The Economic Role of Offer-For-Sale in the IPO Market

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Abstract

We investigate the economic role of offer-for-sale (OFS) in the IPO market. OFS allows existing shareholders, particularly promoters, to reduce holdings by piggybacking shares onto the IPO as residual claimants, which can be costly if the IPO is undersubscribed or if increased institutional ownership leads to heightened oversight. We find that without a low-cost alternative, OFS reduces the effectiveness of promoters' retained equity in mitigating information asymmetry. However, with a low-cost secondary market OFS, where promoters are primary claimants and share transfers do not increase institutional ownership, the signaling value of retained equity in the IPO market is restored.

Keywords: Promoters; IPO; OFS; institutional monitoring; information asymmetry; signaling.

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1. Introduction

A well-functioning initial public offering (IPO) market not only facilitates financing for young, high-growth firms but also provides an exit for existing shareholders. Private equity funds, venture capitalists (VCs), and promoters, for example, invest in early-stage firms with the anticipation of a liquid market in which to sell some or all of their shares (Ritter, 2013). Since private firms are unknown to potential investors, IPOs typically suffer from the liability of newness (Sanders and Boivie, 2004). Uncertainty about IPO value and information asymmetry between firm insiders and outsiders are widely seen as the primary causes of IPO underpricing, or the abnormal first-day return in the IPO market (Benveniste and Spindt, 1989; Benveniste and Wilhelm, 1990; Sherman and Titman, 2002). Uncertainty and information asymmetry in the IPO market are thus costly for both young firms seeking financing for their positive net present value projects and promoters looking to liquidate some or all of their holdings in the firm.

The literature has suggested several channels through which entrepreneurs and promoters can mitigate the costs associated with uncertainty and information asymmetry in the capital market. For example, issuing firms may reduce uncertainty by certifying their IPOs, such as through underwriter reputation (Carter and Manaster, 1990; Carter et al., 1998), auditor reputation (Titman and Trueman, 1986; Michaely and Shaw, 1995), VC reputation (Megginson and Weiss, 1991; Lin and Smith, 1997; MacIntosh, 1997; Amit et al., 1998; Cumming and MacIntosh, 2003; Brau et al., 2004; Suchard, 2009; Krishnan et al., 2011), prestigious board structures (Certo, 2003), top management team compositions (Higgins and Gulati, 2006), and affiliations with esteemed universities (Colombo et al., 2019). Insiders and large shareholders may also reduce uncertainty and information asymmetry in the IPO market by retaining a significant portion of their equity in

the firm at the time of the IPO, thereby signaling their confidence in the firm's future prospects (Leland and Pyle, 1977; Downes and Heinkel, 1982; Grinblatt and Hwang, 1989).

In this paper, we expand the scope of existing studies by investigating the impact of a distinct, regulated channel—the offer-for-sale (OFS) mechanism in India—on reducing uncertainty and information asymmetry in the IPO market. This mechanism provides a platform through which early shareholders and promoters—shareholders responsible for taking the firm public—can reduce their holdings in the firm by transferring their shares to new investors. The OFS mechanism in India is regulated and can be conducted both concurrently with the IPO and, since February 2012, as a standalone OFS in the secondary market following the IPO. The OFS conducted concurrently with the IPO allows existing shareholders to piggyback their OFS shares onto the IPO as residual claimants. This means promoters can reduce their holdings during the IPO, but only after the newly issued shares are sold. This structure ensures that the priority goes to newly issued shares, while the existing shareholders act as residual claimants, transferring their shares after the primary allocation. This arrangement gives promoters and other shareholders, such as venture capitalists and private equity funds, who own more than 10% equity in the firm an opportunity to reduce up to 80% of their holdings in the firm during the IPO. The regulatory authority in India mandates that firms allocate OFS shares piggybacked on IPO shares proportionally—50% to institutional investors and 50% to retail investors. Since OFS shares are non-dilutive (meaning no new shares are created), the proportional transfer of shares via an OFS piggybacked on the IPO increases institutional ownership without altering the total number of outstanding shares. In contrast, the OFS conducted in the secondary market, which is also non-dilutive, can be freely allocated to institutional or retail investors and may not necessarily result in an increase in institutional ownership.

The literature posits that institutional investors play a crucial role in monitoring firm decisions and facilitating information production by reducing uncertainty and information asymmetry surrounding the value of the IPO (Bushee, 1998; Hartzell and Starks, 2003; Grinstein and Michaely, 2005; Ferreira et al., 2010; Boone and White, 2015; Liu et al., 2018). Building on this body of research, along with studies suggesting that equity retained by promoters signals confidence in the firm's future prospects, we argue that in a market with an OFS mechanism, where reducing ownership using the OFS option is more costly in the primary market and less costly in the secondary market, firms face a tradeoff between the benefits of institutional monitoring and the benefits of retained ownership. In this type of market, a profit-maximizing strategy for promoters in high-quality firms—seeking to distinguish themselves from low-quality ones during the IPO—is to stagger the sale of their shares.[3]

The first step in the staggered approach entails promoters in high-quality firms transferring, or selling, a portion of their shares to institutional investors at IPO to benefit from increased institutional monitoring, unveiling the "true" value of the IPO firm's securities to the market. Additionally, in this step, selling shareholders are residual claimants, meaning that they may not receive any proceeds if the IPO is undersubscribed. This makes piggybacking OFS shares on the IPO a risky undertaking. Thus, transferring shares to institutional investors during the IPO sends a positive signal to the market that promoters are confident about their valuation of the IPO. In order to preserve the signaling value of retained equity, promoters piggyback a small number of shares on the IPO and retain a large portion of their equity in the firm. In this type of market, both

[3] Large shareholders in India such as promoters are required to maintain a 20% ownership in the firm after the IPO. Thus, they cannot sell all of their shares via the OFS during the IPO.

actions—transferring shares to institutional investors and retaining a large fraction of equity—are necessary for effective signaling.

The second step in the staggered approach involves promoters of high-quality firms transferring or selling the remaining shares from their intended sale to investors in the secondary market through a low-cost, non-dilutive OFS. This step is taken after institutional monitoring has increased transparency, allowing the market to better assess the firm's true value. Consequently, the selling shareholders, now acting as primary claimants, can capitalize on a more informed and potentially favorable market environment. By retaining a significant fraction of equity during the IPO, promoters in high-quality firms fully benefit from institutional monitoring.

In contrast to promoters in high-quality firms, a profit-maximizing strategy for selling shareholders in low-quality firms is to avoid institutional monitoring during the IPO and instead sell all their shares from their intended sale through a low-cost OFS in the secondary market. The underlying premise of this strategy is that negative information revealed through institutional monitoring during the IPO can harm the market's perception of the firm's securities in future offerings, such as the low-cost OFS in the secondary market. Additionally, as residual claimants, promoters in low-quality firms increase the risk of receiving fewer or no proceeds from the sale of their shares when they choose to enhance institutional monitoring. Thus, we hypothesize that offering OFS shares as residual claimants concurrently with IPO shares in a market where a low-cost non-dilutive OFS is also available post-IPO establishes a separating equilibrium, signaling the firm's quality to the market.

Our hypotheses, substantiated by empirical evidence, extend beyond the predictions of the signaling models developed by Leland and Pyle (1977) and Grinblatt and Hwang (1989) by incorporating the cost-benefit tradeoffs associated with increased institutional monitoring at the

time of the IPO. These tradeoffs are difficult to capture within the frameworks of Leland and Pyle (1977) and Grinblatt and Hwang (1989), which are based on the U.S. market context, where share allocation is opaque, and the underwriter has full discretion, raising concern about potential allocation bias. In contrast, in India, share allocation during IPOs is transparent, proportional and unbiased. In this IPO environment, the non-dilutive transfer of shares from existing shareholders to new shareholders at the time of the IPO effectively increases institutional ownership, resulting in a more predictable allocation process.

Using a sample of 218 IPOs in India from January 2007 to December 2014, along with difference-in-differences-in-differences (DDD) and placebo tests to address endogeneity arising from omitted variable bias due to unobserved confounders (Imbens and Wooldridge, 2009), we find that promoters' retained equity reduces IPO underpricing and post-IPO trading activity in the post-February 2012 period, which includes the low-cost non-dilutive OFS option in the secondary market, when promoters use the OFS piggybacked on IPOs. Conversely, in the pre-February 2012 period without the low-cost alternative, promoters' retained equity has no effect. The findings suggest that a high-cost OFS option without a low-cost alternative exacerbates information asymmetry and diminishes the signaling value of promoters' retained equity.

Our study contributes to the literature in several key ways. First, we extend the signaling frameworks of Leland & Pyle (1977), Downes & Heinkel (1982), and Grinblatt & Hwang (1989), by incorporating institutional monitoring. We propose a conceptual framework that jointly considers both retained equity and institutional monitoring. Second, we provide empirical support for our hypotheses using a quasi-experimental design based on a regulatory policy change, addressing sample selection bias. Third, we explore the impact of the OFS mechanism on

uncertainty and information asymmetry in both primary and secondary markets, offering insights valuable for shareholders and policymakers to enhance firm success and market efficiency.

The rest of the paper is organized as follows. Section 2 discusses the related literature. Section 3 presents the institutional setting of the IPO market in India. Section 4 develops the conceptual framework and the testable hypotheses. Sections 5 and 6 present the empirical methodology and data used in the analyses. Section 7 summarizes the findings and Section 8 concludes.

2. Related literature

Our study contributes to the monitoring literature. This body of work identifies several factors that drive monitoring and discusses their impact on corporate governance. For instance, Oh et al. (2022) demonstrate that government-led VCs provide robust monitoring functions, which enhances firm growth and innovation in Korean firms. Randøy and Goel (2003) examine the ownership structure of small- and medium-sized enterprises (SMEs) in Norway and find that monitoring by blockholders and foreign institutional investors is more effective in non-founder firms than in founding family firms, due to higher agency costs faced by non-founder firms. In the context of IPOs, Benson et al. (2015) find that entrepreneurs engage in impression management behavior by providing obscure governance information to outside investors. However, this effect is attenuated when firms face increased public scrutiny, as measured by analyst following, industry concentration, and IPO clustering. Arthurs et al. (2008) illustrate that inside board members serve as monitors of the underwriter, thereby reducing IPO underpricing. Bell et al. (2012) extend the scope of studies to foreign IPOs and find that the relationship between corporate governance and foreign IPO performance is contingent upon the IPO firm's home country investor protection and

the firm's choice of host market. Our study adds to this literature by demonstrating that institutional monitoring prompts different cost-benefit tradeoffs among firms of varying quality. This finding provides a more in-depth understanding of the relationship between institutional monitoring and firm performance, especially in the context of IPOs.

Our study also contributes to the signaling literature. Indeed, the literature has extensively examined alternatives to the Leland and Pyle (1977) and the Grinblatt and Hwang (1989) signals in the IPO market. For example, Arthurs et al. (2009) examine the lockup period as a signal of firm quality and compare it against the other quality indicators. The lockup period is a timeframe immediately following the IPO during which existing shareholders cannot sell their shares without the underwriter's consent. Although the Securities and Exchange Commission (SEC) in the U.S. typically mandates a 180-day lock-up period (Bradley et al., 2001), insiders often agree to longer durations. Consistent with Field and Hanka (2001) and Brav and Gompers (2003) who argue that longer lockup periods signal insiders intention to delay exit and avoid abandoning ship ahead of imminent bad news, and Garfinkle et al. (2002) who find that VC-backed firms exhibit a spike in trading activity around the expiration of the lockup period, Arthurs at al. (2009) show that—using a sample of 640 ventures going through the IPO in the U.S.—a longer lockup period acts as a substitute signal for VC backing and reputable underwriter backing. Specifically, they show that high-quality ventures use a longer lockup period to signal their quality to the market when signals of higher quality are not available and when there is high uncertainty surrounding the value of the venture. Our study adds to this strand of the literature by demonstrating that institutional monitoring at the time affects the market's perception of equity retained by existing shareholders as a signal of firm quality.

3. Institutional setting

Private firms going public by way of an IPO in India employ the services of an investment bank to underwrite the IPO. The investment bank conducts a "road show" to advertise the IPO and gather demand information. Following the road show, the lead underwriter, in coordination with the syndicate of underwriters, determines the initial price range. Information about the IPO, including the initial price range, ownership structure, and recent financial statements are disclosed in the IPO prospectus. The prospectus is available to institutional investors and the syndicate of investment banks working with the underwriter.

Investors in India can electronically observe the status of their bids and those of other bidders at half-hour intervals. In this regard, the IPO process in India, unlike in the U.S., is transparent. IPO shares in India are proportionally allocated to investor types. The allocation quotas are fixed by the Securities and Exchange Board of India (SEBI): 50% of IPO shares are proportionally allocated to institutional investors; 15% to high-net-worth retail investors with bids higher than INR100,000 (about US$2,000); and 35% to retail investors with bids equal to or lower than INR100,000. In the case of oversubscription in one investor group and undersubscription in another, shares from the undersubscribed group are proportionately allocated to investors in the oversubscribed group. The final offer price at which the shares are allocated to investors in the primary market is set by the underwriter after the bidding phase. Trading in the secondary market begins 21 days after the bidding phase.

Most listed firms in India are run and funded by a group of investors called promoters. Promoters are individual investors, associations, and investment companies that have controlling rights and that are instrumental in the formation of the firm. The SEBI requires promoters to hold

at least 20% equity in the firm locked in for three years.[4] Thus, promoters generally face liquidity hurdles when attempting to reduce their stake in (or exit) the firm.

The IPO policies in India are set by the SEBI and disclosed to the public in the Amendments to the DIP guidelines document.[5] Since its inception in April 1988, the SEBI has amended the guidelines for listing newly issued shares on the two major stock exchanges—the Bombay Stock Exchange (BSE) and the National Stock Exchange (NSE)—several times. In 1999, the SEBI amended the DIP guidelines allowing the underwriter to allocate shares to institutional investors in the primary market at his discretion. Prior to 1999, allocation of shares to investors in the primary market was non-discretionary and based on the fixed-price listing method. In 2005, the SEBI amended the DIP guidelines taking away the discretionary powers from the underwriter. The allocation of shares to investors in the primary market since the 2005 regulatory change is similar to an auction—the underwriter uses the demand curve to determine the price and proportionally allocate the shares to investors in the primary market. In 2007, the SEBI introduced anchor investments to the capital market (Lu and Samdani, 2019; Samdani, 2019). Anchor investment essentially allows the underwriter to commit, at the underwriter's discretion, shares from the institutional tranche to institutional investors prior to public filing. In 2009, the SEBI amended the DIP guidelines with regard to disclosure in the prospectus. The amendment essentially defines the rules for reporting information about shareholders in general and promoters, in particular, in the IPO prospectus. Disclosure rules were loosely defined prior to July 2009.

The non-dilutive follow-on public offering (FPO), or the low-cost standalone OFS, was introduced to the capital market in India in February 2012. Prior to February 2012, the OFS was

4 The lock-in period for promoters' investment has recently been reduced to 18 months.
5 See circular SEBI/CFD/DIL/DIP/14/2005/25/1 dated 25 January 2005 at www.sebi.gov.in.

available to selling shareholders only at the time of the IPO. While both, IPO shares and OFS shares, are proportionally distributed to retail investors and institutional investors, the percentage increase in institutional ownership is greater from an IPO with OFS than from an IPO without OFS. Whereas the capital raised in the IPO is reported by the issuing firm as paid-in capital, the capital raised in the OFS is not—selling shareholders receive the funds from the transfer of OFS shares to new shareholders. In the event that the IPO is undersubscribed, OFS proceeds are used to meet the IPO's minimum subscription requirement. The remaining OFS proceeds are proportionally distributed to the selling shareholders. In the event that the IPO fails, or if the OFS shares fail to cover the IPO's minimum subscription requirement, selling shareholders do not receive reimbursement for the cost of the underwriting fee.[6]

In the standalone OFS, shareholders in listed firms reduce their holdings in the firm by directly selling their shares to a group of investors in the secondary market.[7] The SEBI requires selling shareholders to inform the stock exchange two days prior to the OFS of their intention to sell OFS shares. Investors, including retail investors registered with the NSE and the BSE, can submit their indications of interest specifying the quantity and the price using the regulatory controlled OFS trading platform. There is no minimum bid requirement in the OFS. Investors can bid for a single OFS share. Selling shareholders may set a floor price or they may set a cutoff price below which they will not entertain offers. The floor price ensures that all bids at or above the floor price are considered, whereas the cut-off point ensures that retail investors are also allocated

[6] If the IPO is a combination of fresh issue and an offer for sale of existing shares, the costs are shared between the issuing company and the selling shareholder in the proportion of the shares being offered by the respective parties.

[7] Shareholders in the secondary market can also sell their shares via the OFS during a SEO. Whereas the SEO is a time-intensive procedure that involves approval from the board of directors, the standalone OFS is simply a transfer of ownership from existing shareholders to new shareholders. Shareholders can also make direct sales in the secondary market. However, this method may raise insider trading concerns and a large quantity of shares for sale can exert downward pressure on the stock price.

shares, albeit the number of shares allocated to investors also depends on the demand at various price points (bids). Unlike the standard trading platform in which investors can both buy and sell shares, investors using the OFS platform can only buy shares. The SEBI contends that the standalone OFS mechanism allows majority shareholders in the firm in general and promoters, in particular, to transparently reduce their equity ownership at a relatively low cost and meet the SEBI's minimum public shareholding requirement.[8]

4. Conceptual Framework and Hypotheses development

4.1 Conceptual Framework

To conceptualize our empirical predictions on promoters' decisions to sell shares via the OFS during an IPO, we develop a simple model. The model illustrates how retained equity and institutional monitoring jointly serve as an effective signaling mechanism, influencing both the market's perception and the promoters' payoffs. Consider a firm that is going public at time $t = 0$. At this point, promoters must decide whether to sell any of their shares during the IPO and, if so, what proportion α (where $0 \leq \alpha \leq \alpha_{max}$) to sell via the OFS. The upper limit, α_{max}, is imposed by regulatory constraints, ensuring that promoters retain at least 1-α_{max} of their ownership post-IPO.

We assume there are two types of firms in the IPO market: high-quality firms which have strong fundamentals and promising growth prospects, and low-quality firms which have weak fundamentals and limited growth potential. High-quality firms enjoy positive monitoring benefits when new institutional shareholders come on board, as these shareholders contribute valuable

[8] Effective May 2006, all listed companies (with a few exceptions) in India are required to maintain a minimum public shareholding of 25%.

oversight. In contrast, low-quality firms are vulnerable to monitoring effects, where increased scrutiny from new institutional shareholders may lead to unfavorable IPO outcomes.

The firm's intrinsic value at $t = 0$ is denoted by θ, known only to the promoters and not directly observable by outside investors. The promoters retain a fraction $1 - \alpha$ of the equity, which serves as a signal of their confidence in the firm's future prospects. Institutional monitoring is effective only if the promoters sell at least a minimum proportion of shares during the IPO (α_{mon}), which is the threshold required for institutional investors to exert effective oversight.[9]

The IPO price per share, P_0, is set at $t = 0$ and may involve underpricing due to information asymmetry. Underpricing compensates investors for the risk associated with uncertainty in firm value. As the market adjusts to the firm's true value, the post-IPO price per share, P_1, observed at $t = 1$, converges to the intrinsic value θ.

Underpricing $U(\alpha)$ is influenced by two signaling mechanisms: retained equity and institutional monitoring. Retained equity reduces underpricing by signaling promoters' confidence, while institutional monitoring affects underpricing differently for high-quality and low-quality firms.

The underpricing function is defined as:

$$U(\alpha) = U_0 - s(1 - \alpha) - m\delta(\alpha \geq \alpha_{mon})$$

where U_0 is the base level of underpricing due to inherent information asymmetry; s represents the marginal effect of retained equity on underpricing; m captures the effect of institutional monitoring; and $\delta(\alpha \geq \alpha_{mon})$ is an indicator variable equal to one if $\alpha \geq \alpha_{mon}$ (i.e., effective monitoring) and zero otherwise. For high-quality firms, institutional monitoring reduces underpricing, implying $m > 0$. For low-quality firms, it increases underpricing, implying $m < 0$.

[9] It's reasonable to assume $\alpha_{max} > \alpha_{mon}$.

When monitoring is active, as indicated by the indicator variable $\delta(\alpha \geq \alpha_{mon}) = 1$, monitoring reduces underpricing for high-quality firms and increases for low-quality ones. When monitoring is not active ($\delta(\alpha \geq \alpha_{mon}) = 0$), monitoring has no effect on underpricing for either high-quality or low-quality firms.

The IPO price is then determined as:

$$P_0 = \theta - U(\alpha)$$

The promoters' total payoff, PO, consists of the proceeds from selling shares during the IPO and the value of retained shares post-IPO. The net proceeds from selling shares during the IPO are:

$$IPO\ Proceeds = \alpha P_0 - k\alpha$$

where k is the cost per share of selling via OFS during the IPO.

The value of the retained shares post-IPO is:

$$Retained\ Equity\ Value = (1 - \alpha)P_1 = (1 - \alpha)\theta$$

Assuming negligible costs for selling retained shares post-IPO, the promoters' total payoff simplifies to:

$$PO = \alpha P_0 - k\alpha + (1 - \alpha)\theta$$

Substituting P_0 in the equation and simplifying, we get:

$$PO = \theta - \alpha U_0 + \alpha(s - k) - \alpha^2 s + \alpha m\delta(\alpha \geq \alpha_{mon})$$

The promoters aim to choose α to maximize PO. Taking the derivative with respect to α yields the first-order condition:

$$\frac{dPO}{d\alpha} = -U_0 + s - k - 2\alpha s + m\delta(\alpha \geq \alpha_{mon})$$

Setting $\frac{dPO}{d\alpha} = 0$ for maximization and solving for α, we get:

$$\alpha^* = \frac{s + m\delta(\alpha \geq \alpha_{mon}) - k - U_0}{2s}$$

This α^* is the unconstrained optimum for the proportion of shares sold via OFS. Given the existence of underpricing, it is reasonable to assume that $U_0 - s > 0$.[10] Additionally, the cost of selling shares via OFS is non-trivial, suggesting $k > 0$.

In our setup, low-quality firms have $m < 0$. This means that $s + m\delta(\alpha \geq \alpha_{mon}) - k - U_0 < 0$ for all $0 \leq \alpha \leq \alpha_{max}$, implying that $\alpha^* < 0$. Given that the payoff function PO is concave with respect to α, the best feasible solution that maximizes PO is $\alpha = 0$.

In contrast, high-quality firms have $m > 0$. There are three scenarios to consider: 1) when $\alpha \geq \alpha_{mon}$ and $\alpha^* \geq \alpha_{mon}$, promotors choose $\alpha = \alpha^*$ if $\alpha^* \leq \alpha_{max}$ or choose $\alpha = \alpha_{max}$ if $\alpha^* > \alpha_{max}$; 2) when $\alpha \geq \alpha_{mon}$ and $\alpha^* < \alpha_{mon}$, the unconstrained optimum is not achievable, and promotors choose the best feasible solution at $\alpha = \alpha_{mon}$; 3) when $0 \leq \alpha < \alpha_{mon}$, $\alpha^* < 0$. In this case, the unconstrained optimum is not achievable, and promoters choose the best feasible solution at $\alpha = 0$.

The model predicts that when $\alpha^* \geq \alpha_{mon}$, promoters of high-quality firms will sell a fraction of their equity (α^* or α_{max}) via the OFS during the IPO necessary to enhance institutional monitoring and retain the remaining equity to signal confidence in the firm's future prospects. Promoters of low-quality firms are better off not selling any shares via the OFS during the IPO to avoid the adverse effects of institutional monitoring and instead sell their intended shares through a low-cost OFS subsequent to the IPO. This suggests the existence of a separating equilibrium between high-quality and low-quality firms in the IPO market.

[10] In other words, if promotors do not sell any shares via the OFS and retain all shares after the IPO, IPO still has some level of underpricing.

4.2 Hypotheses Development

In India, the OFS piggybacked on an IPO allows selling shareholders to reduce their holdings during the IPO. If the IPO is undersubscribed, proceeds from the OFS are used to meet the IPO's minimum subscription requirement. This implies that selling shareholders may not fully realize their divestment goals when they piggyback their shares onto an undersubscribed IPO. Moreover, as residual claimants, promoters may relinquish shares without receiving the expected proceeds from their sale. While both IPO shares and OFS shares are proportionally distributed to retail and institutional investors, the percentage increase in institutional ownership is greater when non-dilutive OFS shares are transferred to new shareholders compared to when they are not.

The literature positively associates institutional ownership with improved firm governance. Institutional investors, through their voting rights, wield substantial influence over managerial decision-making. As institutional ownership increases, so does their influence, affecting the firm's strategic direction and corporate governance practices. Shleifer and Vishny (1989) present a theoretical model illustrating that large shareholders, particularly institutional investors, have a strong incentive to monitor management decisions. Empirical evidence by Agrawal and Mandelker (1990) supports this, showing that firms with a high percentage of institutional ownership exhibit more effective management oversight. In a more recent study, Chen et al. (2007) find that institutional blockholders (owning at least 5% of a firm's outstanding shares) engage in more active monitoring compared to smaller shareholders. These findings collectively underline the importance of increased institutional ownership in promoting effective corporate governance and management oversight.

Beyond direct intervention through active monitoring and voting, institutional investors also influence management decisions indirectly. For instance, Hirschman (1970) argues that the

"threat of exit" encourages managers to align their interests with those of institutional investors. Supporting this view, Parrino et al. (2003) demonstrate that institutional investors "vote with their feet" when dissatisfied with management, exerting downward pressure on the firm's stock price and thus disciplining management. Additionally, institutional investors leverage their monitoring power across various aspects of corporate decision-making, including R&D investment (Bushee, 1998), executive compensation (Hartzell and Starks, 2003), payout policy (Grinstein and Michaely, 2005), mergers and acquisitions (Ferreira et al., 2010), and earnings management (Liu et al., 2018). Institutional investors also facilitate information production, enhancing firm transparency (Boone and White, 2015). In the context of IPOs, Aggarwal et al. (2002) highlight that institutional investors possess private information about firms and often participate in high-quality IPOs to reduce information asymmetry in the capital market.

However, while institutional ownership brings many benefits, the literature also points to costs associated with institutional monitoring, particularly for low-quality firms. Institutions often demand extensive operational disclosures, which can consume resources and expose negative information about underperforming firms (Boone and White, 2015). Additionally, high-turnover institutions may pressure firms to focus on short-term gains at the expense of long-term growth (Bushee, 1998). Large institutional investors may also increase stock price volatility, which hinders a firm's ability to secure capital and negatively impacts market sentiment. Institutional monitoring may even lead to shareholder activism, drawing regulatory attention and scrutiny (Klein and Zur, 2009). Consequently, low-quality firms may benefit from avoiding institutional monitoring and withholding their true value from the market, as increased oversight could ultimately be detrimental to them.

Based on the theoretical underpinnings of institutional monitoring in the literature, we argue—consistent with our conceptual framework—that selling shareholders face a cost-benefit tradeoff in institutional monitoring at the time of the IPO. Effective monitoring, resulting from an increase in institutional ownership through the OFS piggybacked on an IPO, reduces information asymmetry in the capital market and promotes price discovery. A well-functioning monitoring system also inhibits management from focusing on short-term stock prices. Institutional monitoring, therefore, appeals to selling shareholders in high-quality firms that can benefit from early price discovery, while deterring low-quality firms that are adversely affected by it. Thus, we propose that promoters' decision to piggyback OFS shares onto IPO shares creates a separating equilibrium in the IPO market in India. Firms for which the benefits of institutional monitoring outweigh the costs are likely to piggyback OFS shares onto IPO shares. In contrast, firms for which the costs of institutional monitoring outweigh the benefits are likely to wait out the IPO. This perspective aligns with our theoretical framework, which illustrates how high-quality firms signal their value to the market by not only retaining equity but also embracing institutional monitoring through the OFS mechanism. By doing so, they differentiate themselves from low-quality firms that avoid such scrutiny.

To realize the separating equilibrium, low-quality firms must have access to a low-cost alternative for selling their shares without increased scrutiny and costs associated with undersubscribed or failed IPOs. The introduction of the low-cost secondary market OFS in India in February 2012 provides promoters with such an option. This secondary market OFS allows promoters of low-quality firms to sell shares as primary claimants while avoiding the scrutiny associated with increased institutional ownership. Accordingly, we argue that the availability of the OFS piggybacked on IPOs creates a separating equilibrium in the post-February 2012 period.

In contrast, prior to February 2012 in India, the absence of a low-cost alternative means that promoters from both high-quality and low-quality firms wishing to divest their holdings could opt to use the OFS piggybacked on IPOs, making a separating equilibrium unachievable.

While institutional monitoring reduces information asymmetry and enhances price discovery, thereby benefiting high-quality firms, selling shares during the IPO may be perceived as a lack of promoters' confidence in the firm's future prospects. This negative perception could undermine the positive effects of increased institutional monitoring. To reconcile this with the signaling theory related to promoters' retained equity, as outlined in our theoretical framework, promoters of high-quality firms mitigate such concerns by retaining a significant portion of their equity and selling only a small fraction during the IPO. By maintaining substantial ownership stakes, they demonstrate their confidence in the firm's future prospects, thereby reinforcing positive signals.

Drawing on both monitoring and signaling theories, and consistent with our theoretical model, we posit that an optimal profit-maximizing strategy for selling shareholders of high-quality firms involves staggering the sale of their shares. Initially, they sell a small number of shares to institutional investors via the OFS during the IPO, thereby benefiting from both institutional monitoring and retained ownership signal. Subsequently, once the market is more informed and the firm's true quality is recognized, they sell the remaining shares via a low-cost, non-dilutive standalone OFS in the secondary market. This approach allows them to maximize proceeds while maintaining market confidence.

Conversely, for low-quality firms, where the costs of institutional monitoring exceed the benefits, the optimal strategy is to delay selling any shares during the IPO. Instead, they sell all their intended shares through the low-cost standalone OFS after the IPO, thereby avoiding

increased scrutiny and potential negative effects of early price discovery. This strategic divergence between high-quality and low-quality firms, facilitated by the availability of the low-cost OFS option, reinforces the separating equilibrium in the market, as predicted by our theoretical framework.

Acknowledging that both monitoring through the transfer of shares to institutional investors and signaling through retained ownership reduce uncertainty and information asymmetry surrounding IPO value—and that IPO underpricing reflects these factors (Ritter, 1984; Beatty and Ritter, 1986, Michaely and Shaw, 1994)—we propose the following hypotheses:

H1a: Promoters' retained equity is inversely related to first-day return when they use the OFS in the primary market and also have access to the OFS in the secondary market.

H1b: Promoters' retained equity is not related to first-day return when they don't have access to the OFS in the secondary market, regardless of whether they utilize the OFS in the primary market.

Beginning with Kyle (1985), a large body of research establishes that information asymmetry and trading activity are closely related. Theory predicts that when liquidity trading is exogenous, trading volume prior to public announcement increases in information asymmetry. This occurs because informed traders exploit their private information in a market with a high degree of information asymmetry. The literature also documents that the differential interpretations of public information and the resulting heterogeneous beliefs among investors contribute to variations in trading volume (Bamber et al, 1999; Brockman and Chung, 2000). Chae

(2005) empirically tests the positive relation between trading activity and information asymmetry by considering the trading volume before and after the scheduled and unscheduled earnings announcements. In line with Kyle's (1985) hypothesis, Chae (2005) finds that price sensitivity not only increases before scheduled announcements but also before unscheduled earnings announcements. This phenomenon can be attributed to market makers, who are uninformed regarding corporate information, raising their price when they perceive securities to exhibit asymmetric information costs. These findings highlight the role of information asymmetry in shaping trading activity and price sensitivity in capital markets.

We acknowledge that trading volume does not adjust for the number of outstanding shares. This implies that the measure using the trading volume may be biased if the variability in the number of outstanding shares across firms is very large. Stated differently, with everything else being equal, firms with more (fewer) tradable shares are likely to have higher (lower) trading volume. To address this concern, we use trading turnover measure defined as the natural logarithm of the mean daily trading volume divided by number of outstanding shares over 30 days starting from the second day of secondary market trading. For additional robustness of our results, we consider yet another trading measure that is independent of the stock price. Specifically, we use share turnover calculated as the natural logarithm of the mean daily number of shares traded divided by the number of outstanding shares over 30 days starting from the second day of secondary market trading. In contrast to trading volume and trading turnover, share turnover directly measures the fraction of shares traded in the market, without considering the impact of stock price. This measure thus more likely captures the intensity of trading at the firm level.

Acknowledging that trading activity, such as trading turnover and shares turnover, is sensitive to uncertainty and information asymmetry (Chae, 2005), we argue that in a market with

a low-cost standalone OFS, OFS piggybacked on the IPO reduces uncertainty and information asymmetry in the market, which in turn reduces trading activity. We therefore hypothesize the following:

H2a: Promoters' retained equity is inversely related to trading turnover when they use the OFS in the primary market and also have access to the OFS in the secondary market.

H2b: Promoters' retained equity is not related to trading turnover when they don't have access to the OFS in the secondary market, regardless of whether they utilize the OFS in the primary market.

H3a: Promoters' retained equity is inversely related to shares turnover when they use the OFS in the primary market and also have access to the OFS in the secondary market.

H3b: Promoters' retained equity is not related to shares turnover when they don't have access to the OFS in the secondary market, regardless of whether they utilize the OFS in the primary market.

Our profit-maximizing strategies are robust to partial divestment, meaning they do not assume that all shareholders aim to sell some or all of their shares during the IPO. While some shareholders, such as VCs, private equity firms, and promoters, may wish to reduce their holdings (e.g., to comply with SEBI's minimum public shareholding requirement), others may prefer to remain invested. If no shareholder wishes to sell, the OFS piggybacked on an IPO becomes

redundant. However, if some shareholders seek to reduce their holdings, our hypotheses predict that an OFS coupled with an IPO can create a separating equilibrium in a market that also includes a low-cost standalone OFS.

5. Empirical methodology

A key challenge facing researchers and policymakers examining the effects of policies in non-experimental studies is selection bias—the individuals or groups affected by a policy change may differ from those who are not affected by the change. In the context of the Indian IPO market, the group of firms in which existing shareholders sell their shares through the OFS at the time of the IPO may have different characteristics compared to those in which shareholders do not sell their shares through the OFS at the time of the IPO.

A popular non-experimental approach used by researchers to estimate the effect of a policy on individuals or groups affected by the policy at a particular point in time is the difference-in-differences (DD) approach. DD compares changes over time between a group affected by a policy and a group not affected by it. DD estimates are considered unbiased if, in the absence of the policy intervention, both groups would have followed parallel trends over time (Abadie, 2005).

The difference-in-difference-in-differences (DDD) method extends DD by incorporating an additional dimension, allowing for a more comprehensive examination of the policy's effects across different contexts.[11] In this study, DDD is employed to analyze the effects of the February 2012 policy change, the use of OFS piggybacked on the IPO, and promoters' retained equity. Since the decision to use the OFS mechanism is endogenous, meaning it is influenced by factors that

[11] See, e.g., Tsoutsoura (2014), Serfling (2016), Faccio and Hsu (2017), and Bennedsen et al. (2022) for examples of using the DDD approach to measure the effect of policy changes.

could also affect IPO outcomes, simply relying on DD may not fully account for these biases. By employing a DDD approach, we introduce an additional layer of differencing that helps control for factors that might vary across groups and over time. This method can better isolate the true effect of the policy intervention by accounting for differences in group compositions before and after the policy change.

In the Indian IPO market examined in this study, DDD estimates of outcomes are unbiased if, in the absence of the February 2012 policy change, trends over time are consistent across the group of IPOs with OFS piggybacked on the IPO, the group without OFS piggybacked on the IPO, and across different levels of promoters' retained equity. The key identifying assumption is that IPO outcomes for firms with and without piggybacked OFS are influenced by similar factors. Consequently, any differences in IPO outcomes between these groups can be attributed to the 2012 policy change.

We recognize that the parallel trends assumption may be too strong, given the endogeneity of the decision to piggyback OFS share on the IPO. Therefore, for additional robustness, we conduct placebo tests using a DDD approach similar to our main analysis. These tests address endogeneity and further validate our findings by examining two unrelated policy changes in India that affected the IPO's informational environment but were not associated with the OFS mechanism. The first policy pertains to the allocation of shares to anchor institutional investors (September 2007), and the second policy clarifies IPO disclosure rules (July 2009). By applying DDD around these independent policy enactment dates, we assess whether our observed effects genuinely stem from the OFS mechanism or are merely coincidental. The absence of similar effects in these placebo tests would suggest that our main findings are not spurious, thereby strengthening the causal inference.

It is important to clarify that DDD does not simply "add robustness" to the analysis; it captures additional interactions among treatment, time, and key covariates. This additional interaction is particularly useful for analyzing how policy changes, market structures, and promoter behaviors jointly influence IPO outcomes, such as first-day return, trading turnover, and share turnover. Moreover, the assumption of similar trends over time does not imply that the composition of the groups remains unchanged—especially in repeated cross-sectional data, where individual observations (e.g., IPOs) may vary between time periods. For instance, the group of IPOs using the OFS mechanism before the February 2012 policy change differs from those using OFS after the policy change. This shift in composition may introduce potential biases. However, the DDD approach accounts for these differences, thereby better isolating the true effect of the policy intervention on IPO outcomes.

To account for potential correlations in the residuals, we cluster observations by year. This method addresses the concern that observations from the same year may share common influences, such as macroeconomic conditions, regulatory changes, or market-wide events, leading to correlated errors. By adjusting the standard errors for these within-year correlations, we reduce the risk of biased inferences that might arise from treating the observations as independent when they are not.

In addition to clustering by year, we employ bootstrapping to further enhance the robustness and accuracy of our analysis.[12] Bootstrapping is a resampling technique that involves repeatedly drawing samples from the original dataset, with replacement, to generate a distribution of the parameter estimates. This approach allows us to empirically estimate the variability of the

[12] See, e.g., Kosowski et al. (2006), Fama and French (2010), and Harvey and Liu (2019), for various applications of bootstrapping as robustness tests.

parameters rather than relying solely on theoretical assumptions about the data's underlying distribution. By implementing bootstrapping in a manner that respects the year-based clustering, we ensure that each resampled dataset maintains the original within-year structure. This means that in each bootstrap sample, observations within the same year remain grouped together and thus any potential correlations and dependencies among them are preserved. This approach provides a more realistic representation of the data's inherent structure while addressing issues such as heteroskedasticity (unequal variances across years) and serial correlation (autocorrelation of observations over time).

Through the combined use of DDD, placebo tests, clustering, and bootstrapping, our study robustly addresses selection bias and endogeneity concerns. These methodological choices enhance our ability to isolate the true effect of the February 2012 policy change on IPO outcomes in the Indian market, thereby providing more reliable and credible findings.

6. Data

The data for the analysis is collected from Prime Database, the Bombay Stock Exchange (BSE), and the National Stock Exchange (NSE).[13] The data sample consists of 315 IPOs (November 2005–December 2014) of which 214 IPOs are in the period January 2007 to December 2014. We use IPO data in this period to examine the effect of the February 2012 regulatory act on underpricing and trading activity in the IPO market, and we use the November 2005–July 2009 period and the September 2007–February 2012 period to examine the effect of the September 2007 regulatory change and the effect of the July 2009 regulatory change, respectively, on the IPO firms'

[13] www.primedatabase.com

informational environment. All IPOs in the data sample are listed on the NSE and the BSE. IPO listings on the smaller stock exchanges are excluded from the data sample.

The data on market index returns is collected from Money Control.[14] Daily market returns are computed using the S&P BSE Sensex. The Sensex is the benchmark stock market index of India, representing 30 of the largest and most actively traded stocks on the BSE. It is similar to the Dow Jones Industrial Average (DJIA) in the United States, as both indices are key indicators of the stock market performance in their respective countries. The variables used in the analysis are fully defined in Appendix A. Table 1 provides the descriptive statistics for the data sample of 214 IPOs listed on the BSE and NSE between January 2007 and December 2014.

[Insert Table 1 about here]

Panel A of Table 1 presents the descriptive statistics for 36 IPOs that included an OFS during the January 2007 to December 2014 period, while Panel B presents the same statistics for 178 IPOs without an OFS in that period. Notably, the standard deviations for both firm size and issue size are higher than their respective means and top quartiles, indicating substantial outliers or high data spread. This suggests the need to control for outliers, potentially by applying a log transformation to firm size and issue size to reduce skewness and improve normality.

Table 2 presents the Pearson correlations between the variables used in the analysis. In addition to the correlation between the proxies for trading activity—trading turnover and share turnover—the table also indicates a strong correlation between firm size and issue size. This suggests the importance of addressing multicollinearity in the analysis to ensure reliable results.

[14] www.moneycontrol.com

[Insert Table 2 about here]

Table 3 presents the results of the logit regression analysis, where the dependent variable indicates whether an IPO is piggybacked by an OFS—taking a value of one if it is, and zero if it is not. The objective of this regression is to examine the characteristics of IPOs that are piggybacked by an OFS in the primary market.

[Insert Table 3 about here]

Table 3 shows that IPOs in which venture capitalists sell their shares and promoters retain a large fraction of their equity are likely to be piggybacked by an OFS. These findings support our hypotheses, suggesting that promoters leverage the OFS mechanism to signal their commitment and confidence in the firm's future by maintaining significant equity stakes, while venture capitalists capitalize on the positive signal from promoters' retained equity to exit their investments.

7. Results

In this section, we present the results on how the OFS mechanism influences the relationship between promoters' retained equity and information asymmetry. We use the February 2012 policy change as an exogeneous shock to the IPO's informational environment. Prior to the policy change, shareholders piggybacked their shares on IPO shares as residual claimants to reduce their holdings in the firm. After the policy change, shareholders have the option to also sell their

shares after the IPO using the standalone OFS in the secondary market as primary claimants. We argue that the OFS coupled with the IPO creates a separating equilibrium in the post-policy change period. We further argue that the action, if perceived by investors as an action of a high-quality firm, affects both IPO underpricing and trading in the secondary market. We test these arguments, and thereby the predictions of our hypotheses, using the DDD approach. Table 4 reports the results of the DDD regressions with FIRST_DAY_RETURN, TRADING_TURNOVER, and SHARE_TURNOVER as the dependent variables in Panels B, C, and D, respectively.

[Insert Table 4 about here]

The negative and statistically significant coefficients for the DDD variable across all models and panels in Table 4 indicate that IPO underpricing (Panel B) and trading activity (Panels C and D) in the post-February 2012 period decrease as promoters retained ownership increases and they piggyback their shares onto the IPO as residual claimants. These findings support the predictions of H1a, H2a, and H3a.

Furthermore, the statistically non-significant coefficients for the interaction term DD — RETAINED_EQUITY × OFS in Models 2 and 3 across all panels suggest that the effect of retained ownership on IPO underpricing and trading activity is not influenced by whether promoters utilize the OFS in the pre-February 2012 period. This result aligns with H1b, H2b, and H3b, which predict that the absence of a low-cost alternative like the standalone OFS diminishes the ability of the OFS piggybacked on the IPO to mitigate information asymmetry in the IPO market.

Next, we conduct placebo tests to further demonstrate that our findings are not a statistical artifact. Specifically, we consider two additional policy changes in India that affected the IPO's

informational environment but that were not related to the OFS mechanism. We perform the DDD analyses around the two policy enactment dates. The analyses are similar to the DDD analysis thus far in all aspects except for the policies used as exogenous shocks. The first policy we consider for the placebo test is with regard to allocation of shares to anchor institutional investors. This policy was enacted in September 2007. The policy reduced heterogeneity of investors' beliefs associated with above-market average reported earnings in the market (Samdani, 2019). The second policy clarified the rules for disclosing information in IPO prospectus (Samdani, 2024). This policy was enacted in July 2009.

If the results around the September 2007 policy change and the July 2009 policy change show significant differences in information asymmetry between IPOs piggybacked by OFS and IPOs not piggybacked by OFS, then one may argue that our findings on OFS are perhaps due to investors' general reaction (e.g., risk aversion) to policy changes, and not due to the presence/absence of the low-cost standalone OFS. However, if the results do not show significant differences in information asymmetry, then it is plausible to conclude that the February 2012 policy change which introduced a low-cost standalone OFS option for existing shareholders to sell their shares in the secondary market is critical for creating a separating equilibrium in a market with a high-cost OFS piggybacked on IPO mechanism. Furthermore, we argue that without a low-cost alternative, the signaling value of promoters' retained equity is diminished in a market with high-cost feature. Indeed, we find that the coefficient for the DDD is statistically non-significant, suggesting that the effect of promoters' retained equity on underpricing and trading activity is not statistically different in these periods. The results are reported in Tables B1 and B2 in Appendix B.

[Insert Table B1 about here]

[Insert Table B2 about here]

8. Conclusion

Selling shares through the OFS mechanism during an IPO has significant implications for various stakeholders. Contrary to the common belief that selling shares during an IPO sends a negative signal to the market, our study of the IPO market in India demonstrates that when selling shareholders are residual claimants, retain a substantial equity stake, and their sale leads to increased institutional monitoring, the OFS can serve as a positive signal, eliciting a favorable market response.

Our research identifies specific institutional features that enhance effective signaling in India's IPO market. The non-dilutive OFS in the primary market, in which selling shareholders are residual claimants, strengthens institutional monitoring. Additionally, the non-dilutive standalone OFS in the secondary market, in which selling shareholders are primary claimants, provides a low-cost avenue for existing shareholders to divest. These mechanisms create an environment in which high-quality firms can effectively signal their value to the market.

For the signaling models proposed by Leland and Pyle (1977) and Grinblatt and Hwang (1989) to function effectively in this context, promoters of high-quality firms must utilize the OFS piggybacked on the IPO in the primary market. This strategy contrasts with the U.S. approach, where relaxed regulations regarding allocation of shares make it challenging to establish a separating equilibrium with institutional monitoring during the IPO. For instance, Yahoo Inc.'s sale of 140 million shares during Alibaba's 2014 IPO does not clarify whether the transaction enhanced or diminished institutional monitoring.

Moreover, our study highlights potential adverse effects associated with introducing new features, like the OFS piggybacked on the IPO, into a capital market. To mitigate these risks, it is crucial to offer alternatives, such as the standalone OFS in the secondary market. This approach helps ensure that existing mechanisms remain effective while accommodating new innovations.

Our findings also pave the way for future research. Investigating the long-term performance of firms that utilize the OFS mechanism at the time of the IPO, including factors such as post-IPO growth, profitability, and stock price performance, could shed light on the lasting implications of using the OFS as a key component of a signaling strategy. Additionally, exploring the different types of shareholders participating in the OFS during the IPO and assessing their impact on the effectiveness of signaling could provide deeper insights. Such studies would be valuable for policymakers aiming to design more effective IPO processes.

In summary, this study contributes to the IPO literature by examining the role of institutional monitoring in a firm's signaling strategy in the IPO market. Our findings offer valuable insights for early shareholders, promoters, regulators, and policymakers. These insights can help in developing a more transparent and efficient capital market. By enhancing our understanding of the signaling mechanism and the tradeoffs involved in institutional monitoring, this research lays the groundwork for future studies aimed at deepening the understanding of the various stakeholders' role in the IPO market.

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Table 1: Descriptive statistics of 214 IPOs in the January 2007 to December 2014 period in India

Panel A: 36 IPOs with OFS

	Mean	Median	p25	p75	Std. dev.
FIRST_DAY_RETURN	0.12	0.09	-0.11	0.29	0.29
TRADING_TURNOVER	0.17	0.04	0.01	0.08	0.44
SHARE_TURNOVER	0.03	0.006	0.002	0.02	0.08
FIRM_SIZE (INR million)	50700	15800	5150	34400	1030000
ISSUE_SIZE (INR million)	7063	2738	1166	6381	11919
EPS	7.12	5.82	2.12	10.60	6.08
OVERSUBSCRIBED	17.50	4.98	1.47	25.11	26.16
ANCHOR SHARES (# of shares)	6168875	22883482	1737914	4883720	8440795
GRADE (1–5)	3.24	3	3	4	0.67

Panel B: 178 IPOs without OFS

	Mean	Median	p25	p75	Std. dev.
FIRST_DAY_RETURN	0.19	0.07	-0.07	0.37	0.48
TRADING_TURNOVER	0.33	0.12	0.03	0.38	0.75
SHARE_TURNOVER	0.07	0.03	0.005	0.06	0.15
FIRM_SIZE (INR million)	31100	3360	1540	14000	141000
ISSUE_SIZE (INR million)	3546	943	559	2270	9931
EPS	8.80	4.15	1.91	8.45	23.40
OVERSUBSCRIBED	16.29	3.53	1.32	15.14	27.82
ANCHOR SHARES (# of shares)	9655212	2638560	1254289	9286600	15500000
GRADE (1–5)	2.62	3	2	3	1

Notes: This table reports the descriptive statistics of the variables mean, median, 25th percentile, 75th percentile, and standard deviation, over the period of January 2007 to December 2014. Panels A and B present the results for 36 IPOs piggybacked by OFS and 178 IPOs not piggybacked by OFS in that period, respectively.

Table 2: Correlation matrix (2007-2014)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
FIRST_DAY_RETURN	1								
TRADING_TURNOVER	0.36***	1							
SHARE_TURNOVER	0.33***	0.99***	1						
FIRM_SIZE	-0.02	-0.09	-0.09	1					
ISSUE_SIZE	-0.04	-0.13**	-0.13**	0.95***	1				
EPS	0.01	0.01	-0.01	-0.02	-0.02	1			
OVERSUBSCRIBED	0.52***	-0.04	-0.06	0.10	0.11*	0.09	1		
ANCHOR SHARES	-0.23*	-0.27*	-0.26*	0.60***	-0.73***	-0.18	-0.12	1	
GRADE	-0.05	-0.26***	-0.26***	0.30***	0.35***	0.04	0.27***	0.09	1

Notes: This table reports the pairwise (Pearson) correlations of the variables used in the analysis.

Table 3: 214 IPOs (2007–2014) piggybacked by OFS and firm characteristics (Logit regressions)

Dependent Variable: OFS piggybacked on IPO			
Constant	-6.85**	-7.23***	-6.12
	(2.397)	(2.768)	(6.088)
RETAINED_EQUITY	5.85***	6.78*	7.19*
	(2.397)	(3.583)	(4.312)
VC_SELL	3.64***	4.06***	4.06***
	(0.665)	(0.889)	(0.899)
Ln(FIRM_SIZE)			-0.04
			(0.359)
Ln(ISSUE_SIZE)		0.08	
		(0.351)	
EPS		-0.01	-0.01
		(0.021)	(0.022)
ANCHOR		-0.27	-0.22
		(0.769)	(0.761)
AUDITOR_REPUTATION		0.23	0.24
		(0.698)	(0.692)
UNDERWRITER_REPUTATION		0.59	0.74
		(0.923)	(0.925)
GRADE		-0.29	-0.23
		(0.321)	(0.335)
POST_FEB_2012		-0.21	-0.30
		(1.968)	(2.008)

Notes: This table reports the estimation results of the logit regressions. The dependent variable is a dummy variable equal to one if the IPO is piggyback by OFS and zero if the IPO is not piggybacked by OFS. ***, **, and * indicate statistical significance at the 1%, 5% and 10% levels.

Table 4: 214 IPOs (2007–2014) piggybacked by OFS and information asymmetry (DDD regressions)

Panel A: Control Variables and Standard Errors	Model 1	Model 2	Model 3
Control Variables (without ISSUE_SIZE)	No	No	Yes
Control Variables (without FIRM_SIZE)	No	Yes	No
Industry and Year Fixed Effects	No	Yes	Yes
Standard Errors Clustered by Year	No	Yes	Yes
Standard Errors Robust to Heteroskedasticity	Yes	Yes	Yes
Panel B: FIRST_DAY_RETURN	**Model 1**	**Model 2**	**Model 3**
Constant	0.02	0.44**	1.05*
	(0.223)	(0.171)	(0.526)
RETAINED_EQUITY	0.24	0.10	0.26
	(0.300)	(0.326)	(0.340)
OFS	-0.85**	0.15	0.16
	(0.411)	(0.147)	(0.180)
POST_FEB_2012	-0.16	-0.40	-0.30
	(0.253)	(0.408)	(0.429)
DD — RETAINED_EQUITY × OFS	0.93*	-0.23	-0.26
	(0.530)	(0.155)	(0.172)
DD — RETAINED EQUITY × POST_FEB_2012	-0.01	0.59	0.43
	(0.359)	(0.550)	(0.569)
DD — OFS × POS_FEB_2012	1.46*	2.95**	2.64**
	(0.841)	(1.051)	(1.170)
DDD— RETAINED_EQUITY × OFS × POST_FEB_2012	-1.72*	-3.50**	-3.15*
	(1.044)	(1.237)	(1.393)
Panel C: Ln(TRADING_TURNOVER)	**Model 1**	**Model 2**	**Model 3**
Constant	2.30***	4.06***	12.42***
	(0.815)	(1.065)	(3.303)
RETAINED_EQUITY	6.37***	-0.15	1.86***
	(1.088)	(0.695)	(0.428)
OFS	-5.80**	-0.36	0.17
	(2.340)	(1.310)	(1.169)
POST_FEB_2012	-7.55***	-7.49***	-5.91***
	(2.660)	(0.873)	(0.899)
DD — RETAINED_EQUITY × OFS	6.89**	0.03	-0.67
	(2.939)	(1.960)	(1.746)
DD — RETAINED EQUITY × POST_FEB_2012	7.07*	7.73***	5.63***
	(3.669)	(1.554)	(1.466)
DD — OFS × POS_FEB_2012	20.25**	20.95***	14.48**
	(7.852)	(4.953)	(4.834)
DDD— RETAINED_EQUITY × OFS × POST_FEB_2012	-24.17**	-25.27***	-17.80**
	(9.705)	(5.771)	(5.566)
Panel D: Ln(SHARE_TURNOVER)	**Model 1**	**Model 2**	**Model 3**
Constant	1.49**	3.15***	11.64***
	(0.755)	(0.849)	(2.831)
RETAINED_EQUITY	-7.42***	-1.14*	0.90**
	(1.008)	(0.549)	(0.327)
OFS	-6.17***	-0.84	-0.31
	(2.234)	(1.387)	(1.124)
POST_FEB_2012	-7.55***	-7.61***	-6.01***

	(2.714)	(0.857)	(0.842)
DD — RETAINED_EQUITY × OFS	7.36**	0.69	-0.02
	(2.822)	(2.010)	(1.655)
DD — RETAINED EQUITY × POST_FEB_2012	7.05*	7.70***	5.57***
	(3.643)	(1.515)	(1.415)
DD — OFS × POS_FEB_2012	19.34**	19.37***	12.84**
	(8.233)	(4.854)	(4.421)
DDD— RETAINED_EQUITY × OFS × POST_FEB_2012	-23.02**	-23.39***	-15.85**
	(10.140)	(5.729)	(5.143)

Notes: This table reports the estimation results of the DDD regressions. The dependent variables are FIRST_DAY_RETURN, Ln(TRADING_TURNOVER), and Ln(SHARE_TURNOVER), with related results reported in Panels B, C, and D, respectively. Panel A reports the results of the control variables in the three models. The control variables are Ln(ISSUE_SIZE), Ln(FIRM_SIZE), EPS, ANCHOR, GRADE, VC_SELL, AUDITOR_REPUTATION, and UNDERWRITER_REPUTATION. The variables are defined in Appendix A. Standard errors are in parentheses. ***, **, and * indicate statistical significance at the 1%, 5% and 10% levels. Standard errors for DDD in Model (2) and Model (3) in Panel A are bootstrap standard errors adjusted for clusters in year.

APPENDIX A

Variable	
MARKET RETURN	Return on S&P BSE SENSEX, the India equivalent of DJIA in the U.S.
FIRST_DAY_RETURN	((First-day closing price/Offer price) -1) – MARKET RETURN.
TRADING_VOLUME	(Mean daily number of shares traded x natural log of trading price) over 30 days starting from the second day of secondary market trading.
TRADING_TURNOVER	(Mean TRADING_VOLUME / the number of outstanding shares) over 30 days starting from the second day of secondary market trading.
SHARE_TURNOVER	(Mean daily number of shares traded / the number of outstanding shares) over 30 days starting from the second day of secondary market trading.
FIRM_SIZE	Firm size (INR).
EPS	Earnings-per-share reported in the prospectus.
OVERSUBSCRIBED	Number of times the IPO is oversubscribed.
ANCHOR SHARES	Number of shares allocated to anchor institutional investors.
ANCHOR	Dummy variable equal to 1 if IPO is backed by anchor institutional investors and 0 otherwise.
GRADE	A grade between 1 and 5 assigned by a SEBI approved rating agency.
UNDERWRITER REPUTATION	Dummy variable equal to 1 if the underwriter is a top-ranked underwriter and 0 otherwise.
AUDITOR REPUTATION	Dummy variable equal to 1 if the underwriter is top-ranked auditor and 0 otherwise.
VC_SELL	Dummy variable equal to 1 if VC are involved in the IPO and they sell their shares during the IPO, 0 otherwise.
RETAINED_EQUITY	Fraction of promoters' equity retained in the firm.
POST_FEB_2012	Takes a value of 1 if IPO is in the February 2012 to December 2014 period, and 0 if in the September 2007 to February 2012 period.
POST_JULY_2009	Takes a value of 1 if IPO is in the July 2009 to February 2012 period, and 0 if in the September 2007 to July 2009 period.
POST_SEP_2007	Takes a value of 1 if IPO is in the September 2007 to July 2009 period, and 0 if in the August 2005 to September 2007 period.

APPENDIX B

Table B1: 180 IPOs (2007–2012) piggybacked by OFS and information asymmetry (DDD regressions)

Panel A: Control Variables and Standard Errors	Model 1	Model 2	Model 3
Control Variables (without ISSUE_SIZE)	No	Yes	No
Control Variables (without FIRM_SIZE)	No	No	Yes
Industry and Year Fixed Effects	No	Yes	Yes
Standard Errors Clustered by Year	No	Yes	Yes
Standard Errors Robust to Heteroskedasticity	Yes	Yes	Yes
Panel B: FIRST_DAY_RETURN	**Model 1**	**Model 2**	**Model 3**
Constant	0.13	1.65***	2.31***
	(0.328)	(0.095)	(0.439)
RETAINED_EQUITY	0.25	0.29	0.42
	(0.440)	(0.257)	(0.330)
OFS	0.15	-1.37	-1.73
	(2.432)	(1.602)	(1.579)
POST_JULY_2009	-0.02	-1.24***	-1.31***
	(0.395)	(0.241)	(0.213)
DD — RETAINED_EQUITY × OFS	-0.19	1.45	1.89
	(2.995)	(1.874)	(1.825)
DD — RETAINED EQUITY × POST_JULY_2009	-0.22	0.29	0.36
	(0.524)	(0.296)	(0.279)
DD — OFS × POST_JULY_2009	-1.12	1.45	1.83
	(2.469)	(1.888)	(1.834)
DDD — RETAINED_EQUITY × OFS × POST_JULY_2009	1.29	-1.57	-2.05
	(3.042)	(2.134)	(2.009)
Panel C: Ln(TRADING_TURNOVER)	**Model 1**	**Model 2**	**Model 3**
Constant	2.26*	0.53	7.39**
	(1.230)	(1.109)	(2.391)
RETAINED_EQUITY	-5.927***	0.92	2.29**
	(1.578)	(0.622)	(0.669)
OFS	2.29	2.98	4.51
	(5.783)	(8.374)	(7.461)
POST_JULY_2009	1.60	3.71**	3.27*
	(1.751)	(1.185)	(1.265)
DD — RETAINED_EQUITY × OFS	-2.25	-4.28	-6.15
	(6.874)	(10.136)	(8.934)
DD — RETAINED EQUITY × POST_JULY_2009	-3.03	-2.24	-1.70
	(2.313)	(1.308)	(1.399)
DD — OFS × POST_JULY_2009	-10.40*	-4.48	-5.59
	(6.259)	(7.34)	(6.850)
DDD — RETAINED_EQUITY × OFS × POST_JULY_2009	12.11	6.28	7.53
	(7.562)	(8.839)	(8.208)
Panel D: Ln(SHARE_TURNOVER)	**Model 1**	**Model 2**	**Model 3**
Constant	1.53	0.36	7.30**
	(1.162)	(0.930)	(2.213)
RETAINED_EQUITY	-7.13***	-0.38	1.07*
	(1.489)	(0.394)	(0.470)

OFS	-0.15	1.03	2.65
	(6.070)	(8.806)	(7.861)
POST_JULY_2009	1.14	2.97**	2.49*
	(1.650)	(1.016)	(1.087)
DD — RETAINED_EQUITY × OFS	0.72	-1.81	-3.78
	(7.207)	(10.707)	(9.541)
DD — RETAINED EQUITY × POST_JULY_2009	-2.35	-1.53	-0.95
	(2.174)	(1.125)	(1.201)
DD — OFS × POST_JULY_2009	-7.77	-2.61	-3.77
	(6.480)	(7.75)	(7.257)
DDD — RETAINED_EQUITY × OFS × POST_JULY_2009	-8.86	3.93	5.25
	(7.808)	(9.336)	(8.700)

Notes: This table reports the estimation results of the DDD regressions. The dependent variables are FIRST_DAY_RETURN, Ln(TRADING_TURNOVER), and Ln(SHARE_TURNOVER), with related results reported in Panels B, C, and D, respectively. Panel A reports the results of the control variables in the three models. The control variables are Ln(ISSUE_SIZE), Ln(FIRM_SIZE), EPS, ANCHOR, GRADE, VC_SELL, AUDITOR_REPUTATION, and UNDERWRITER_REPUTATION. The variables are defined in Appendix A. Standard errors are in parentheses. ***, **, and * indicate statistical significance at the 1%, 5% and 10% levels.

Table B2: 192 IPOs (2005–2009) piggybacked by OFS and information asymmetry (DDD regressions)

Panel A: Control Variables and Standard Errors	Model 1	Model 2	Model 3
Control Variables (without ISSUE_SIZE)	No	Yes	No
Control Variables (without FIRM_SIZE)	No	No	Yes
Industry and Year Fixed Effects	No	Yes	Yes
Standard Errors Clustered by Year	No	Yes	Yes
Standard Errors Robust to Heteroskedasticity	Yes	Yes	Yes
Panel B: FIRST_DAY_RETURN	**Model 1**	**Model 2**	**Model 3**
Constant	-0.16	0.40	4.77
	(0.361)	(0.314)	(3.343)
RETAINED_EQUITY	0.55	0.58*	-5.40
	(0.481)	(0.215)	(3.039)
OFS	-1.18	0.08	-5.85
	(0.837)	(0.401)	(3.002)
POST_SEPT_2007	0.30	-1.24***	-3.21
	(0.488)	(0.241)	(2.227)
DD — RETAINED_EQUITY × OFS	1.31	-0.11	6.60
	(1.109)	(0.631)	(2.963)
DD — RETAINED EQUITY × POST_SEPT_2007	-0.30	-0.29	5.76
	(0.651)	(0.294)	(3.363)
DD — between OFS and POST_SEPT_2007	1.33	1.57	0.00
	(2.57)	(2.134)	(0.000)
DDD — RETAINED_EQUITY × OFS × POST_SEPT_2007	-1.51	-1.57	0.00
	(3.190)	(2.134)	(0.000)
Panel C: Ln(TRADING_TURNOVER)	**Model 1**	**Model 2**	**Model 3**
Constant	0.01	-8.41	-5.26
	(0.889)	(11.714)	(16.174)
RETAINED_EQUITY	-2.94**	8.37	6.74
	(1.283)	(13.513)	(13.419)
OFS	-4.87	-27.48	-24.448
	(4.608)	(10.433)	(11.322)
POST_SEPT_2007	2.25	32.35	3.70
	(1.516)	(11.954)	(9.838)
DD — RETAINED_EQUITY × OFS	5.78	5.12	28.55
	(5.993)	(9.161)	(13.073)
DD — RETAINED EQUITY × POST_SEPT_2007	-2.98	-9.15	-7.00
	(2.832)	(13.459)	(14.379)
DD — between OFS and POST_SEPT_2007	7.168	0.00	0.00
	(7.388)	(0.000)	(0.000)
DDD — RETAINED_EQUITY × OFS × POST_SEPT_2007	-0.04	0.00	0.00
	(9.112)	(0.000)	(0.000)
Panel D: Ln(SHARE_TURNOVER)	**Model 1**	**Model 2**	**Model 3**
Constant	-0.89	-8.93	-4.66
	(0.861)	(10.900)	(15.933)
RETAINED_EQUITY	-3.94***	8.39	6.85
	(1.249)	(12.111)	(12.050)
OFS	-5.30	-29.64	-26.29
	(4.618)	(11.415)	(12.569)
POST_SEPT_2007	2.43*	6.15	4.61

	(1.445)	(8.147)	(8.947)
DD — RETAINED_EQUITY × OFS	6.32	35.17	30.98
	(6.025)	(13.237)	(14.700)
DD — between POST_SEPT_2007 and RETAINED EQUITY	5.15	-10.61	-8.31
	(7.620)	(12.032)	(13.131)
DD — between OFS and POST_SEPT_2007	-5.59	0.00	0.00
	(9.386)	(0.000)	(0.000)
DDD — RETAINED_EQUITY × OFS × POST_SEPT_2007	-8.86	0.00	0.00
	(7.808)	(0.000)	(0.000)

Notes: This table reports the estimation results of the DDD regressions. The dependent variables are FIRST_DAY_RETURN, Ln(TRADING_TURNOVER), and Ln(SHARE_TURNOVER), with related results reported in Panels B, C, and D, respectively. Panel A reports the results of the control variables in the three models. The control variables are Ln(ISSUE_SIZE), Ln(FIRM_SIZE), EPS, ANCHOR, GRADE, VC_SELL, AUDITOR_REPUTATION, and UNDERWRITER_REPUTATION. The variables are defined in Appendix A. Standard errors are in parentheses. ***, **, and * indicate statistical significance at the 1%, 5% and 10% levels.