantage of periods of low expected returns. Movements in the expected returns of IPO investors can have rational or irrational underpinnings. Pastor and Veronesi (2005) present a fully rational model that predicts more issuance after strong returns and subsequent poor returns (see also, Carlson, Fisher, and Giammarino, 2006). Baker and Wurgler (2000) argue that positive investor sentiment explains the strong returns that precede issuance. Managers can identify the overvaluation and issue accordingly. The low future returns reflect the reversal of sentiment in the behavioral case. Although investor sentiment can explain low expected returns, it is also true that managerial expectations of future returns can be miscalibrated (Ben-David, Graham, and Harvey, 2013). In other words, managers' perceptions of overvaluation may not be real. Still, managers can remain confident about their predictive abilities (Malmendier and Tate, 2005). For our first stage to work

we simply need that owner-managers try to time the market, not necessarily that they effectively identify periods of low expected returns. Variation in expected returns implies predictability of future changes in firm value, which we discuss in the next section as it relates to the exclusion restriction.

In Table 4 we show evidence consistent with the relevance of the instrument. When splitting firms according to the market returns in the previous 3 months (above and below the sample median), we find that the stake reduction is larger in the sample with high past returns. The difference in stake reduction in this table is akin to a first-stage estimate in the sense that it captures the effect of the instrument on the endogenous variable. Table 4 shows that a 12.5 percentage points difference in returns is associated with a 1.7 percentage points larger stake reduction.

Table 4 also allows us to check for balance between the samples with high and low prior market returns. We find that firm size and ROA are significantly higher in the sample with high 3-month returns, which suggests that the type of firms that go public after high returns are different than those that go public after low returns. However, these differences can be traced back to broader trends in issuance and not necessarily to the instrument per se. In order to show this, we adjust each variable for year, market, and industry fixed effects as in Table 3. After adjusting for fixed effects, none of the pre-IPO covariates (firm size, profitability, leverage, and the dummy for VC-backed IPOs) are significantly different when comparing samples with high and low returns. Therefore, although underlying trends related to year, market, and industry effects can affect the type of firm that goes public, once we look within year, market, and industry it is not true that firms that go public after high 3-month returns are different from firms that go public after low 3-month returns. Simply put, the instrument does not split the sample into "good" and "bad" firms. In this sense, Table 4 is consistent with the as-random assignment of the instrument (Atanasov and Black, 2016; Bennedsen, Nielsen, Perez-Gonzalez, and Wolfenzon, 2007).

At the same time, Table 4 shows that differences in the endogenous variables (stake reduction, Tobin's q) remain significant after the adjustment for fixed effects. This implies that 3-month returns have explanatory power for variation in the stake

reduction even within year, market, and industry. Hence, the adjustment for fixed effects does not take away the instrument's relevance. Differences in Tobin's q are still observable, and they are consistent with a reduced-form effect of 3-month returns on the dependent variable.

Any IV strategy relies on "compliers," i.e., those agents that respond to the instrument. Compliers may represent a subset of the population with unique characteristics, and hence extrapolating the IV results to the whole population could be inappropriate. To study this issue, we define compliers as firms that experience prior market returns above average and reduce the stake more than average, or firms that experience returns below average and reduce the stake less than average. Unlike other setups where the treatment of interest is binary (1-0), in our case it is a continuous variable (stake reduction). Hence, we are equally interested in agents who are exposed to high and low levels of the treatment. The instrument is also a continuous variable, so our compliers are those with high treatment intensity and high instrument intensity together with those with low treatment intensity and low instrument intensity. According to our definition, there are 626 compliers out of 1,184 IPOs in the sample. In Table 5 we find no significant differences in pre-IPO average size, leverage, profitability, or the frequency of VC-backed IPOs when comparing compliers and non-compliers, both with and without the adjustment for fixed effects. Overall, compliers are comparable to non-compliers, and hence they are representative of the whole IPO sample. This analysis also emphasizes that it is not enough to account for differences between IPOs after high and low returns for a selection story to contradict our findings. Such a story must account for differences between IPOs that sell more after high returns and IPOs that sell less after high returns, together with differences between IPOs that sell less after low returns and IPOs that sell more after low returns.[8]

[8] Table A.1 in the appendix shows separately the two sub-groups of compliers (IPOs that sell more after high returns and IPOs that sell less after low returns) and the two sub-groups of non-compliers (IPOs that sell less after high returns and IPOs that sell more after low returns). We find that the spread in Tobin's q (endogenous dependent variable) is largest across the two complier sub-groups rather than across high and low returns, which is consistent with compliers driving the main effect on valuation.

c.2 Exclusion Restriction

The exclusion restriction in our case says that market returns on the 3 months before the IPO have no impact on future firm value, except through the reduction in stake. This assumption is ultimately untestable. In this section we spell out alternative theories that predict a direct link between prior returns and firm value, and which would constitute a violation of the exclusion restriction. We perform tests of additional predictions of the alternative theories to see if we can indirectly reject them. In this way, we can find support for the exclusion restriction.

One concern is that prior market returns can be correlated with variation in expected returns demanded by IPO investors or derived from the behavior of IPO investors. If this is the case, then prior market returns belong in the structural equation on their own merit. Although 3-month returns are *not* among the usual predictors of future returns (Campbell and Thompson, 2008), there is still the possibility that they proxy for variation in expected returns in the context of IPOs.

Predictability is the main prediction of this alternative hypothesis. Variation in expected returns, which 3-month market returns supposedly capture, must be translated into predictability of future *changes* in firm value (i.e., future returns). If we find no predictability, then there is no evidence of variation in expected returns. The horizon of predictability is related to the horizon at which expected returns are supposedly varying. The advantage of predictability is that we can take it to the data, and hence test this potential violation of the exclusion restriction.

Predictability could be present regardless of whether we consider rational or irrational fluctuations in expected returns. They only differ in the source of expected returns variation. In the rational case, changes in risk move discount rates, but investors and managers alike are aware of the fluctuations (Pastor and Veronesi, 2005; Carlson, Fisher, and Giammarino, 2006). In the behavioral case, positive investor sentiment causes overvaluation, which predicts low future returns as sentiment reverts (Baker and Wurgler, 2000). In this case, managers are aware of the overvaluation, while investors are naïve.

Although variation in expected returns is a potential violation of the exclusion restriction, it is important to emphasize that its predictions go against the agency model. This happens because our tests deal with a cross-section of firm values and not with a cross-section of *changes* in firm values. Low expected returns do not imply that the long-run values of firms that issue more should be lower than the values of other firms. If firms issue when expected returns are low, then they issue at relatively high prices. After expected returns revert to normal levels (i.e., after predictability is extinguished), prices should revert to normal or fair levels, but not to levels below fair. If reversal is incomplete, prices should be higher -not lower- in high issuance firms compared to low-issuance firms because values are converging from a high level. Hence, variation in expected returns does not predict low values of high-issuance firms relative to other firms in the cross-section, although it predicts low returns or low changes in firm value. Agency theory, instead, predicts low values of high-issuance (i.e., high stake-reduction) firms relative to other firms.

3. Results

a. Baseline IV Results

Table 6 shows the results for the IV system in equations (2) and (3). Columns 1-3 show the first stage where we run the stake reduction (or its components: dilution and secondary sales) on prior 3-month market returns. The coefficient in column 1 implies that a 10-percentage-points higher return leads to a 0.93% larger reduction in stake (*t*-stat 3.57).[9] Since the average stake reduction is 13%, this effect implies an approximately 7% larger stake reduction. This evidence is consistent with the owner's attempt to time the market, although without claiming that market timing is the sole nor the most important motive for issuing equity (Kim and Weisbach, 2008; DeAngelo, DeAngelo, and Stulz, 2010).

We report the Montiel-Olea and Pflueger (2013) effective first-stage F-statistic, which corrects for non-homoskedasticity. The F-statistic of 12.64 (column 1) implies that

[9] In unreported results we find that most of the explanatory power comes from the returns on months t-3 and t-2 rather than the last month t-1. This fits well with the timing of IPO decisions previously discussed.

our instrument is not weak, and hence that we can use standard IV inference. The cases of stake dilution (column 2) and secondary sales (column 3) show worse F-statistics than the stake reduction. In particular, past returns seem to be weak instruments for secondary sales (F-stat of 4.87).

Column 4 in Table 6 shows the second stage results. The coefficient on the stake reduction is negative and significant at the 5% level (-9.292; t-stat 2.39). It implies that Tobin's q falls by 8.6% from the reduction in stake of 0.93% that we find in the first sage (8.6%=0.93% x 9.292). In the last column of Table 6, we report the reduced-form regression, which relates Tobin's q with 3-month returns directly. The reduced-form coefficient is basically the first stage coefficient times the second stage coefficient. Hence it is not surprising that it implies the same effect as above: a fall of Tobin's q of 8.6% (*t*-stat 3.08) when returns are 10 percentage points higher.

The IV coefficient on the stake reduction is about 11 times larger than the OLS coefficient (comparing column 4 in Table 6 with column 4 in Table 2), but the difference is due to the mitigation bias in OLS produced by endogeneity. The magnitude of the IV coefficient is plausible in the sense that the costs involved (i.e., 8.6% of firm value when returns are 10% higher in the previous 3 months) does not seem to be prohibitively high. For example, for the median firm in our sample, it implies a cost of USD 4.8 million, which is in the ballpark of listing and underwriting fees (Abrahamson, Jenkinson, and Jones, 2011).[10,11] This suggests that the effect can survive in equilibrium (see Jiang, 2017, for an argument along these lines when discussing the magnitude of IV estimates). Going public is typically a one-time decision for owner-managers, so it is less likely that the preference for market timing wears off by learning.

Also regarding the magnitude of the effect, it is worth noting that the IV estimates represent local average treatment effects (LATE). This matters for the external validity of our results. We estimate the effect of selling a marginally larger ownership

[10] From Table 1, median book assets are USD 22.7 MM, which at a Tobin's q of 2.48 implies a firm value of USD 56.4 MM. An 8.6% of that value is USD 4.8 MM.

[11] An indirect way to benchmark the magnitude of our estimates is to compare them with the value of the private benefits of control in the previous literature. Dyck and Zingales (2004) find that, on average, private benefits are 14% of firm value.

stake but remaining within the typical conditions faced by IPOs. Simply extrapolating our results to cases that involve, for example, changes in ownership in large and mature firms is not appropriate because overall conditions are likely to change. For instance, passive institutional investors that follow stock indices (which typically do not include IPOs) are part of the demand for large firms and not for IPOs. On top of variation in demand conditions, the ownership structure of large firms can change the nature of the stake being sold. For example, a 5% stake in a large firm with a dispersed shareholder base conveys more control rights than a 5% stake in a small firm with a dominant owner-manager (see Barclay and Holderness, 1989, 1991). Hence, selling a 5% stake of a large firm is unlikely to convey a loss of 43% (=8.6% x 5) of firm value as a naive extrapolation of our results would suggest. These thought experiments abandon the local nature of our results and must be interpreted carefully.

b. Timing of the Effects

The regressions in Tables 2 and 6 use average valuation between t=0 and t=2. We now run regressions on a year-by-year basis (t=0,1,2). The dependent variable (Tobin's q) varies across these different regressions. The stake reduction is still measured at the moment of the IPO, and the pre-IPO covariates are the same across all specifications.

Figure 6 summarizes the dynamics of the effect of the stake reduction (Table A.2 in the appendix reports detailed regression statistics). We report the OLS and IV coefficients on the stake reduction for each cross-section, together with confidence intervals at the 95% confidence level. We find a small but significant OLS coefficient in year t=0. The coefficient then falls in magnitude and significance as time passes, and by year t=2, the coefficient is practically zero. The IV coefficients are, instead, stable in magnitude and significance across the three cross-sections (t=0,1,2).

Our interpretation is that the IV estimate can isolate the exogenous and stable relationship between ownership and firm value. The endogeneity bias, which pulls the OLS coefficient towards zero, gets stronger every year. One source of endogeneity is

that firms with poor prospects receive weaker demand for their shares at the time of the IPO. Poor prospects lead to bad profitability after the IPO, which in turn can reduce valuations even more. Hence, owner-managers that endogenously retain a high stake at the IPO can be "stuck" with a large stake in a poorly-performing-low-valuation firm after two years (Fabisik, Fahlenbrach, Stulz, and Taillard, 2020). This reinforcement of the endogeneity problem further biases the OLS coefficient at t=2. The IV estimation produces more stable coefficients by focusing on the exogenous variation in concentration that occurs at the birth of the firm into public markets.

c. Placebo tests

We design two placebo tests. We first study the role of market returns in different windows around the IPO. Second, we study the behavior of controlling shareholders other than owner-managers. Both tests speak about the assumptions underlying the first stage (i.e., relevance), and the second stage (i.e., exclusion restriction).

c.1 Tests with Placebo Returns

Table 7 reports the first stage and the reduced-form regressions using returns around the 3-month window. Columns 1-3 explore the impact of past and future returns on the first stage, i.e., the regression where the stake reduction is the dependent variable. In columns 1 through 3, we find that returns adjacent to our main 3-month window have no bearing on the stake reduction of owner-managers. In particular, we find no impact of returns between months -6 and -3, or between the IPO and month +3, on the stake reduction. In column 4, we run the reduced-form regression with all returns, and we find that only returns in the 3 months before the IPO have an impact on firm value that is statistically significant.

The results in Table 7 speak in favor of the exclusion restriction because we see an impact of 3-month returns on future valuation (reduced form) only when those returns also have an impact on the ownership decision (first stage). Returns slightly before or slightly after the window that is relevant for the ownership decision have no

impact on valuation. Hence, it becomes harder to argue that 3-months returns are part of market dynamics that directly affect long-run valuation through channels other than ownership.

c.2 Tests with placebo sample

The second placebo test deals with IPOs where the controlling shareholder is not an owner-manager. These IPOs are controlled by financial institutions (i.e., banks, venture capitalists), other companies (e.g., spin-offs), the state in the case of privatizations, and others. These IPOs are interesting because these other investors have objective functions and contractual, or even political, constraints that differ from owner-managers. Table A.3 in the appendix shows averages of the main variables for these other IPOs and the comparison with IPOs controlled by owner-managers. The IPOs controlled by other shareholders are larger and less profitable firms when compared to IPOs controlled by owner-managers. Post-IPO stakes are smaller with other shareholders, mostly because secondary sales are two to three times larger than with owner-managers. This suggests a strong exit motive in other shareholders that is absent from owner-managers. Interestingly, prior 3-month market returns are indistinguishable when we compare across different IPO types.

Table 8 shows regressions for the sample of other IPOs. In columns 1 and 2, we run OLS regressions of Tobin's q on our ownership variables. The coefficients on the post-IPO stake, pre-IPO stake, and stake reduction have the same signs as in the sample of owner-managers, but magnitudes fall approximately by one third (when comparing Table 8 with Table 2). There is little or no statistical significance. We see at least two explanations for these results. First, agency theory applies more readily to owner-managers than to other controlling shareholders, and hence the ownership stake can be less relevant to determine firm value in the alternative sample. Second, endogeneity can be stronger in the sample with other shareholders since these firms have significantly lower profitability (ROA) than the firms of owner-managers (see Table A.3). This would bias the OLS coefficients further down, following the type of endogeneity suggested by Fabisik, Fahlenbrach, Stulz, and Taillard (2020).

Columns 3 and 4 in Table 8 show the first stage regression and the reduced-form regression for the sample of other IPOs. We find that 3-month market returns have no explanatory power either for the stake reduction (column 3) or for Tobin's q (column 4). These results suggest two things. First, other shareholders do not try to time the market like owner-managers or can't time the market because the number of shares offered depends on other constraints. Second, the reduced-form regression for other IPOs supports the exclusion restriction because it is not clear why, under the alternative hypotheses, 3-month returns should belong to the structural equation for owner-managers, but not for IPOs with other controlling shareholders. If 3-month *market* returns proxy for variation in expected returns, then this variation should be relevant for the entire market, and not only for owner-managers that represent a subset of the market. Similarly, if 3-month returns are picking up some form of firm selection based on unobservables, it is not clear why this selection would work for firms controlled by owner-managers and not for other firms.

d. Predictability tests

Predictability tests are crucial to study variation in expected returns in the IPO market. If 3-month returns proxy for low expected returns, then they should predict future changes in firm value with a negative sign, i.e., a reversal. These low future returns reflect the low discount rates that lead rational investors to accept the high initial prices, or they reflect a reversal of the irrational optimism that initially produced overvaluation. There is predictability in both cases, but the source of predictability is different.

In Table 9 we show regressions where we look at the predictive power of 3-month market returns for future changes in firm value. Before exploring long-run changes in firm value, in column 1 of Panel A we show regressions with underpricing (first-day return) as the dependent variable. In line with the results on "hot markets" (Ritter and Welch, 2002), high market returns predict stronger IPO underpricing. Derrien (2005) and Cornelli, Goldreich, and Ljungqvist (2006) relate this result to the sentiment of retail investors in the pre-IPO market. Interestingly, the underpricing result can also

be seen in the IPOs with other controlling shareholders (see column 1 of Panel B). Hence, the sensitivity of underpricing to past returns is a market-wide effect, and not exclusive to owner-managers.

Starting with column 2 in Table 9, we present regressions where the dependent variable is the change in log-Tobin's q between different points in time. These different time windows allow us to estimate the precise horizon at which expected returns are varying. In column 2 we use the difference in q between the end of the IPO year (t=0) and the IPO date. Tobin's q at the IPO date uses the offer price to value equity. In column 3, we use the difference in q between the end of year t=1 and the end of year t=0; and so on and so forth for the columns that follow. In columns 1, 2, 5, and 6, the sample size is smaller than in our main tests because there are missing values for q at the IPO date and for years beyond t=2.

In column 2 of Panels A and B, we find that Tobin's q strongly reverts between the IPO date and the end of year t=0. The effect is of similar magnitude in both samples (-0.83 for owner-managers and -0.91 for other IPOs). Hence, this predictability is a market-wide effect rather than an exclusive feature of IPOs from owner-manager firms. Expected returns on *all* IPOs are low during the first few months after listing in a hot market.

Crucially for our empirical design, we find no predictability of the change in Tobin's q between t=0 and t=1 (column 3 of Table 9, both panels). There is no predictability either in later years (columns 4-6, both panels). In other words, expected returns starting from the end of t=0 are not affected by market returns in the 3 months before the IPO. Hence, there is predictability related to prior 3-month market returns, but this predictability is relatively short lived. Our main tests (Table 6) exclude valuations before the end of year t=0, so we are effectively excluding the period with predictability. Therefore, for the horizon that is relevant for our results, we can say that firm values are fair, i.e., *changes in firm value are unpredictable with respect to the instrument*. This lack of predictability implies that the exclusion restriction holds because 3-month returns are not proxying for movements in expected returns beyond the end of year t=0.

Figure 7 summarizes the dynamics of Tobin's q in our sample of owner-managers. We split IPOs into firms going public after high 3-month returns and firms going public after low 3-month returns (as in Table 4). Before plotting, we purge market, industry, and year fixed effects from the data. At the IPO date, IPOs that follow high returns are valued slightly below IPOs that follow low returns. Both IPOs increase in value sharply on the first day of trading. Since underpricing is stronger in IPOs that follow high returns (column 1 of Table 9), both IPOs end up basically with the same Tobin's q after the first day of trading. Between the first day of trading and the end of year t=0 we see reversals in the valuation of both types of IPOs, but more strongly so in IPOs that follow high market returns. This is again what the results in Table 9 show (column 2).

The difference in valuation between IPOs that follow high and low returns is seen at the end of year t=0 (see Panel B of Figure 7). If reversal were incomplete, then there should be a price premium at the end of year t=0 instead of a price discount. If reversal were complete (and in the absence of an agency discount), then there should be no premium nor discount at the end of year t=0. The fact that the values of firms preceded by high 3-month returns fall below the prices of other IPOs in Figure 7 is evidence that this is not merely a reversal. Instead, it is consistent with an agency discount because these owners reduced their ownership stakes more in response to high returns. The discount on IPOs that follow high returns persists at approximately the same magnitude for all subsequent years in Figure 7. Our main regressions start with data at the end of year t=0, and basically capture the same value discount that is showcased in Figure 7 in a reduced-form fashion. Although the valuations of IPOs that follow both high and low returns trend downwards, the *wedge* between them is stable in time. Our main tests are cross-sectional comparisons, so what we really care about is this wedge.

The stability of the wedge also helps us to shed light on the short-run nature of predictability in our data. For example, if 3-month returns capture changes in discount rates at long horizons, then we should find that the wedge grows in time as returns are compounded. An annual difference in the discount rate of, say, 5% should translate into a price wedge of approximately 5% at the end of the first year, 10% the second year, and 15% the third year. We find instead that the cross-sectional wedge is of similar

magnitude across years, which speaks against 3-month returns as a proxy for discount rates at this horizon.

e. Interpretation

In order to interpret the mechanism behind the value discount of low concentration firms, we explore the effects on other firm outcomes for the sample of owner-managers. We first study average asset growth over the period t=0, 1, and 2, where growth for year t is computed as the log difference in book assets between the end of year t+1 and year t. We also study ROA, leverage, and the ratio of cash holdings to assets as averages of year-end values on t=0, 1, and 2. No pre-IPO information is used when computing these dependent variables. The OLS and IV results in Table 10 show a significant and negative impact of the stake reduction on asset growth (columns 1 and 5), but no significant impact on ROA, leverage, or cash over assets. The IV coefficient implies that asset growth falls by 5.25% (column 5) with an additional reduction in stake of one percentage point. The mean (median) post-IPO asset growth in our sample is 5% (8%), so the effect is economically relevant.

Our results are consistent with agency costs of equity in the sense of Jensen and Meckling (1976). The market discounts the valuation of a firm with a small-stake owner-manager because of the stronger divergence of interests between outside shareholders and the owner-manager. The low asset growth that we find in Table 10 suggests that the owner has weaker incentives to keep on investing when her stake is small.[12] This could be an indication that owner-managers with smaller stakes settle into the "quiet

[12] As Jensen and Meckling (1976) put it: "We shall continue to characterize the agency conflict between the owner-manager and outside shareholders as deriving from the manager's tendency to appropriate perquisites out of the firm's resources for his own consumption. However, we do not mean to leave the impression that this is the only or even the most important source of conflict. Indeed*, it is likely that the most important conflict arises from the fact that as the manager's ownership claim falls, his incentive to devote significant effort to creative activities such as searching out new profitable ventures falls.* He may in fact avoid such ventures simply because it requires too much trouble or effort on his part to manage or to learn about new technologies. Avoidance of these personal costs and the anxieties that go with them also represent a source of on the job utility to him and it can result in the value of the firm being substantially lower than it otherwise could be." (p. 313; our emphasis).

life" instead of empire building (Bertrand and Mullainathan, 2003). Firms that raise more money at the IPO, since the stake reduction is driven by dilution and hence by new capital, do not seem to devote the extra cash to more accelerated growth.

In Jensen and Meckling (1976) the owner-manager is simultaneously deciding firm size and the ownership stake. The firm becomes bigger when the owner issues new shares and dilutes her stake. Incentives deteriorate as the owner's proportional stake falls because the owner faces less than the full cost of private benefits, while still enjoying full benefits. This happens regardless of the fact that the manager's stake in the new firm becomes bigger, in monetary terms, relative to other sources of owner wealth (e.g., housing, financial investments, other businesses, etc.). In practice, it is hard to have a complete picture of owner wealth since most of these data are not reported and even less so in a consolidated database. Therefore, we do not study the impact of owner wealth on our results. However, we note that it would be a channel different from Jensen-Meckling's incentive problem.

Besides the agency model of Jensen and Meckling (1976), Leland and Pyle (1977) also predict a positive relationship between ownership stakes and value in a model with asymmetric information. In their model, the owner retains a large stake to signal the good quality of the assets. Although the asymmetric information model implies a value discount when the ownership stake is low, the absence of a significant effect on ROA (columns 2 and 6 in Table 10) suggests that firms with high stake reductions are not low-profitability or low-quality firms as the asymmetric information model predicts. The absence of differences in ex-ante measures of profitability (Table 4) also suggests that these are not necessarily low-quality firms.

The lack of an effect on leverage (columns 3 and 7 in Table 10) implies that the value discount cannot be attributed to capital structure, or that it is unlikely that conflicts between debtholders and equity holders cause the effect. Finally, the results for cash holdings (columns 4 and 8 in Table 10) speak against another alternative hypothesis to the agency model. If by selling a larger stake firms raise more capital than what they can efficiently redeploy, then those firms can become stuck in an equilibrium with low valuations and large cash holdings. Our finding that cash holdings are

unaffected by the stake reduction suggests that this alternative hypothesis is unlikely to explain the valuation effects of the stake reduction.

f. Implications for market efficiency

We briefly discuss the implications of our results for the rationality of the IPO market, both in terms of investors and owner-managers. First, in terms of investor rationality we need that, at least at some point after the IPO, prices are unpredictable using the instrument (i.e., price changes are fair with respect to the instrument). Our identification strategy requires market efficiency in this narrow sense. It ensures that cross-sectional comparisons of firm values are free from differences in expected returns, although not necessarily that the overall price level in the economy is fair or unaffected by sentiment (Summers, 1985). Our results imply that there is a short window of variation in expected returns (i.e., a few months), but that prices are fair with respect to the instrument in the long term. Our results cannot disentangle whether the short-run predictability is driven by rational or irrational IPO investors. However, they do speak against rational models of IPO timing that imply long-run predictability.

Second, we need to evaluate the rationality of owner-managers. We find that owner-managers tailor their ownership decision to short-run predictability. Only owner-managers engage in this type of market timing, but variation in expected returns affects all types of IPOs (Table 9). In other words, all IPOs ride a similar valuation wave, but owner-managers do it aggressively by selling more or less depending on the strength of the wave, while other controlling shareholders do it passively. In the long run, high stake-reduction owner-managers experience negative consequences for firm value. Is this type of market timing rational? It would seem that owner-managers take advantage of low short-run expected returns, but that eventually the market understands their behavior and punishes them with the agency discount. At face value this suggests that owners are myopic or irrational (Malmendier and Tate, 2005). However, this is not necessarily the case. Owners derive utility from private benefits as well as from market values in Jensen and Meckling (1976)'s model. At the time of going public, although long-run market values are ultimately lower with a larger stake reduction, owners may be

inclined towards dilution to have a larger firm under control. Owners can be aware that the stake reduction comes at the expense of long-run value, but they may be perfectly content with it because they are compensating with the extraction of more private benefits. Hence, owner-managers are not necessarily myopic or irrational.[13]

g. Robustness checks

In the appendix we report a battery of robustness checks for our results (see Table A.4). The find that the main result becomes even stronger when adding market-by-year fixed effects.[14] This reinforces the idea that the instrument captures differences across IPOs in the same market and year instead of broad valuation waves that jointly affect IPOs and their markets as suggested by Gompers and Lerner (2003). The results also survive the inclusion of industry-by-year fixed effects.

The end of the dot-com period (1999-2001) and the market crash of 2008-9 are not the drivers of our findings, since we get basically the same magnitude and statistical significance of the coefficients of interest when excluding these sub-periods. Some industries, such as the service industry (SIC 7) that accounts for close to one third of the sample, or the finance industry (SIC 6), might be affected by distorted valuations. Again, our results are robust to excluding IPOs from these industries. Finally, excluding markets with very few IPOs (less than 20), or excluding small firms (firms with less than 5 MM in pre-IPO assets) does not affect our results either.

4. Conclusions

The relationship between ownership concentration and firm value has been a cornerstone of corporate finance since Jensen and Meckling (1976). We revisit this relationship using hand-collected data on the stakes of owner-managers immediately

[13] The value discount may also be small in comparison to the owner's ability to extract surplus from a buyer in a future sale of control (Zingales, 1995). Another explanation for the owner's willingness to take the value discount is a desire to diversify her portfolio (Bodnaruk, Kandel, Massa, and Simonov, 2008).

[14] The F-statistic in the first stage is weaker, which can be expected since market-times-year fixed effects absorb approximately 400 degrees of freedom out of a sample of approximately 1,200 observations.

before and after IPOs. Our sample covers IPOs in 19 European countries between 1990 to 2013. In OLS regressions, we find a negative relationship between reductions in concentration and firm value, as predicted by agency theory, but which has proven elusive in other empirical setups. Since there is no delegation of management in our setup, our results are free from entrenchment effects that the previous literature needs to take into consideration.

We confirm that the effect of ownership concentration on value is causal by instrumenting for the reduction in stakes using the market returns on the 3 months prior to the IPO. The reason behind the importance of prior market returns on the stake reduction is the attempt of owner-managers to time the market. Other controlling shareholders do not engage in this type of market timing and do not suffer value consequences afterward. We also find that returns on other windows around the IPO have no predictive power for the stake reduction nor to explain cross-sectional differences in firm value after listing. Finally, predictability tests show that variation in expected returns is extinguished before the valuations for which we conduct our tests, and hence that the exclusion restriction holds.

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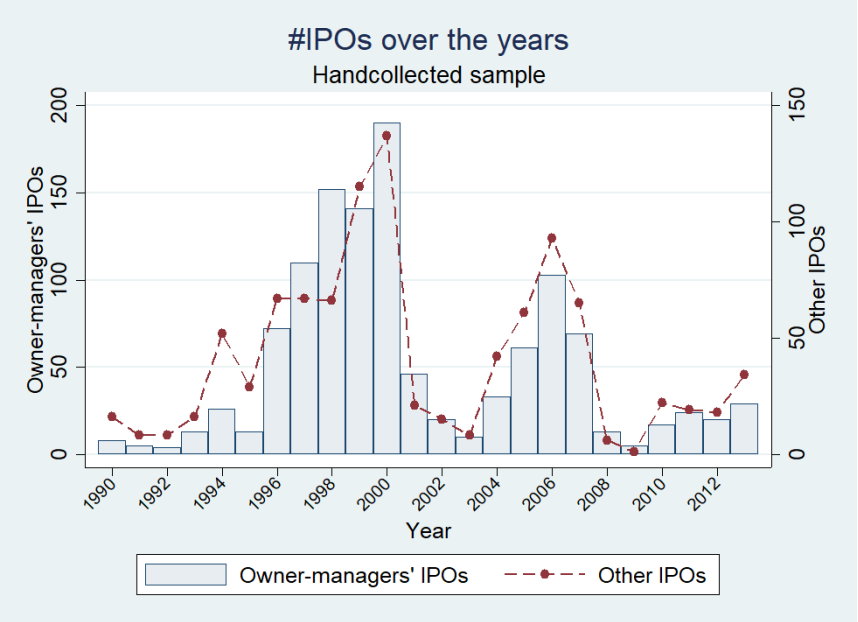
Figure 1

This figure displays the number and valuations of hand-collected European IPOs over the years with complete information on pre-IPO controlling stakes, pre-IPO firms' financials, stake reduction at the IPO, and post-IPO valuation. The bars (left axis) represent IPOs where the controlling shareholder is an owner-manager, and the dotted line (right axis) represents IPOs where the controlling shareholder is a financial institution, another company, or the state. Panel A displays the number of IPOs over the years. Panel B showcases the mean Tobin's q by the end of the year for IPOs that went public during that year.

Panel A



Panel B

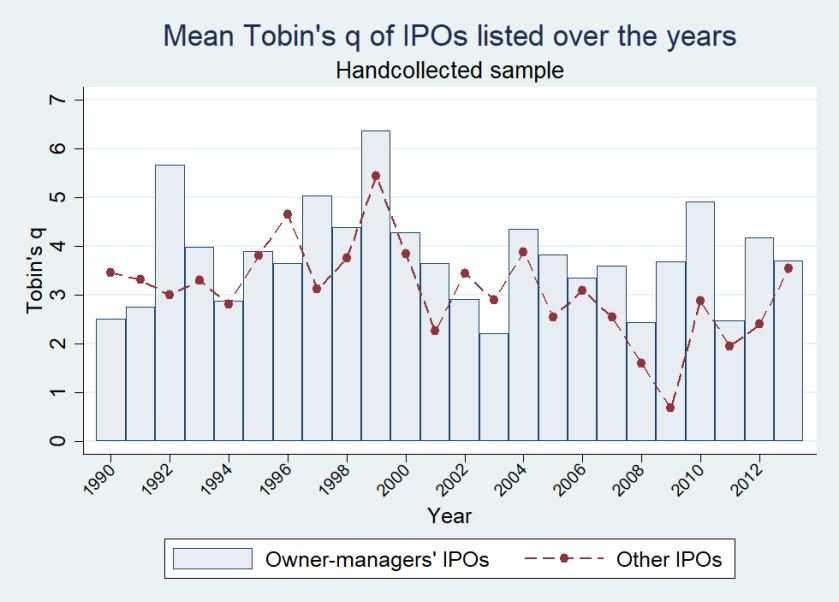


Figure 2

This figure displays the yearly average of the stake held before the IPO, the stake retained after the IPO, and stake reduction at the IPO in the owner-managers sample.

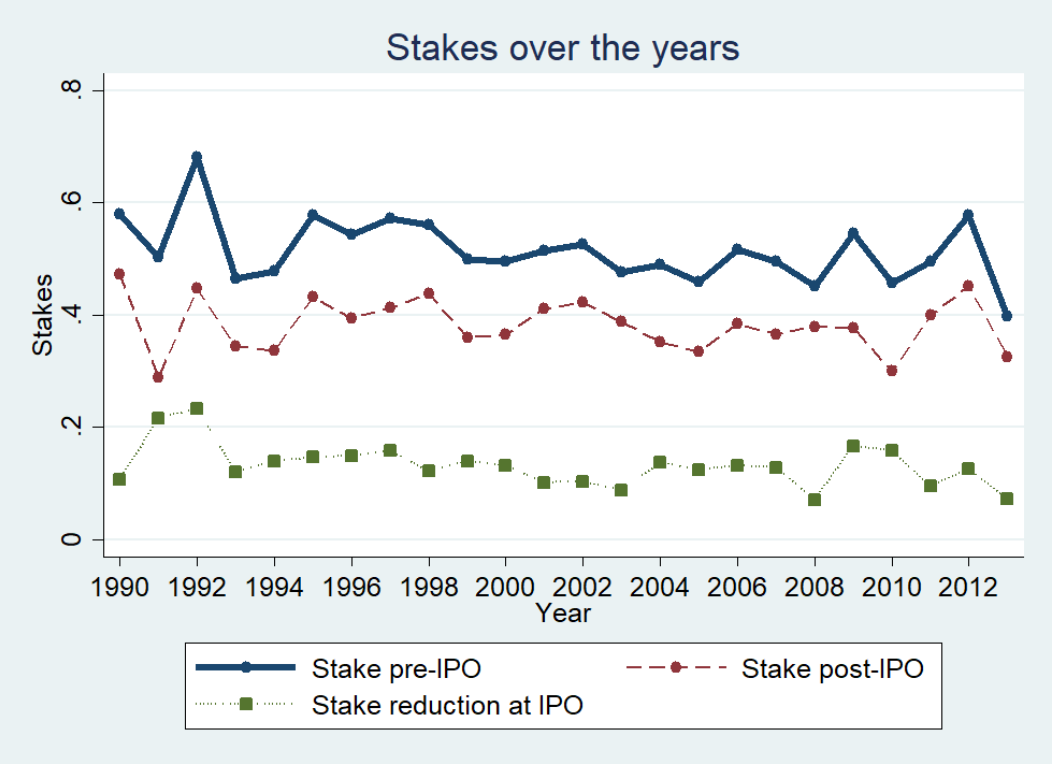


Figure 3

The figure displays the frequency of stake held by the owner-manager pre-IPO (solid bars), and the stake retained immediately after the IPO (dashed bars).

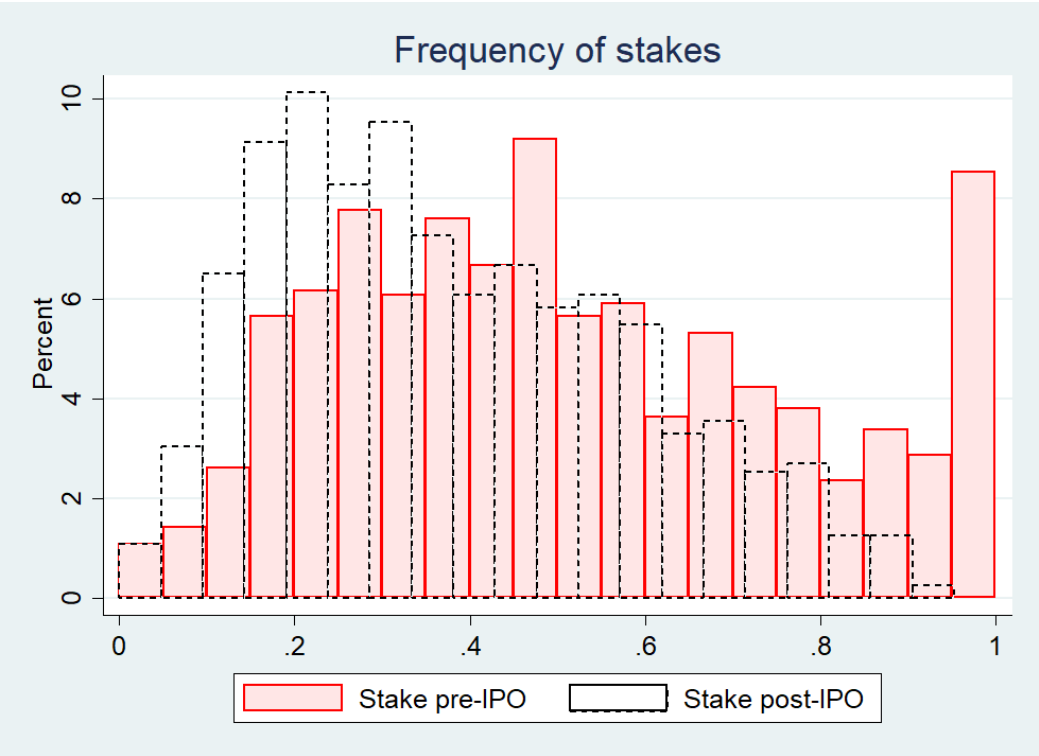
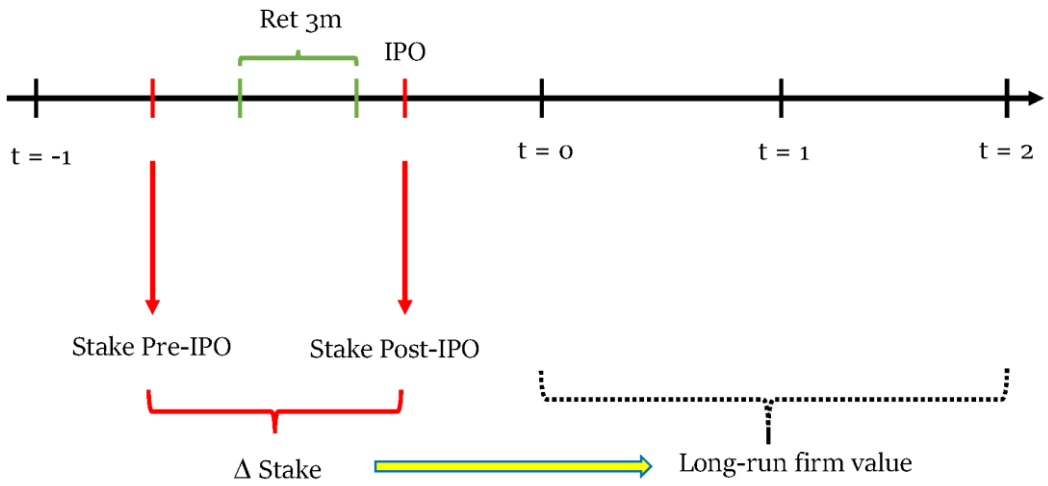


Figure 4

The figure shows the timing conventions for our main variables. Year t=0 is the year of the IPO. From the prospectus, we measure the stake before the IPO and the stake immediately after the IPO. In the 3 months before the IPO, we record the index return of the market where the IPO is listed. The three months are the calendar months that end prior to the date of the IPO, so there is no overlap with the IPO itself. We measure firm value using Tobin's q at the end of years t=0, 1, and 2.



Identification Strategy:

Ret 3m ⟹ Δ Stake ⟹ Long-run firm value

Figure 5

This figure plots the average firm value (measured by Tobin's q) for four groups, based on the equity stake retained post IPO by the owner-manager. Tobin's q for each firm is adjusted by market, year and industry fixed effects. To that end, we first run Tobin's q on market, industry, and year fixed effects and obtain the residuals for each firm (i.e., the portion unexplained by the fixed effects) and add it to the variable mean.

Figure 6

This figure plots the OLS and IV coefficients of the stake reduction at the IPO, together with 95% confidence intervals, for the regression where the dependent variable is the logarithm of Tobin's q. The regressions also include firm-level controls and fixed effects. We run separate regressions using firms' valuations at each year-end following the IPO (t=0, 1, and 2). The regression results are presented in Appendix Table A.1.

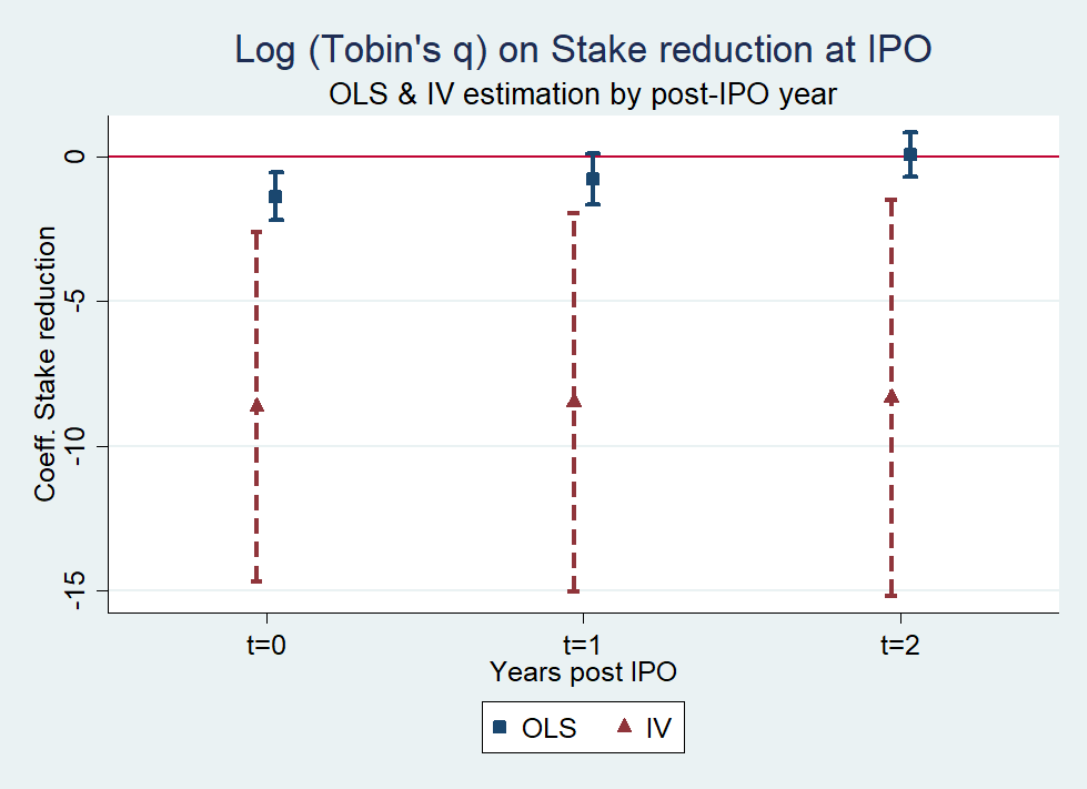
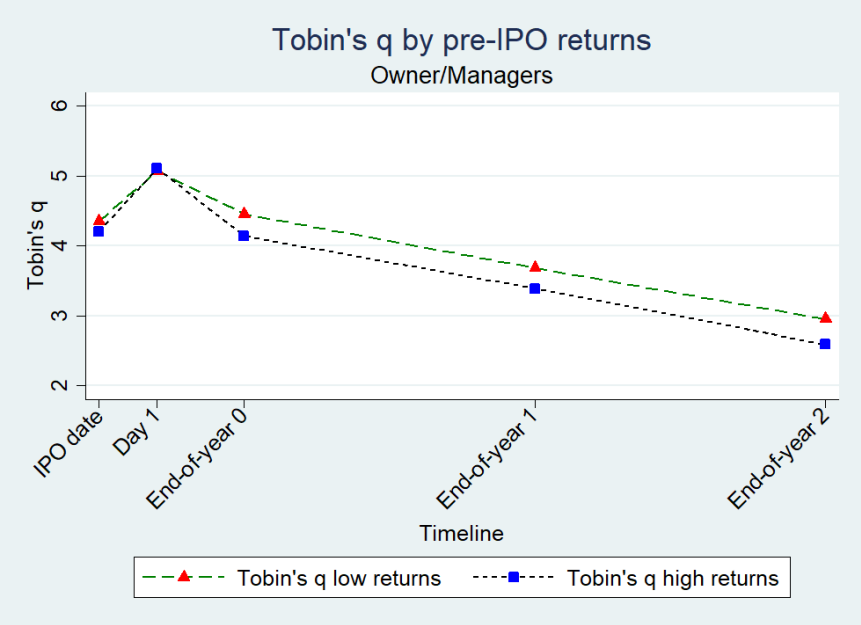


Figure 7

This figure plots the evolution of average firm value (measured by Tobin's q) from the IPO date up to the year-end of the second year after the IPO. In Panel A, we plot the evolution of Tobin's q for two groups: Firms that faced high (above average) vs. low (below average) 3-month market returns prior to the IPO. In Panel B, we plot the difference in Tobin's q between the two groups. Tobin's q for each firm is adjusted by market, year, and industry fixed effects. To that end, we first run Tobin's q on market, industry, and year fixed effects and obtain the residuals for each firm (i.e., the portion unexplained by the fixed effects), and add it to the variable mean. The sample is restricted to firms that have observations for all time periods, including the IPO date (1,142 observations).

Panel A



Panel B

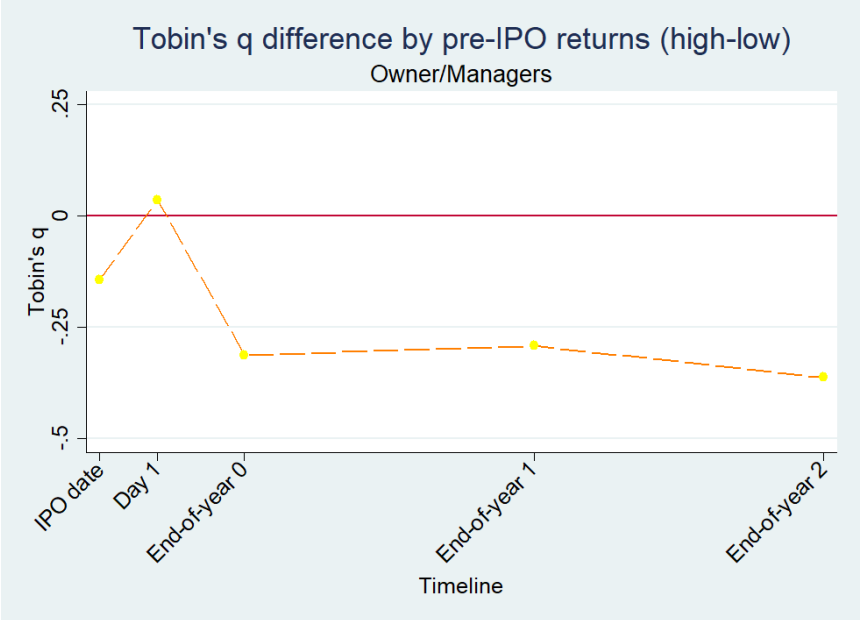


Table 1: Summary statistics

This table displays summary statistics for the sample of IPOs controlled by owner-managers. The appendix contains detailed definitions for all variables. Pre-IPO variables are hand-collected from the IPO prospectus.

	Mean	P10	P25	P50	P75	P90	SD	Total
Log(assets) pre-IPO	16.62	13.66	15.44	16.94	18.14	19.41	2.55	1,184
ROA pre-IPO	0.11	-0.13	0.04	0.15	0.27	0.41	0.36	1,184
Leverage pre-IPO	0.70	0.27	0.52	0.70	0.84	0.97	0.38	1,184
VC-backed	0.26	0.00	0.00	0.00	1.00	1.00	0.44	1,184
Stake pre-IPO	0.51	0.20	0.30	0.49	0.70	0.92	0.26	1,184
Mkt ret 3m	0.03	-0.06	-0.01	0.03	0.07	0.14	0.09	1,184
Stake post-IPO	0.38	0.14	0.22	0.35	0.53	0.69	0.21	1,184
Stake reduction at IPO	0.13	0.03	0.06	0.11	0.18	0.26	0.12	1,184
Stake dilution at IPO	0.10	0.00	0.04	0.08	0.14	0.21	0.09	1,184
Secondary sales at IPO	0.03	-0.00	-0.00	0.00	0.05	0.10	0.08	1,184
Underpricing	0.19	-0.01	0.00	0.05	0.18	0.50	0.51	1,142
Tobin's q	3.68	1.09	1.56	2.48	4.21	7.69	3.49	1,184
Asset growth post-IPO	0.05	-0.52	-0.17	0.08	0.26	0.51	0.46	1,184
ROA post-IPO	0.02	-0.28	-0.02	0.09	0.16	0.24	0.27	1,183
Leverage post-IPO	0.47	0.15	0.29	0.48	0.65	0.80	0.24	1,184
Cash/Assets post-IPO	0.16	0.01	0.04	0.09	0.22	0.43	0.18	1,136

Table 2: OLS regressions of ownership stakes and firm value

This table displays the OLS regressions of ownership stakes and firm value, measured by the logarithm of one plus Tobin's q. In Columns 1-3, the main explanatory variables are variations of the Stake post-IPO. Column 1 includes a linear effect, column 2 includes a linear and quadratic term, and column 3 considers a piecewise-linear specification with two dummies: One that takes a value of one if the stake retained post-IPO is between 20% and 50% and 0 otherwise, and another that takes a value of 1 if the stake is larger than 50% and 0 otherwise. In Column 4, we consider the two components of Stake post-IPO separately: Stake pre-IPO and Stake reduction at IPO. In column 5, we include Stake dilution at IPO instead of Stake reduction at IPO. In column 6, we include both components of Stake reduction at IPO as explanatory variables: Stake dilution at IPO and Secondary sales at IPO. Control variables include pre-IPO log(assets), leverage, ROA, and the VC-backed dummy variable. Standard errors are adjusted by heteroscedasticity and clustered at the market-by-year level. Significant at the *10%, **5%, ***1%.

VARIABLES	(1) log(Tobin's q)	(2) log(Tobin's q)	(3) log(Tobin's q)	(4) log(Tobin's q)	(5) log(Tobin's q)	(6) log(Tobin's q)
Stake post-IPO	0.364***	0.246				
	(0.140)	(0.513)				
Stake pre-IPO				0.422***	0.599***	0.548***
				(0.148)	(0.136)	(0.151)
Stake reduction at IPO				-0.793**		
				(0.344)		
(Stake post-IPO)^2		0.137				
		(0.614)				
0.2<(Stake post-IPO)<0.5			0.055			
			(0.057)			
(Stake post-IPO)>=0.5			0.169**			
			(0.075)			
Stake dilution at IPO					-2.029***	-1.931***
					(0.509)	(0.521)
Secondary sales at IPO						0.299
						(0.342)
Observations	1,184	1,184	1,184	1,184	1,184	1,184
R-squared	0.359	0.360	0.358	0.362	0.383	0.383
Market FE	Yes	Yes	Yes	Yes	Yes	Yes
Ind FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes
Sample	Owner/ Managers	Owner/ Managers	Owner/ Managers	Owner/ Managers	Owner/ Managers	Owner/ Managers

Table 3: Split by stake reduction (endogenous variable)

This table displays variable means, and their difference, according to whether the stake reduction at the IPO (the endogenous variable) is above or below the sample median for the owner-managers sample. Column 1 displays the variable means for low stake reduction, column 2 for high stake reduction, and column 3 reports the difference. Columns 4-6 repeats the analysis after adjusting the variables by market, industry, and year fixed effects. Significant at the *10%, **5%, ***1%.

	Unadjusted sample			**Adjusted (by FE) sample**		
Variable	Low stake red.	High stake red.	Diff.	Low stake red.	High stake red.	Diff.
Pre-IPO covariates						
Log(assets) pre-IPO	16.680	16.552	-0.128	16.657	16.575	-0.082
ROA pre-IPO	0.088	0.134	0.047**	0.093	0.130	0.037**
Leverage pre-IPO	0.686	0.714	0.028	0.696	0.704	0.008
VC-backed	0.313	0.206	-0.106***	0.303	0.216	-0.086***
Stake pre-IPO	0.365	0.664	0.299***	0.399	0.630	0.232***
Instrument						
Mkt ret 3m	0.028	0.036	0.008*	0.027	0.037	0.010**
Endogenous explanatory variable						
Stake reduction at IPO	0.050	0.212	0.162***	0.074	0.188	0.114***
Dependent variable						
Tobin's q	3.825	3.538	-0.287	3.759	3.603	-0.157
# of firms	592	592		592	592	

Table 4: Split by return pre-IPO (instrument)

This table displays variable means, and their difference, according to whether market returns in the three months prior to the IPO (the instrumental variable) were above or below the sample median for the owner-managers sample. Column 1 displays the variable means for low market returns, column 2 for high market returns, and column 3 reports the difference. Columns 4-6 repeats the analysis after adjusting the variables by market, industry, and year fixed effects. Significant at the *10%, **5%, ***1%.

	Unadjusted sample			**Adjusted (by FE) sample**		
Variable	Low ret.	High ret.	Diff.	Low ret.	High ret.	Diff.
Pre-IPO covariates						
Log(assets) pre-IPO	16.449	16.783	0.334**	16.603	16.630	0.027
ROA pre-IPO	0.074	0.149	0.075***	0.109	0.113	0.003
Leverage pre-IPO	0.717	0.683	-0.034	0.705	0.695	-0.010
VC-backed	0.262	0.257	-0.005	0.272	0.247	-0.026
Stake pre-IPO	0.497	0.533	0.036**	0.509	0.520	0.012
Instrument						
Mkt ret 3m	-0.031	0.095	0.125***	-0.011	0.075	0.085***
Endogenous explanatory variable						
Stake reduction at IPO	0.123	0.139	0.017**	0.124	0.138	0.015**
Dependent variable						
Tobin's q	3.785	3.578	-0.207	3.909	3.453	-0.457***
# of firms	592	592		592	592	

Table 5: Compliance

This table displays variable means, and their difference, according to compliance with the instrument. We categorize firms in the "High compliance" group if the instrument (three-month market return) and endogenous regressor (Stake reduction at IPO) are both above the median, or if both the instrument and the endogenous regressor are below the median. We categorize firms in the "Low compliance" group otherwise. Column 1 displays the mean for low compliance, column 2 for high compliance, and column 3 reports the difference. Columns 4-6 repeats the analysis after adjusting the variables by market, industry, and year fixed effects. Significant at the *10%, **5%, ***1%.

	Unadjusted sample			**Adjusted (by FE) sample**		
Variable	Low compliance	High compliance	Diff.	Low compliance	High compliance	Diff.
Pre-IPO covariates						
Log(assets) pre-IPO	16.613	16.619	0.006	16.570	16.657	0.087
ROA pre-IPO	0.114	0.108	-0.006	0.116	0.107	-0.009
Leverage pre-IPO	0.705	0.695	-0.010	0.696	0.703	0.007
VC-backed	0.254	0.264	0.009	0.243	0.274	0.031
Stake pre-IPO	0.502	0.526	0.024	0.509	0.520	0.011
Instrument						
Mkt ret 3m	0.036	0.029	-0.008	0.034	0.030	-0.004
Endogenous explanatory variable						
Stake reduction at IPO	0.132	0.130	-0.003	0.135	0.128	-0.007
Dependent variable						
Tobin's q	3.660	3.700	0.039	3.732	3.636	-0.096
# of firms	558	626		558	626	

Table 6: IV estimation

This table displays the instrumental variables regression estimates using the owner-managers sample. Column 1 presents the regression estimates from the first-stage equation (equation (2) in the main text), where the dependent variable is the Stake reduction at IPO, and the instrument is market returns for the three months before the IPO listing date. Columns 2 and 3 present analogous regressions using the components of the Stake reduction at IPO as dependent variables: The Stake dilution at IPO and the Secondary sales at IPO. Column 4 presents the second-stage regression estimates, where the logarithm of Tobin's q is the dependent variable, and the Stake reduction at IPO is the key explanatory variable instrumented by market returns, as shown in column 1. Column 5 presents the reduced-form estimates, where we directly estimate the effect of the instrument on firm value. Standard errors are adjusted by heteroscedasticity and clustered at the market-by-year level. Significant at the *10%, **5%, ***1%.

VARIABLES	(1) Stake reduction at IPO	(2) Stake dilution at IPO	(3) Secondary sales at IPO	(4) log(Tobin's q)	(5) log(Tobin's q)
Mkt ret 3m	0.093***	0.080***	0.044**		-0.868***
	(0.026)	(0.025)	(0.020)		(0.281)
Stake pre-IPO	0.308***	0.240***	0.169***	3.049**	0.183*
	(0.018)	(0.015)	(0.018)	(1.241)	(0.110)
Stake reduction at IPO				-9.292**	
				(3.878)	
Observations	1,184	1,184	1,184	1,184	1,184
Market FE	Yes	Yes	Yes	Yes	Yes
Ind FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes	Yes
Sample	Owner/ Managers	Owner/ Managers	Owner/ Managers	Owner/ Managers	Owner/ Managers
Regression	First stage	First stage	First stage	Second Stage	Reduced form
F-test Montiel-Pflueger	12.64	10.07	4.87		
Instrument				Mkt ret 3m	

Table 7: Placebo returns

This table presents regression results where market returns at different horizons are used as "placebo instruments." In columns 1 and 2, we use Stake reduction at IPO as the dependent variable, and the estimations are akin to first-stage regressions, but with "placebo instruments." In column 3, we include the instrument, Mkt ret 3m, along with placebo instruments as main explanatory variables. In columns 4, we use the logarithm of Tobin's q as the dependent variable - akin to a reduced-form regression. Standard errors are adjusted by heteroscedasticity and clustered at the market-by-year level. Significant at the *10%, **5%, ***1%.

VARIABLES	(1) Stake reduction at IPO	(2) Stake reduction at IPO	(3) Stake reduction at IPO	(4) log(Tobin's q)
Mkt ret 3m			0.098***	-0.767**
			(0.027)	(0.314)
Mkt ret 6-3m	0.009		0.019	-0.024
	(0.026)		(0.029)	(0.361)
Mkt fwd ret 3m		-0.013	0.017	0.601
		(0.040)	(0.045)	(0.430)
Stake pre-IPO	0.309***	0.309***	0.309***	0.170
	(0.018)	(0.019)	(0.019)	(0.111)
Observations	1,184	1,184	1,184	1,184
Market FE	Yes	Yes	Yes	Yes
Ind FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes
Sample	Owner/Managers	Owner/Managers	Owner/Managers	Owner/Managers
Regression	First stage	First stage	First stage	Reduced form

Table 8: Placebo sample

This table presents regression results using a sample of firms not controlled by owner-managers at the time of the IPO (placebo sample). Columns 1 and 2 present OLS regression estimates where the key explanatory variables are the post-IPO stake (col. 1; equation 1), and the pre-IPO stake together with the stake reduction (col. 2; equation 3). Column 3 presents regression estimates from the first stage regression (equation 2) and column 4 from a reduced form regression, where firm value is regressed against the instrument. Standard errors are adjusted by heteroscedasticity and clustered at the market-by-year level. Significant at the *10%, **5%, ***1%.

VARIABLES	(1) log(Tobin's q)	(2) log(Tobin's q)	(3) Stake reduction at IPO	(4) log(Tobin's q)
Stake post-IPO	0.217			
	(0.203)			
Stake pre-IPO		0.230	0.432***	0.028
		(0.202)	(0.023)	(0.143)
Stake reduction at IPO		-0.469*		
		(0.268)		
Mkt ret 3m			0.015	-0.025
			(0.073)	(0.485)
Observations	986	986	986	986
Market FE	Yes	Yes	Yes	Yes
Ind FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes
Sample	Other IPOs	Other IPOs	Other IPOs	Other IPOs
Regression	OLS	OLS	First stage	Reduced form

Table 9: Predictability of future changes in firm value using pre-IPO returns

This table presents reduced-form regression results for underpricing or the stock return on the first day of trading (column 1), and changes in log Tobin's q (columns 2-6). The dependent variable in column 2 is the difference between the log q at the end of the IPO year and the log q at the offer price. The dependent variables in columns 3-6 are changes between year-end log q. Panel A shows results for the owner-managers' sample and Panel B for the sample with other IPOs. Standard errors are adjusted by heteroscedasticity and clustered at the market-by-year level. Significant at the *10%, **5%, ***1%.

Panel A

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Underpricing	log (q) (t=0) - log(q) (offer)	log (q) (t=1) - log(q) (t=0)	log (q) (t=2) - log(q) (t=1)	log (q) (t=3) - log(q) (t=2)	log (q) (t=4) - log(q) (t=3)
Mkt ret 3m	0.855***	-0.830***	0.013	0.015	0.131	-0.229
	(0.219)	(0.296)	(0.254)	(0.259)	(0.268)	(0.225)
Stake pre-IPO	0.005	0.064	-0.009	-0.077	-0.015	-0.064
	(0.043)	(0.106)	(0.089)	(0.119)	(0.107)	(0.103)
Observations	1,142	1,159	1,184	1,184	1,054	930
Market FE	Yes	Yes	Yes	Yes	Yes	Yes
Ind FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes
Sample	Owner/Managers	Owner/Managers	Owner/Managers	Owner/Managers	Owner/Managers	Owner/Managers
Regression	reduced form	reduced form	reduced form	reduced form	reduced form	reduced form

Panel B

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Underpricing	log (q) (t=0) - log(q) (offer)	log (q) (t=1) - log(q) (t=0)	log (q) (t=2) - log(q) (t=1)	log (q) (t=3) - log(q) (t=2)	log (q) (t=4) - log(q) (t=3)
Mkt ret 3m	1.068***	-0.911**	0.435	0.144	-0.055	0.336
	(0.288)	(0.395)	(0.442)	(0.543)	(0.319)	(0.355)
Stake pre-IPO	-0.114*	0.068	-0.140	-0.047	-0.020	0.074
	(0.058)	(0.130)	(0.122)	(0.113)	(0.127)	(0.126)
Observations	926	950	986	986	875	761
Market FE	Yes	Yes	Yes	Yes	Yes	Yes
Ind FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes
Sample	Other IPOs	Other IPOs	Other IPOs	Other IPOs	Other IPOs	Other IPOs
Regression	reduced form	reduced form	reduced form	reduced form	reduced form	reduced form

Table 10: Other outcomes

This table presents regression results for outcomes other than firm value. Columns 1-4 present OLS estimates and columns 5-8 present second-stage IV estimates. Columns 1 and 5 use Asset growth as the dependent variable, columns 2 and 6 use ROA, columns 3 and 7 use book leverage, and columns 4 and 8 use the ratio of cash over assets. All variables are the average for the year-end of the IPO (year 0) and two years after (years 1 and 2). Standard errors are adjusted by heteroscedasticity and clustered at the market-by-year level. Significant at the *10%, **5%, ***1%.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	Asset growth	ROA	Leverage	Cash/Assets	Asset growth	ROA	Leverage	Cash/Assets
Stake pre-IPO	0.126*	0.052	0.001	0.006	1.668***	0.080	0.231	0.034
	(0.073)	(0.040)	(0.037)	(0.029)	(0.549)	(0.205)	(0.310)	(0.163)
Stake reduction at IPO	-0.270**	0.030	-0.010	0.067	-5.255***	-0.062	-0.754	-0.024
	(0.126)	(0.120)	(0.100)	(0.065)	(1.791)	(0.654)	(0.996)	(0.539)
Observations	1,184	1,183	1,184	1,136	1,184	1,183	1,184	1,136
Market FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ind FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sample	Owner/Managers	Owner/Managers	Owner/Managers	Owner/Managers	Owner/Managers	Owner/Managers	Owner/Managers	Owner/Managers
Regression	OLS	OLS	OLS	OLS	IV	IV	IV	IV
Instrument					Mkt ret 3m	Mkt ret 3m	Mkt ret 3m	Mkt ret 3m

Internet Appendix

Variable Description

Log(assets) pre-IPO	Logarithm of one plus book value of assets (in 2015 USD) before going public.
ROA pre-IPO	EBITDA over book assets before going public.
Leverage pre-IPO	Sum of total liabilities divided by book value of assets before going public.
VC-backed	Dummy that takes a value of 1 if the firm was backed by venture capital before going public, and 0 otherwise.
Stake pre-IPO	Stake held by the owner-manager before the IPO.
Mkt. ret 3m	Return of the market (country-index) where the firm is listed, the three calendar months before the listing date.
Stake post-IPO	Stake retained by the owner-manager immediately after the IPO.
Stake reduction at IPO	Difference between the stake retained by the owner-manager immediately after the IPO and the stake held by the owner-manager before the IPO (Stake post-IPO – Stake pre-IPO).
Stake dilution at IPO	Reduction in the stake at the IPO because of the issuances of primary shares.
Secondary sales at IPO	Reduction in stake due to the sale of secondary shares by owner-managers at the IPO.
Underpricing	Stock return of the IPO firm the first day it is traded.
Tobin's q	Average for the year-end Tobin's q for the year of the IPO (year 0) and two years after (years 1 and 2).
Asset growth	Average asset growth for the first three years after the IPO: 0, 1 and 2. Asset growth on year T is defined as log(assets) (t=T+1)- log(assets) (t=T).
ROA	Average return on asset for the first three year-end after the IPO: Years 0, 1 and 2.

Leverage	Average book leverage for the first three year-end after the IPO: Years 0, 1 and 2.
Cash/Assets	Average of cash holdings to book assets ratio for the first three year-end after the IPO: Years 0, 1 and 2.
Mkt ret 6-3m	Return of the market (country-index) where the firm is listed, from the sixth to the third calendar months before the listing date.
Mkt fwd ret 3m	Return of the market (country-index) where the firm is listed, for the three-calendar months following the listing date.
q (offer price)	Tobin's q at the IPO date (before trading starts). Market value of equity is computed as total shares outstanding times the offer price. Debt is book value of debt. Book assets is pre-IPO assets plus the IPO proceeds, assuming proceeds are kept as cash by the firm. IPO proceeds are defined as primary shares times the price of allocation.
q (t=0)	Year-end Tobin's q for the year of the IPO (year 0).
q (t=T)	Year-end Tobin's q for the year T after the IPO (T={1-4}).

Valuation and accounting variables are winsorized at the 2.5% level.

Figure A.1

This figure displays the number of hand-collected European IPOs over one-digit SIIC codes for the owner/managers' sample.

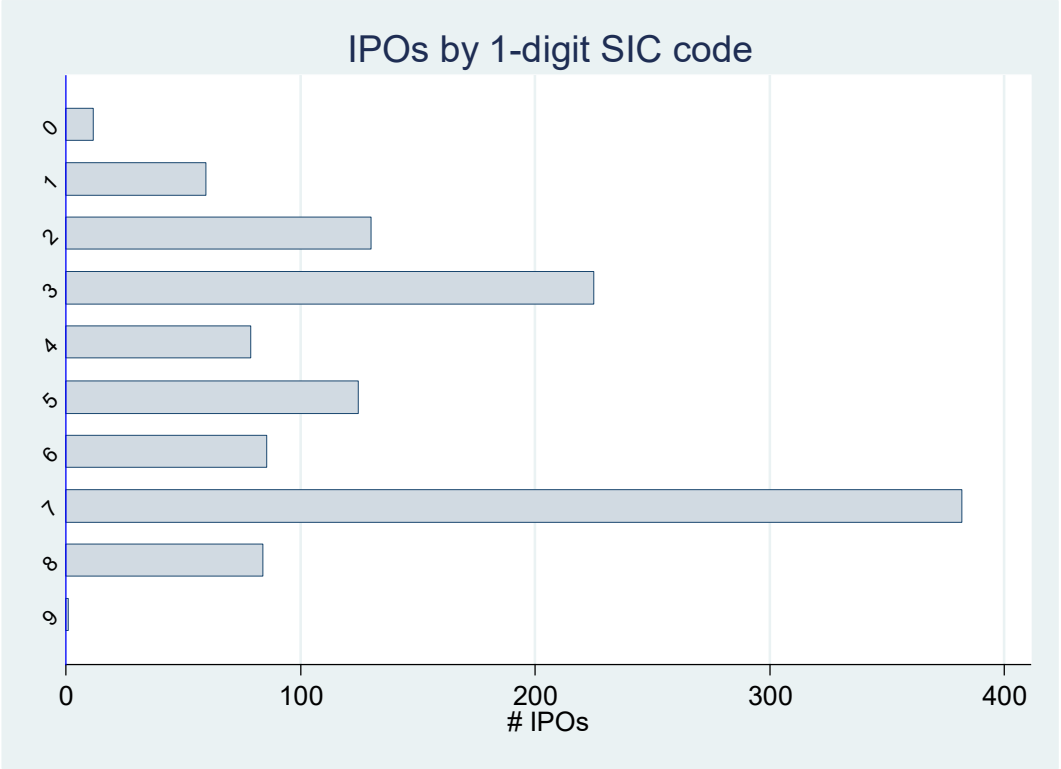


Figure A.2

This figure displays the number of hand-collected European IPOs over the seven largest markets where IPOs took place for the owner/managers' sample. IPOs in this sample took place in 33 markets. The remaining 26 exchanges are grouped into a single category displayed at the bottom ("*Others").

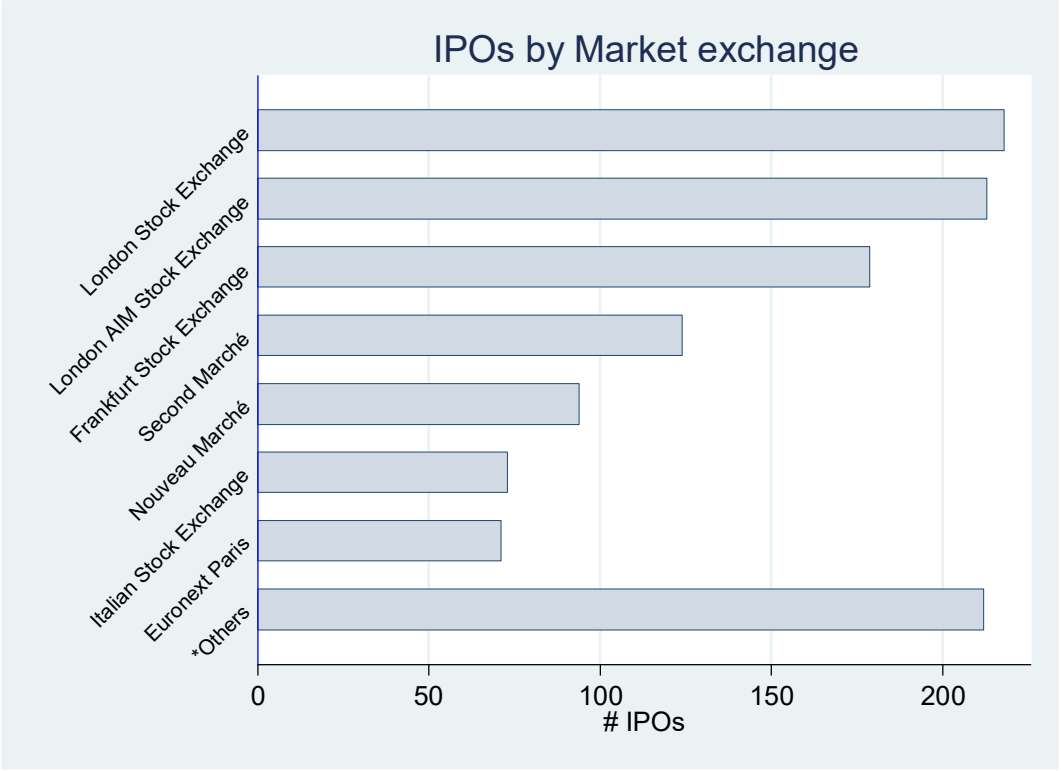


Table A.1: Double sorts according to the instrument and endogenous explanatory variable

This table displays variable means, and their difference, according to double sorts using medians of the instrument (high vs. low three-month market returns) and the endogenous explanatory variable (low vs. high stake reduction at the IPO). “Low compliance” includes IPOs that go after high returns and have a low stake reduction, plus IPOs that go after low returns and have a high stake reduction. "High compliance" includes IPOs that go after high returns and have a high stake reduction, plus IPOs that go after low returns and have a low stake reduction. The last column reports the difference between low and high compliance. Panel A shows means for the raw data. Panel B repeats the analysis after adjusting the variables by market, industry, and year fixed effects. Significant at the *10%, **5%, ***1%.

Panel A: Unadjusted sample

Variable	High ret/ Low stake	Low ret/ High stake	High ret/ High stake	Low ret/ Low stake	Low compliance	High compliance	Diff: Low-High compliance
Pre-IPO covariates							
Log(assets) pre-IPO	16.858	16.367	16.717	16.522	16.613	16.619	0.006
ROA pre-IPO	0.129	0.099	0.166	0.051	0.114	0.108	-0.006
Leverage pre-IPO	0.673	0.738	0.692	0.698	0.705	0.695	-0.010
VC-backed	0.308	0.201	0.211	0.316	0.254	0.264	0.009
Stake pre-IPO	0.362	0.642	0.684	0.367	0.502	0.526	0.024
Instrument							
Mkt ret 3m	0.098	-0.026	0.092	-0.035	0.036	0.029	-0.008
Endogenous explanatory variable							
Stake reduction at IPO	0.055	0.210	0.214	0.045	0.132	0.130	-0.003
Dependent variable							
Tobin's q	3.703	3.618	3.466	3.934	3.660	3.700	0.039
# of firms	279	279	313	313	558	626	

Panel B: Adjusted (by F.E.) sample

Variable	High ret/ Low stake	Low ret/ High stake	High ret/ High stake	Low ret/ Low stake	Low compliance	High compliance	Diff: Low-High compliance
Pre-IPO covariates							
Log(assets) pre-IPO	16.628	16.512	16.631	16.683	16.570	16.657	0.087
ROA pre-IPO	0.098	0.134	0.126	0.088	0.116	0.107	-0.009
Leverage pre-IPO	0.687	0.706	0.703	0.704	0.696	0.703	0.007
VC-backed	0.275	0.211	0.221	0.327	0.243	0.274	0.031
Stake pre-IPO	0.392	0.625	0.635	0.405	0.509	0.520	0.011
Instrument							
Mkt ret 3m	0.074	-0.006	0.075	-0.015	0.034	0.030	-0.004
Endogenous explanatory variable							
Stake reduction at IPO	0.082	0.187	0.188	0.067	0.135	0.128	-0.007
Dependent variable							
Tobin's q	3.573	3.891	3.346	3.926	3.732	3.636	-0.096
# of firms	279	279	313	313	558	626	

Appendix A.2: Year-by-year estimations

This table presents results using year-end valuations for the first three end-of-years after the IPO, rather than the average. Columns 1-3 present results for OLS regressions and columns 4-6 for instrumental variable regression. The results from these estimations are presented in Figure 6. Standard errors are adjusted by heteroscedasticity and clustered at the market-by-year level. Significant at the *10%, **5%, ***1%.

VARIABLES	(1) log(q) (t=0)	(2) log(q) (t=1)	(3) log(q) (t=2)	(4) log(q) (t=0)	(5) log(q) (t=1)	(6) log(q) (t=2)
Stake pre-IPO	0.560***	0.370*	0.034	2.807**	2.756**	2.628**
	(0.155)	(0.188)	(0.177)	(1.154)	(1.244)	(1.293)
Stake reduction at IPO	-1.364***	-0.776*	0.059	-8.631**	-8.495**	-8.330**
	(0.415)	(0.452)	(0.387)	(3.654)	(3.960)	(4.131)
Observations	1,184	1,184	1,184	1,184	1,184	1,184
Market FE	Yes	Yes	Yes	Yes	Yes	Yes
Ind FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes
Sample	Owner/Managers	Owner/Managers	Owner/Managers	Owner/Managers	Owner/Managers	Owner/Managers
Regression	OLS	OLS	OLS	Second Stage	Second Stage	Second Stage
Instrument				Mkt ret 3m	Mkt ret 3m	Mkt ret 3m

Appendix A.3: Alternative samples -descriptive statistics

This table displays variable means, and their difference, according to whether the IPO had an owner/manager as a controller or not. Column 1 displays the variable means for owner/manager IPOs, column 2 for other IPOs, and column 3 reports the difference. Columns 4-6 repeats the analysis after adjusting the variables by market, industry, and year fixed effects. Significant at the *10%, **5%, ***1%.

	Unadjusted sample			**Adjusted (by FE) sample**		
Variable	Owner/Managers	Other IPOs	Diff.	Owner/Managers	Other IPOs	Diff.
Log(assets) pre-IPO	16.616	17.774	1.157***	16.870	17.469	0.599***
ROA pre-IPO	0.111	0.029	-0.082***	0.094	0.049	-0.045***
Leverage pre-IPO	0.700	0.712	0.012	0.700	0.712	0.013
VC-backed	0.259	0.391	0.132***	0.271	0.377	0.106***
Stake pre-IPO	0.515	0.505	-0.010	0.510	0.510	-0.001
Mkt ret 3m	0.032	0.032	0.000	0.031	0.034	0.003
Stake post-IPO	0.384	0.329	-0.055***	0.370	0.346	-0.024***
Stake reduction at IPO	0.131	0.176	0.045***	0.141	0.164	0.023***
Stake dilution at IPO	0.102	0.103	0.001	0.104	0.101	-0.003
Secondary sales at IPO	0.029	0.073	0.044***	0.037	0.063	0.026***
Underpricing	0.195	0.137	-0.058***	0.178	0.158	-0.020
Tobin's q	3.681	3.253	-0.429***	3.571	3.385	-0.187
# of firms	1,184	986		1,184	986	

Appendix A.4: Robustness Checks

This table presents results for the instrumental variables estimation presented in Table 6 but using alternative regression specification or sub-samples. Columns 2 and 3 include market-by-year and industry (SIC 1 digit)-by-year fixed effects respectively. Columns 4 and 5 exclude particular periods such as the end of the dot-com hot market (1999-2001) and the market crash of 2008-9. Columns 6 and 7 exclude particular industrial segments. Column 8 truncates the sample by excluding the top 10% values of Tobin's q. Column 9 excludes markets with fewer than 20 IPOs. Column 10 excludes IPOs with less than US$ 5 MM of assets. Standard errors are adjusted by heteroscedasticity and clustered at the market-by-year level. Significant at the *10%, **5%, ***1%.

VARIABLES	(1) log(Tobin's q)	(2) log(Tobin's q)	(3) log(Tobin's q)	(4) log(Tobin's q)	(5) log(Tobin's q)	(6) log(Tobin's q)	(7) log(Tobin's q)	(8) log(Tobin's q)	(9) log(Tobin's q)	(10) log(Tobin's q)
Stake pre-IPO	3.040**	3.824***	4.368**	3.050***	3.101**	1.769***	3.607***	2.329**	2.967***	3.200**
	(1.237)	(1.359)	(2.127)	(1.094)	(1.273)	(0.647)	(1.315)	(0.936)	(1.120)	(1.444)
Stake reduction at IPO	-9.261**	-11.645***	-14.505**	-9.069***	-9.418**	-5.097***	-11.752***	-7.314**	-9.012***	-9.885**
	(3.868)	(4.207)	(7.349)	(3.117)	(3.946)	(1.956)	(4.377)	(3.045)	(3.497)	(4.658)
Observations	1,184	1,184	1,184	807	1,166	802	1,097	1,064	1,073	893
Market FE	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ind FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Market-year FE	No	Yes	No	No	No	No	No	No	No	No
SIC1-year FE	No	No	Yes	No	No	No	No	No	No	No
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sample	Owner/ Managers	Owner/ Managers	Owner/ Managers	Owner/ Managers	Owner/ Managers	Owner/ Managers	Owner/ Managers	Owner/ Managers	Owner/ Managers	Owner/ Managers
Regression	Second Stage	Second Stage	Second Stage	Second Stage	Second Stage	Second Stage	Second Stage	Second Stage	Second Stage	Second Stage
Instrument	Mkt ret 3m	Mkt ret 3m	Mkt ret 3m	Mkt ret 3m	Mkt ret 3m	Mkt ret 3m	Mkt ret 3m	Mkt ret 3m	Mkt ret 3m	Mkt ret 3m
Baseline	Yes	+ Mkt-year FE	+ SIC1-year FE	Excl. 1999-2001	Excl. 2008-2009	Excl. SIC1 7	Excl. SIC1 6 & 9	Excl. Top 10% q	Excl. Mkt IPO<20	Excl. Assets <5MM