Why Don't Issuers Get Upset about IPO Underpricing: Evidence from the Loan Market*

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Abstract

This paper links IPO underpricing with the benefit of going public from the loan market. We show that IPO underpricing is followed by significantly lower borrowing costs of the issuer after going public. The average reduction in the loan interest spread for firms with above-median IPO underpricing is about 24% of their pre-IPO loan spreads, which almost double the reduction for firms with below-median underpricing, after control for firm and loan characteristics, and important factors that affect IPO underpricing. This larger reduction in borrowing costs amounts to about U.S. $0.8 billion per year for our sample firms, which is substantial relative to the total amount of money left on the table due to higher underpricing (U.S. $21.06 billion). More importantly, neither price revision before IPO nor longer-term stock returns after IPO has a similar effect, suggesting a unique role of underpricing in driving issuers' borrowing costs. Our findings provide a new rationale for why issuers don't get upset about IPO underpricing, and are consistent with the argument that going public generates great publicity of the issuer, while IPO underpricing amplifies this effect and tends to make the issuer an "overnight celebrity."

Keywords: *IPO, Underpricing, Loans, Borrowing costs, Overnight celebrity*

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1 Introduction

The majority of U.S. initial public offerings (IPOs) have been underpriced in the past decades. Despite leaving substantial amounts of money on the table, issuers rarely get upset (Krigman, Shaw, and Womack, 1999; Loughran and Ritter, 2002), and high-underpricing underwriters constantly gain market share (Hoberg, 2007). Why don't issuers get upset about IPO underpricing? For an explanation, extant literature focuses on studying three main players in the IPO market: the IPO firm (entrepreneurs or managers), the underwriter(s), and stock investors (see e.g., reviews by Ritter and Welch, 2002; Ljungqvist, 2007; Lowry, Michaely, and Volkova, 2017). In this paper, we instead look out of the IPO market, and link underpricing with the benefit of going public from the loan market.

In brief, we show that IPO underpricing is followed by significantly lower borrowing costs of the issuer in the loan market. Specifically, firms with higher IPO underpricing experience larger reduction in post-IPO (vs. pre-IPO) borrowing costs. The average reduction in the loan interest spread for firms with above-median IPO underpricing is about 23.7% of their pre-IPO loan spreads, which almost doubles the average reduction (12.6%) for firms with below-median underpricing, after controlling for firm and loan characteristics, and firm and year fixed effects. This larger reduction (11.1%) in borrowing costs amounts to over U.S. $0.79 billion *per year* for our sample firms, and is substantial relative to the total amount of money left on the table due to higher underpricing (U.S. $21.06 billion).[1] That is, the loss of issuers due to underpricing, to a large extent, can be compensated by the benefit of going public from the loan market.

The results are not driven by factors that, documented in the literature, affect IPO underpricing. For example, the difference between the offer price and the mid-point of the filing price range (i.e., price revision) is well documented as one of the most important factors driving underpricing (e.g., Hanley, 1993), but it has almost zero explanatory power over the change in post-IPO loan spreads. The results are also robust to employing exogenous variations of underpricing (i.e., the pre-IPO market returns), supporting a causal effect. In sum, our findings suggest that underpricing plays a unique role in reducing issuers' borrowing costs, and provide a new rationale why issuers don't get upset about leaving money on the table in IPOs.

We start by documenting a substantial reduction in issuers' borrowing costs after going public, based on a sample of 4,948 DealScan bank loans by 1,010 firms that complete an IPO between 1990 and 2013. Compared to loans made within 3 years before IPO, loans made

[1] All dollar amounts in this paper are in 2010 real dollars.

within 3 years after IPO on average have a lower interest spread of 57.74 bps, which is 21.0% of the average pre-IPO interest spread (276.79 bps). Even after controlling for firm and loan characteristics, as well as year and firm fixed effects, the average post-IPO reduction in the loan interest spread is still 17.6% of the average pre-IPO interest spread. The findings are consistent with the conventional wisdom that firms go public with an aim to access cheaper financial capital.

There are two caveats in interpreting the post-IPO reduction in the loan spread as benefit of going public. First, issuers may borrow short-term loans just before IPO to avoid diluting ownership from using other funding sources. These loans have higher spreads than usual, resulting in seemingly higher borrowing costs before IPO and hence a reduction in borrowing costs after IPO. To exclude this possibility, we show that the reduction remains at the same significance level after dropping loans made within one quarter before IPO, or loans with maturity below two years.

Second, going public changes a firm's private-public status and, at the same time, raises firm equity. One may think that the reduction in the post-IPO loan spread is mainly due to increased equity from IPO improving creditworthiness of the firm. Such a reduction presents even for firms that do not change the private-public status, and is hence not a unique benefit of going public. To alleviate this concern, we first focus on a sample of secondary IPOs that do not issue new equity, and show that the reduction in borrowing costs after IPO presents with similar magnitude for this sample of IPOs. Furthermore, we compare the change in borrowing costs, between IPOs and seasoned equity offerings (SEOs). Like IPOs, SEOs increase firm equity. Unlike IPOs, SEOs do not affect the firms' private-public status. If firms experience a significantly larger reduction in borrowing costs after IPO than after SEO, we would conclude that changing from private to public results in lower borrowing costs. Through a propensity score matching (PSM) approach, we create a matched sample of SEOs and IPOs, and show that the average reduction in borrowing costs after IPOs is more than double that after SEOs. Therefore, the effect is beyond what caused only by an equity increase.

After documenting a substantial reduction in issuers' borrowing costs after IPO, we show that this benefit of going public is neither random nor uniform. We compare the post- and pre-IPO loan interest spreads between firms with high and low IPO underpricing, and find that underpricing is associated with significantly larger reduction in the post-IPO loan spreads. The average reduction in the loan interest spread for firms with above-median IPO underpricing is about 23.7% of their pre-IPO loan spreads, which nearly doubles the 12.6% average reduction

for firms with below-median underpricing, after controlling for firm and loan characteristics, and firm and year fixed effects. The economic magnitude is remarkably large. For our sample of firms with high underpricing, the larger reduction in borrowing costs amounts to U.S. $0.79 billion per year. As these firms leave U.S. $21.06 billion more money on the table, their loss in the IPO market due to higher underpricing can be recovered in 26 years by the benefit of lower borrowing costs in the loan market. This positive association between underpricing and the post-IPO reduction in borrowing costs (henceforth the positive association) is quite robust. We also compare IPOs with positive (or top tercile) and negative (or bottom tercile) underpricing, and replace the underpricing dummy in the DiD tests by the continuous variable of underpricing. The positive association remains highly significant.

One may think that the positive association reflects some coincidences. First, IPO underpricing is typically larger in hot markets (e.g., Lowry and Schwert, 2002; Lowry, 2003), which happen during economy booms and hence credit booms with lower borrowing costs, resulting in the positive association. This hot-markets effect, however, does not drive our results. Our sample consists of loans made within 3 years before IPO and 3 years after IPO. The majority of the loans are not made immediately after the issue date. The reduction in loan spreads for underpriced firms is larger not only during hot-market periods, but also in all the three years after IPO. Even if we exclude IPOs in hot markets, such as those in 1998-2000, the positive association maintains.

Second, certain omitted variables may drive both underpricing and the post-IPO reduction in borrowing costs, resulting in the positive association. For example, underpricing is larger for firms with greater pre-IPO information asymmetry (e.g., Rock, 1986; Benveniste and Spindt, 1989), while these firms benefit more from the information creation of going public and hence experience a larger reduction in post-IPO financing costs. In this case, the positive association may only reflect ex-ante information asymmetry of the issuer. In particular, the literature documents that price revision largely explains underpricing (e.g., Hanley, 1993; Cornelli and Goldreich, 2003; Lowry and Schwert, 2004), supporting the underwriting theory (Benveniste and Spindt, 1989). To alleviate this concern, we replace underpricing by price revision in our DiD tests. Surprisingly, price revision has almost zero explanatory power over the post-IPO reduction in borrowing costs. Even after controlling for price revision, the effect of underpricing maintains with the same level of significance. This is the case, if we replace price revision by the stock returns in one week and one month following IPO, as well as the holding-period stock return from the IPO day till the first loan issuance. The results suggest that the price jump in the

first day, not in earlier or latter days, plays a unique role in driving issuers' post-IPO borrowing costs, highlighting a unique role of underpricing.

Furthermore, we show that the positive association is not affected by underwriter quality, VC-backed or not, firm size, firm age, and issue size, which in the literature are important proxies for ex-ante information asymmetry (e.g., Beatty and Ritter, 1986; Ljungqvist and Wilhelm, 2003; Loughran and McDonald, 2013). These tests mitigate the omitted variable bias.

Finally, we employ exogenous variations of underpricing to establish a causal relationship. Previous research documents that underpricing is positively related to recent market movements (e.g., Loughran and Ritter, 2002), while there is little reason to believe that short-term market movements affect the IPO firm's borrowing costs in the next three years without through the channel of underpricing. We thus use the 3-week (15 trading days) Nasdaq return prior to IPO as an instrument for underpricing and conduct 2-stage Least Squares (2SLS) analyses. The IV tests confirm the positive association.

Our study adds to the literature in two aspects. First, we identify a significant drop in the post-IPO borrowing costs that is not due to equity issuance in IPOs. In the literature, Pagano, Panetta, and Zingales (1998) study the decision to go public using a sample of Italy IPOs, and as the first show lower cost of credit after going public. In a recent study on lending relationship, Schenone (2010) reports a reduction in the average loan interest spread after going public for a sample of U.S. IPOs in 1998-2003. Neither of the studies identifies whether the drop in cost of borrowing is beyond the effect of increasing equity in the offering. A few other papers also document that relative to private firms, public firms have a lower cost of financing (e.g., Brav, 2009; Saunders and Steffen, 2011; Gilje and Taillard, 2016), but they mainly focus on the difference in borrowing costs across private and public firms, not in particular the effect of the IPO event.

Second, we are the first to identify real effects of IPO underpricing in the loan market. The literature has documented various benefits of IPO underpricing. For example, underpricing raises investor recognition and promotes information production, which potentially affect the issuer's cost of financing according to extant theory of finance (e.g., Merton, 1987; Jensen and Meckling, 1976; Stiglitz and Weiss, 1981). However, there is no direct evidence showing the existence of such an effect. For example, although underpricing attracts media coverage and raises the website visit of Internet firms (Demers and Lewellen, 2003), there has been little evidence that underpricing has impact on the issuer's product market performance. It is

still unclear whether and how the benefits of underpricing are reflected in the firm's balance sheet. Our paper fills this gap. The findings highlight an important trade-off in IPO pricing and provide a new rationale for why issuers don't get upset about underpricing. Underpricing incurs a direct loss to the issuer by leaving money on the table, but it brings substantial gains. As we show, the money saved only from lower post-IPO borrowing costs for firms with high underpricing can largely recover their loss due to underpricing. A recent study by Arikan and Stulz (2016) reports that underpricing is followed by more acquisitions, reflecting greater investment opportunities of the IPO firm. The larger reduction in borrowing costs associated with underpricing may indicate that the funding source of these acquisitions could be cheaper loans.

The rest of the paper proceeds as follows. Section 2 develops hypotheses. Section 3 describes data and sample, and summarizes the key variables used in our analyses. Section 4 documents a significant reduction in post-IPO borrowing costs from loan markets. Section 5 presents the positive association between the post-IPO reduction in borrowing costs and IPO underpricing. Finally, Section 6 concludes.

2 Hypotheses Development

2.1 Going Public and the Cost of Borrowing

The conventional wisdom of going public is to access cheaper capital, in particular, from the public equity market. If going public reduces the cost of equity through accessing public equity, it reduces the cost of debt at equilibrium. This can be done through several channels.

First, going public raises substantial amount of new equity, which for example is on average 26.33% of the issuer's book assets for our sample of firms. This equity issuance significantly reduces issuers' leverage and improves their credit quality, and hence lowers the cost of borrowing. We henceforth call this the *equity issuance* channel. It is worth emphasizing that such an effect of equity increase exists no matter whether the borrower goes public. A private firm with new equity issuance can also experience lower leverage and hence lower borrowing costs. This is thus not an effect of changing the private-to-public status, or not a unique benefit of going public.

Second, going public is associated with significant information creation. In addition to having an informative stock market price, the issuer is required to meet strict regulatory re-

quirements by the Securities and Exchange Commission (SEC) that improve firm transparency. Going public also attracts media attention and analyst coverage, further improving the firm's disclosure quality. A better information environment moderates lenders' screening and monitoring costs, and hence reduces the cost of borrowing (e.g., Sengupta, 1998). We henceforth call this the *information creation and monitoring* channel.

Third, going public can be an effective device of marketing, and generates great publicity for the issuer, raising its visibility and reputation in both the financial and product markets. According to Merton (1987), investor recognition raises the investor base, stock liquidity and firm value. As supporting evidence, Grullon, Kanatas, and Weston (2004) show that firms with greater visibility have better stock liquidity, while Fang, Noe, and Tice (2009) report that firms with liquid stocks have higher market-to-book ratio. A recent study by Francis, Hasan, Mani, and Yan (2016) indeed finds that firms with higher liquidity in the capital market pay lower spreads for the loans they obtain. Furthermore, with great publicity, the issuer becomes more well-known among investors and have more financing options, enhancing its bargaining power when dealing with bank lenders and hence reducing the cost of borrowing (e.g., Rajan, 1992; Abreu and Gul, 2000). Finally, great publicity raises customer recognition, increasing the issuer's customer base and customer loyalty, and thus improving firm performance in the product market. In sum, going public lowers the issuer's cost of debt through raising investor and customer recognition. We henceforth call this the *investor and customer recognition* channel.

All above three channels point to the same conclusion that going public reduces the issuer's borrowing costs. However, as said earlier, the equity issuance channel is not unique for firms' going public, so it is not an effect of changing the private-to-public status. In order to investigate the benefit of going public from the loan market, we need separate the first channel from other two. Our first hypothesis is thus as follows.

Hypothesis I: *There is a significant reduction in the issuer's borrowing costs after going public, which is beyond the effect of an equity increase in IPOs.*

2.2 IPO Underpricing and the Cost of Borrowing

We argue in the previous section that going public reduces the issuer's borrowing costs through three possible channels. The effect is not uniform for different IPO firms, as the three channels could vary much across firms, for example, due to different levels of IPO underpricing. As one of the biggest puzzles around the IPO event, underpricing may affect the issuer's

borrowing costs by enhancing or weakening the above three channels.

Consider first the effect of the *equity issuance* channel: for the same firm issuing the same amount of shares in an IPO, higher underpricing means less equity increase and hence less reduction in borrowing costs after going public. Even if the firm keeps rasing the same amount of capital, underpricing as a wealth transfer from old to new shareholders does not affect the firm's capital structure. In this case, it has no effect on the issuer's borrowing costs. In sum, underpricing may have no impact on or weaken the equity issuance channel.

Underpricing could, however, enhance the *information creation and monitoring* channel and the *investor and customer recognition* channel. The literature documents that underpricing attracts market attention and media coverage, and hence generates greater publicity for the issuer. Especially in today's Internet world, media attention could quickly generate a network effect and promote instant "online celebrities." First, Cliff and Denis (2004) and Brown (2016) show that underpricing raises post-IPO analyst coverage, and promotes information creation and hence transparency of the issuing firm, while Billett, Garfinkel, and Yu (2017) show that an increase in asymmetric information due to reductions in analyst coverage worsens firm performance. Collectively, underpricing may improve disclosure quality and corporate governance, and consequently reduce the cost of external finance. Second, underpricing can generate some marketing benefits that increase customer recognition in product markets. Demers and Lewellen (2003) find that greater IPO underpricing of internet firms is associated with a post-IPO increase in website traffic and media exposure, while Chemmanur and Yan (2009) show that advertising and underpricing are indeed substitutes. Finally, underpricing increases investor recognition and boosts post-IPO stock liquidity and market demand, potentially reducing the cost of equity (e.g., Merton, 1987; Aggarwal, Krigman, and Womack, 2002; Ellul and Pagano, 2006). Summarizing these effects, underpricing should be followed by a larger reduction in borrowing costs.

As argued earlier, the reduction in borrowing costs due to equity issuance is not a unique benefit of going public, so our interest thus focuses on the effect of underpricing through the other two channels. We hence form our second hypothesis as follows:

Hypothesis II: *The reduction in borrowing costs after going public is larger for firms with higher IPO underpricing.*

If we confirm Hypothesis II and find a positive association between underpricing and the

post-IPO reduction in borrowing costs of the issuer, we can conclude that the effect of underpricing in enhancing the *information creation and monitoring* channel and the *investor and customer recognition* channel outweigh its effect in weakening the *equity issuance* channel.

3 Data, Variables and Statistics

3.1 IPO Data and Sample Selection

We start with all non-utility and non-financial firms in the SDC Global New Issues Database that completed an IPO on the NYSE, AMEX and NASDAQ stock exchanges between 1990 and 2013. Following the IPO literature, we exclude closed-end funds (including REITs), unit of offers, American depositary receipts (ADRs), and offerings with the stock price below U.S. $5. We further correct for SDC errors using information provided on Jay Ritter's website, and merge records that represent one IPO. We select IPOs between 1990 and 2013, because our loan data start in 1987 and end in 2016, while we require every IPO firm to have at least one loan within 3 years before IPO and one loan within 3 years after IPO.[2] The final sample consists of 1,010 IPOs.

Figure 1 shows the frequency or distribution of our IPO sample across years. Although we have only a subset of all IPOs, the distribution of our sample IPOs is quite like that of the universal set of IPOs (see e.g., Lowry, Michaely, and Volkova, 2017). In the figure, we also see that the proportion of IPOs with high (above-median) and low (below-median) underpricing is relatively stable across all years. Figure 2 present the average underpricing for our IPO sample. Many issuers with extremely high underpricing, especially during the internet bubble period (i.e. 1998-2000), have no pre-IPO loans, so they are not included in our sample. We thus see less extremely high values of underpricing in our sample, reflected in the morderate .

We collect the following information for each IPO: the issue date, offer price, filing prices (low, middle, and high), gross proceedings, underwriter ranking, firm age in the IPO year, and whether the IPO is VC-backed. In particular, we obtain information on the issue date, offer price, filing prices, issue amount, and the VC-backed dummy from SDC. We supplement information on venture capital (VC) funding from VentureXpert. Underwriter name are also provided in SDC, and we manually complete the missing data from the Internet (Scoop.com) or SEC Form S-1, which is the initial registration statement filed for an IPO. Underwriter ranking

[2]The loan data are described in Section 3.3.

and the firm founding year (to compute firm age) are downloaded from Jay Ritter's website.[3]

We measure IPO underpricing as the percentage return from the offer price to the first-day closing price. The offer price is available in SDC and we supplement missing information from Scoop.com. The first-day closing price, from the Center for Research in Securities Prices (CRSP), is required to be within 5 days of the offer date in SDC; otherwise, we replace it with information in SDC or Scoop.com. For remaining missing data on the offer price and first-day closing price, we hand-collect them from the Internet (e.g., Google). Alternatively, we define IPO underpricing as the dollar amount left on the table by the issuer.

3.2 Summary Statistics for IPO Characteristics

Table 1 summarizes the key characteristics of our sample of IPOs. We winsorize all variables at the 1^{st} and 99^{th} percentiles to mitigate outlier bias. Panel A of the table includes all 1,010 IPOs in our full sample. On average, firms choose to go public 25.25 years after they were founded. This high average firm age is mainly due to two reasons: First, we include IPO firms that have at least one loan before IPO in DealScan, excluding a large proportion of very young firms; second, our sample also includes a few exceptionally old firms with age above 100 years. The median firm age is only 14 years, and one-fourth IPOs are made within 6 years after the firm was established. The IPO firms have a mean *Book Assets* of U.S. $642.21 million. This variable is also highly right-skewed, with a few large exceptions. The median *Book Assets* is only U.S. $152.46 million. The mean *Gross Proceedings* is U.S. $169.12 million, about 26.33% of the mean of book assets. The median *Gross Proceedings* is U.S. $90.36 million, more than half of the median *Book Assets*. That is, relative to current book assets, smaller firms issue more equity.

Underwriter Ranking or rating takes values 1 to 9 with an average of 8.04. The majority of lead underwriters for our sample IPOs are rated at 8 or 9. These figures are similar to Loughran and Ritter (2004). In addition, only 24% of the firms are funded by a venture capital. This proportion is low, compared to that of the universe of all U.S. IPOs (e.g., Lowry, Michaely, and Volkova, 2017), because we require every IPO firm to have at least one loan within 3 years before IPO, retaining relatively large firms.

In terms of underpricing, the mean first-day return or *Underpricing* (%) is 13.52%. The

[3]Underwriter ranking is on a scale of zero to nine, where nine is the highest underwriter prestige. If the ranking or rating for that period is not available, we employ the rating in the most proximate period. If there is more than one lead underwriter, we use the rank of the bookrunner (in the SEC S-1 Filing) or the highest ranking underwriter.

mean underpricing in terms of dollar amount, i.e. *Underpricing* ($), is U.S. $22.46 million. *Price Revision*, defined as the percentage change in the final offer price from the midpoint of the initial filing price range, has an average of -0.82% and a median of zero. Among the 1,007 IPOs with non-missing data on *Price Revision*, 431 (42.80%) have positive revision, 179 (17.78%) have no revision, and the rest (39.42%) have negative revision. All above figures have similar magnitudes, compared to previo studies (e.g., Lowry, Michaely, and Volkova, 2017).

Panel B splits our sample of IPOs to two subsamples by the median underpricing. In general, there are no remarkable differences between the two subsamples. On average, firms with high underpricing are more likely to be younger and VC-backed, and issue similar amount of equity in the IPO with higher offer prices. The two subsamples are similar in terms of firm size, profitability, tangibility and underwriter ranking.

3.3 Loan and Borrower Data

We obtain bank loan data from the Reuters Loan Pricing Corporation (LPC) DealScan database. DealScan collects loan contracts information from SEC filings, large loan syndicators, and a staff of reporters. It covers the majority of new loans made to U.S. firms, and contains detailed information of corporate loan contracts for both public and private firms from 1987.[4] Our analyse are conducted at the facility level. We obtain the loan variables, including the all-in-spread-drawn (*AIS*), *Maturity* in months, *Loan Amount* in million U.S. $, loan purposes, and whether the loan has financial covenant (*Fin_Covenant*). We generate dummies for loan purposes, based on the four groups of primary purposes: general purposes (working capital and general corporate purpose), recapitalization (debt repayment/consolidation, recapitalization, and debtor-in-possession loans), acquisition (general or specific acquisition program and LBO loans), and others (see e.g., Carey, Post, and Sharp, 1998).

We focus bank loan facilities with non-missing AIS made by the 1,010 IPO firms between 3 years before IPO and 3 years after IPO. To merge the DealScan loan data with our sample of IPOs, we first merge DealScan and Comptat, ing the link table initiated by Chava and Roberts (2008). We manually supplement the link table for the period between 2013 and 2016. Second, we e CUSIP and the fiscal year as the key words to combine the IPO data with the merged DealScan and Compustat data. Because Compustat records data for public firms, accounting data before IPO are typically not available. We manually collect the missing accounting data

[4] According to Carey and Nini (2007), Dealscan has information on 50-75% of all U.S. commercial loan volume into the early 1990s, with coverage increasing to 80-90% from 1992-2002.

from SEC Form S-1 filings, including four important variables: *Total Assets*, *Total Debt*, *Net Income*, *Cash* and *PP&E*.

Our final sample consists of 4,948 loan observations in 1987-2016. There are 2,405 loans made by the 505 firms with high IPO underpricing and 2,543 loans made by the 505 firms with low IPO underpricing. Figure 3 shows the distribution of the number of loans across calender years. In general, the distribution of loans over time is very similar to that of IPOs shown in Figure 1.

Figure 4 shows the distribution of loans across the 12 window quarters. Our time window covers the 3 years before IPO and the 3 years after IPO, so there are in total 6 years or 24 quarters. The figure shows that a significant proportion of loans before IPO are made close to the IPO time, especially in the last 3 quarters before IPO. There are four possible reasons. *First*, some IPO firms go public within 3 years after being established and hence do not have loan records before being founded. In our sample, among the 1,010 IPOs, 132 IPOs are made within 3 years after firm foundation, while 85 (49) are made within 2 (1) years after the firm's foundation. *Second*, some issuers borrow short-term loans just before IPO to avoid diluting firm ownership (e.g., bridge loans) or to restructure the firm (e.g., recapitalization loans). In our sample, both bridge loans and recapitalization loans are of low proportions (below 10% in total). *Third*, many loans are not included in DealScan, especially those issued before the borrowers go public. We manually select a random sample of 20 U.S. IPOs in 1990-2013. We compare the loan information reported by firms in SEC S-1 Filings with that recorded in DealScan. Among these 20 firms, only one has syndicated loans reported in S-1 filings but not recorded in DealScan. This means DealScan is quite complete in covering pre-IPO syndicated loans. *Finally*, many firms renegotiate and restate loans before IPO, and DealScan records them as new loans. As we will show later, this last case can only reduce the significance of our results, and hence it does not matter for the current study.

3.4 Summary Statistics for Loan and Borrower Characteristics

Table 2 summarizes the key loan and borrower characteristics. All the variables are winsorized at the 1^{st} and 99^{th} percentiles. Panel A includes all 4,948 loan observations in our full sample. The reduction in borrowing costs after going public is substantial. Compared to loans before IPO, loans after IPO on average have a lower interest spread of 57.74 bps, which is about 21.0% of the average pre-IPO interest spread (276.79 bps) of all firms. The average loan size increases by U.S. $49.23 million or 28.96% after IPO. Going public expands firm size and

hence firms' borrowing capacity, so public firms tend to borrow more. The loan maturity, however, shows no difference before and after IPO; and loans after IPO are more likely to include financial covenants. This is probably because financial covenants are based on firms' financial ratios, which are more reliable and accurate after IPO, making it easier to implement financial covenants in the loan contract.

Panel A also summarizes borrower characteristics of the 4,948 loan observations. Consistent with increased equity from IPO, *Book Assets* significantly increases, while *Book Leverage* decreases. *Profitability* increases, but *Cash* and *Tangibility* have almost no difference. This lower leverage is consistent with Eckbo and Norli (2005) who show that IPO firms have lower leverage than older firms, for about two years following the IPO. One may wonder, if firms have lower cost of debt after IPO, why they do not increase leverage. There are two possible reasons. First, both cost of debt and cost of equity decrease after going public, so it is not clear what the post-IPO optimal leverage should be. Second, the lower leverage immediately after IPO could be non-optimal, but adjustments towards the optimal leverage ratio take time.

Panel B and C of Table 2 respectively summarize loan and borrower characteristics for the subsamples with high (i.e. above-median) and low (i.e. below-median) underpricing. In general, the loan and firm characteristics of the two subsamples are generally similar before IPO, but they show significant differences after IPO. In particular, loans for firms with high IPO underpricing have significantly lower interest spreads and larger loan amount after IPO. Remarkably, the drop in the loan spread for firms with high IPO underpricing is 67.86 bps, while this figure is 48.27 bps for firms with low IPO underpricing. The difference (19.59 bps) is significant at the 1% level and economically large. Moreover, there is a significant increase in the loan amount and book assets for firms with high underpricing, but not for firms with low underpricing.[5] This may indicate that the increase in book assets could be largely supported by debt, consistent with Arikan and Stulz (2016) that underpricing, followed by more acquisitions, may reflect greater investment opportunities of the IPO firm.

Figure 5 shows the average loan interest spreads and their 90% confidence intervals of the two subsamples across the six years before and after IPO. First, there is no significant difference between the two subsamples in the three years before IPO. Second, there is a significant drop

[5]It seems that there is an inconsistency between statistics for book assets in Table 1 and 2. In Panel A of Table 1, the mean of book assets for IPO firms is 642.21 in the year prior to IPO, while mean of book assets for loan borrowing firms in the loan issue year is 1,396 in Table 2. How come the two figures differ so much. The reason is that the first figure is from the IPO sample with 951 observations, while the second figure is from the loan sample with 2,129 observations. Larger firms issue more loans and hence appear more often in the loan sample, resulting in a much larger figure.

of the average interest spread after IPO for both subsamples. Before IPO, the average spread is above 270 bps, but it is about 220 bps after IPO. One year prior to IPO, the average loan spread starts dropping. As said earlier, firms and lenders anticipating the coming IPO often renegotiate and restate their loans, probably agreeing on lower loan spreads. Third, the post-IPO loan spreads exhibit significant differences across the two subsamples. Specifically, firms with high underpricing have a lower borrowing cost compared to firms with low underpricing. The difference is about 20 bps on average in the three years following IPO.

4 The Benefit of Going Public from the Loan Market

Extant literature suggests that firms, following an IPO, tend to receive reduction in borrowing costs. Pagano, Panetta, and Zingales (1998), using a sample of Italy IPOs in 1982-1992, show that there is a significant drop in the cost of credit after going public. This drop could be because the lower financial leverage after IPO improves the creditworthiness of the firm, information creation reduces lenders' cost of monitoring, and the firm's more financing options curtail bank's bargaining power. Pagano, Panetta, and Zingales (1998) do not separate these possible channels. As we argue earlier, the reduction in borrowing costs due to leverage decrease is not a unique benefit of going public, but presents even for private firms issuing new equity. In a study of lending relationship, Schenone (2010) compares firms' borrowing costs before and after IPO, and reports a significant reduction in loan interest spreads after going public for a sample of U.S. IPOs in 1998-2003. Schenone (2010) shows the drop in a univariate test, but does not distinguish the channels either. A few other papers document that public firms have a lower cost of financing than private firms (e.g., Brav, 2009; Saunders and Steffen, 2011; Gilje and Taillard, 2016). These studies focus on the cross-sectional difference between private and public firms, not the effect of the IPO event on borrowing costs.

So far, there has been no study that identifies the benefit of going public, beyond an effect of equity increase, in reducing borrowing costs. In this section, we fill the gap using a large sample of U.S. IPOs between 1990 and 2013.

4.1 The Post-IPO Reduction in Borrowing Costs: Baseline Results

To identify the benefit of going public from the loan market, we run the following OLS regression at the loan facility level,

$$\log AIS_i = \alpha + \beta \cdot \textit{Post}_i + \Theta \cdot \mathbf{X}'_{i,j,t} + \mu_t + \eta_j + \epsilon_{i,j,t}, \tag{1}$$

The sample consists of 4,948 DealScan loan facilities made by 1,010 firms that complete an IPO between 1990 and 2013. In Equation (1), the dependent variable is the logarithm of *AIS* ($\log$*AIS*). *Post* is a dummy variable, which equals one if the loan is issued after firm goes public. $\mathbf{X}'$ represents a set of firm and loan characteristics. Specifically, firm controls include $\log$(*Book Assets*) that is the natural logarithm of book assets, *Book Leverage* defined as total liabilities scaled by total assets, *Tangibility* as PP&E scaled by total assets, *Cash Ratio* as cash and short-term investments scaled by total assets, *Profitability* as the ratio of net income to book assets, and $\log$(*Firm Age*) that is the natural logarithm of firm age in the loan issue year. Loan controls include the natural logarithm of both loan amount and maturity, i.e. $\log$(*Loan Amount*) and $\log$(*Maturity*), and a dummy variable, *Fin_Covenant*, which is equal to one for loans with at least one financial covenant. These non-price features of loans are usually fixed before the syndication process, and hence commonly used as control variables (e.g., Ivashina, 2009). We also include year, firm and loan purpose fixed effects in the regression, but not IPO controls, because IPO controls are absorbed in firm fixed effects. The coefficient of *Post* captures the within-firm change in borrowing costs after IPO. By expectation, β is negative. All variables are winsorized at the 1^{st} and 99^{th} percentiles to reduce outlier bias. Standard errors are clustered at the firm level and corrected for heterogeneity.

Results are reported in Table 3. Column (1) of the table presents the most parsimonious specification, without any control but including year and firm fixed effects. Column (2) adds firm controls, and Columns (3) and (4) further include both loan controls and loan purpose fixed effects. In Columns (1) to (3), the dependent variable is $\log$*AIS*, while we use *AIS* in Column (4) to facilitate interpretation of the results. Across all four columns or specifications, *Post* enters with a significantly negative coefficient, with t-values above 6.50. The economical magnitude is remarkably large. According to Column (3), the within-firm reduction in the loan spread is 17.6%, after considering firm, loan and year heterogeneity. According to Column (4), the average reduction in the loan spread is 41.05 bps for our sample of loans. A few control variables show consistent signs across specifications. For example, *Book Leverage* is positively, while *Profitability* is negatively associated with $\log$*AIS*, possibly because these firms have lower credit risk and therefore could negotiate a lower loan spread. In addition, consistent with previous studies (e.g., Ivashina, 2009), larger loans and loans with financial covenants have lower borrowing cost.

The results in Columns (1)-(4) are consistent with the first part of Hypothesis I that there is a significant reduction in the issuer's borrowing costs after going public. However, this drop

may not be a unique benefit of going public. For example, some issuers may borrow short-term loans just before IPO to avoid diluting ownership (e.g., bridge loans) or to restructure the firm (e.g., recapitalization loans), while these loans have higher spreads than usual, resulting in a higher average loan spread before IPO and thus a seemingly reduction in the loan spread following IPO.[6] Moreover, many firms went public during hot market periods, which might coincide with credit booms and hence be followed by lower borrowing costs, resulting in a reduction in borrowing cost after IPO. These reductions are, however, clearly not a benefit of going public. To address this concern, in Columns (5) to (7) of Table 3, we respectively exclude loans issued within one quarter before IPO, loans with maturity less than two years,[7] and loans issued by firms going public during the hot market period (1998-2000). The reduction in the loan spread after going public remains with similar levels of statistical significance, and even shows larger economical magnitude, indicating that the post-IPO reduction in borrowing costs is not caused by short-term loans issued just before going public or the hot market effect.

4.2 Does the Post-IPO Reduction in Borrowing Costs Reflect only Increased Equity from IPO?

IPO increases a firm's equity, and raises the firm's creditworthiness and hence reduces its borrowing costs. Having this in mind, one may argue that the reduction in borrowing costs after IPO may mainly reflect the effect of increased equity, instead of the effect of going public or changing the public-private status. Such a reduction in borrowing costs can be present for any equity issuance, not necessarily through an IPO. In this case, it is not a benefit of going public. This concern is alleviated as we have already controlled for key firm characteristics, such as book assets, leverage and cash holdings, which are directly linked to increased equity from an IPO.

To further identify the reduction in the loan spread as a benefit of going public, we first focus on a sample of secondary IPOs, in which firms go public for the sole purpose of allowing existing shareholders to cash out, rather than raising equity in the stock market. Since there is no equity issuance in secondary IPOs, we basically shut down the equity issuance channel. If we see a significant drop in the post-IPO loan spread for these firms, we could conclude that

[6]For example, mezzanine financing, also known as bridge financing, finances the growth of expanding companies prior to an IPO. Such funding is usually made up of convertible debt or preferred shares, which are more costly than common and provide investors certain rights over the holders of common equity. For more information, see http://fundingsage.com.

[7]We also exclude recapitalization loans, and our results remain the same.

going public reduces borrowing costs, and the effect is beyond that of equity increase. Based on Asker, Farre-Mensa, and Ljungqvist (2014), we collect 93 secodary IPOs in 1993-2016.

One may argue that the sample of secondary IPOs is rather small and hence not representative. We further compare the post-issue borrowing costs between IPOs and SEOs. Both IPOs and SEOs are associated with an equity increase, but SEOs do not change the issuer's public-private status. Therefore, a significant difference of the post-issue change in the loan spread between IPOs and SEOs captures the effect of going public or of changing the public-private status, which is beyond the effect of increased equity.

We start with all SEOs in the SDC Database, made by non-utility and non-financial firms in 1990-2013. We exclude those with an issue price below U.S. $5, and keep security types as "Common Shares" and "Ord/Common Shs." We further require the issuing firm to have at least one loan with non-missing AIS within 3 years before SEO and one loan with non-missing AIS within 3 years after SEO, which results in 3,849 SEOs. Since we have only 1,010 IPOs in our sample, we might be picking up other firm characteristics if simply comparing the IPOs with these 3,849 SEOs. For this reason, we also employ a propensity score matching (PSM) approach to construct a matched SEO sample. By doing so, we first estimate the propensity score of a firm having an IPO (vs. a SEO) by regressing an indicator variable for IPOs on *Issue Ratio*, $\log$*(Book Assets)*, *Book Leverage*, *Profitability*, *Cash Ratio* and *Tangibility*, as well as industry and year fixed effects. We then match, for each IPO, a SEO based on the propensity score. The matching is done without replacement and the maximum difference in the propensity score allowed for a match is 1%. This results in a sample of 569 IPOs and 569 SEOs.

Using our IPOs as the treatment group and all or matched SEOs as the control group, we run difference-in-differences (DiD) tests, specified in Equation (2), to compare the effects of IPOs and SEOs on borrowing costs.

$$\log AIS_i = \alpha + \beta \cdot \textit{Post}_i + \gamma \cdot \textit{Post}_i \times \textit{Treated}_j + \Theta \cdot \mathbf{X}'_{i,j,t} + \mu_t + \eta_j + \epsilon_{i,j,t}, \qquad (2)$$

We add an interaction term, *Post*×*Treated*, to Equation (1), where *Treated* is a dummy variable that equals to one for IPOs and zero for SEOs. The results are reported in Table 4. In Panel A of the table, we compare between IPOs and matched SEOs the variables that are used to compute the propensity scores. After matching, all the six variables exhibit no significant difference between IPOs and SEOs, suggesting that our matched sample satisfies the important validity criteria of PSM (see e.g., Fang, Tian, and Tice, 2014). Panel B reports results of the DiD tests. We use all IPOs and SEOs in Columns (1) to (3), but only the matched IPOs and

SEOs in Columns (4) to (6). In all specifications, the reduction in the loan spread after IPO is significantly higher than that after SEO. In particular, according to Column (6) with all controls and fixed effects, the average reduction in borrowing costs for IPOs (15.7%=8.6%+7.1%) more than doubles that for the matched SEOs (7.1%). This difference is statistically significant and economically large.

SEOs do not affect the firms' public-private status but increase firm equity, so the above results confirm that the post-IPO reduction in borrowing costs is indeed a benefit of going public and is beyond the effect of increased equity from IPO, confirming our Hypothesis I.

5 The Benefit of Going Public from the Loan Market and IPO Underpricing

After documenting a significant benefit of going public from the loan market, i.e. a reduction in borrowing costs, we will further show that this benefit is related to IPO underpricing. As argued in Section 2, going public reduces the issuer's borrowing costs through three possible channels: the *equity issuance* channel, the *information creation and monitoring* channel and the *investor and customer recognition* channel. IPO underpricing may enhance the second and third channels, resulting in a positive association between underpricing and the post-IPO reduction in borrowing costs, but it may weaken the first channel, resulting in a zero or negative association. Hypothesis II emphasizes how underpricing affects the second and third channels. If Hypothesis II is confirmed, we can conclude that the role of underpricing in enhancing the second and third channels dominates its role in weakening the first channel.

5.1 The Post-IPO Reduction in Borrowing Costs and IPO Underpricing

To test Hypothesis II, we construct tests to compare borrowing costs of loans made by firms with high underpricing and low underpricing. Specifically, we add to Equation (1) an interaction term between the *Post* dummy and the dummy (*High Underpricing*) indicating whether the loan is issued by a firm with above-median underpricing.

$$\begin{aligned}\log AIS_i = \alpha + \beta \cdot \textit{Post}_i + \gamma \cdot \textit{Post}_i \times \textit{High Underpricing}_j \\ + \Theta \cdot \mathbf{X}'_{i,j,t} + \mu_t + \eta_j + \epsilon_{i,j,t},\end{aligned} \tag{3}$$

Note that we control firm fixed effects, so the coefficient of the interaction term (γ) captures the difference in the within-firm reduction in borrowing costs between firms with high and low

underpricing. By expectation, γ is negative.

Results are reported in Table 5. In all columns, we include firm, loan controls, and firm and year fixed effects. Columns (1) to (3), the dummy variable, *High Underpricing*, equals one if underpricing of the IPO is above the sample median and zero otherwise. In Columns (4) and (5), we replace *Higher Underpricing* by *Top Underpricing*, which equals one if underpricing is in the top tercile, and zero if it is in the bottom tercile. In Column (6), we instead use a continuous variable of underpricing, *Underpricing*. Moreover, underpricing can be defined in two different ways, either as the percentage change from the offer price to the first-day closing price or as the dollar amount of money left on the table. Among the six columns of the table, we use the first way to define underpricing in Columns (1), (2), (4) and (6), indicated by the column header, "%." In other columns, we define underpricing using dollar amount indicated by "$."

In all six columns, the negative coefficient of the interaction term are highly significant. In Column (1), for example, with $logAIS$ as the dependent variable, the interaction term *Post* $\times$ *High Underpricing* enters the regression with a t-value of 3.40. In terms of economical significance, the post-IPO reduction in borrowing costs for firms with above-median underpricing (23.7%$=$ 11.1%+12.6%) almost doubles that for firms with below-median underpricing. The result confirms the positive association between the post-IPO reduction in borrowing costs and IPO underpricing, supporting Hypothesis II. In Column (2), we use *AIS* as the dependent variable to facilitate interpretation. The interaction term keeps consistently significant and negative. The average reduction of the loan interest spread for firms with high IPO underpricing is 23.20 bps larger than that for firms with low IPO underpricing. The remaining columns, (3)-(6), further confirm the positive association.[8] In particular, according to Column (6), a one standard deviation increase in underpricing raises the post-IPO reduction in the loan spread by 4.1%.

Using the estimated coefficient in Column (1), we are able to estimate the aggregate cost savings due to the larger reduction in loan spreads after going public for our sample firms. In our sample, the total amount of new loans made after IPO by the firms with high underpricing is about U.S. $258.32 billion.[9] Almost all these loans mature after 3 years and hence are not closed in our sample period. As firms with high underpricing experience a larger reduction in the average loan spread by 11.1 percentage points, this larger reduction amounts to U.S. $258.32 $\times$ 11.1%$\times$ 276.79 $\times$ 10^{-4} $=$0.79 billion per year. On the other hand, firms with

[8] Alternatively, we compare loans made by firms with and without underpricing, and obtain similar results.

[9] As a comparison, the total amount of money raised from IPO by high underpricing firms is about 92.58 billion.

high underpricing leave about U.S. $21.06 billion more money on the table than firms with low underpricing.[10] That is, the loss due to underpricing can be recovered within 26.5 years from lower borrowing costs in the loan market. The findings highlight an important trade-off in IPO pricing and provide a rationale for why issuers do not get upset about leaving money on the table in IPOs. Underpricing incurs a direct loss to the issuer in the equity market, but it brings indirect gains from other markets. The money saved from lower post-IPO borrowing costs can largely compensate the loss due to underpricing.

Overall, our results confirm a significantly positive association between IPO underpricing and the benefit of going public from the loan market. This association confirms Hypothesis II and supports the presence of certain benefits of underpricing through enhancing the *information creation and monitoring* channel and the *investor and customer recognition* channel, which dominate its effect through weakening the *equity issuance* channel. In untabulated analyses, we show that our results in Table 5 does not change if we exclude the years of hot markets (i.e. 1998-2000), suggesting that our results are not driven by the hot-market effect.

5.2 Underpricing as Partial Adjustment of Prices? Underpricing vs. Price Revision

According to the bookbuilding theory (Benveniste and Spindt, 1989), underpricing compensates institutional investors for revealing their private information concerning the issuer's firm value. A larger difference between the valuations of institutional investors and the issuer before bookbuilding is followed by higher price revision after the bookbuilding process and higher underpricing in the first trading day. This is called the partial adjustment phenomenon. Supporting the bookbuilding theory, in particular, the literature documents a positive association between price revision and underpricing (e.g., Hanley, 1993; Cornelli and Goldreich, 2001, 2003; Lowry and Schwert, 2004). Note that a larger valuation difference could also be a larger positive surprise to lenders and hence induces a larger reduction in post-IPO borrowing costs. Therefore, the bookbuilding theory may imply the positive association that we document. However, if the theory drives our findings, price revision should affect borrowing costs. As shown in Table 6, when replacing underpricing in (3) by price revision, price revision has almost zero explanatory power over the post-IPO reduction in borrowing costs. Even if we

[10]The amount of money left on the table by each firm is defined as the first-day price increase (i.e. the first-day closing price minus the offer price) multiplied by the number of shares sold. In aggregate, the total amount of money left on the table by the IPOs with high underpricing is about U.S. $22.73 billion, while by the IPOs with low underpricing is about U.S. $1.67 billion.

control for price revision in the regression, the effect of underpricing maintains with the same level of significance. The results contradict with the bookbuilding theory.

We document a positive association between underpricing and the post-IPO reduction in borrowing costs. There is little reason to believe that an IPO firm's post-IPO borrowing costs have impact on underpricing, so we interpret the larger reduction in borrowing costs as real effects of underpricing in the loan market. For this interpretation, we need to establish causality. As the first step, we would like to check whether underpricing plays a unique role in predicting within-firm reduction in borrowing costs after IPO.

Figure 6 shows the timeline of pricing information updates for an IPO. At the beginning of the filing period, the issuer and underwriter determine the filing price range, which together with other key information about the firm and IPO will be submitted to SEC for approval. After that, the marketing of the offering begins, and the company and the the underwriter promote the IPO and collect demand from institutional investors through the road show. On the day prior to the IPO day, the final offer price is determined, and it is normally released on the IPO day before the market opens. At the end of the first trading day, the first-day closing price is finalized, and underpricing becomes public information, less than one day after price revision is observable. After the IPO day, the firm starts trading on the stock exchange, and we could further observe following stock returns, such as the first-week return and first-month return following IPO.

To examine whether underpricing plays a unique role in predicting post-IPO reduction in borrowing costs, we run the same tests as Equation (3), but replace underpricing with price revision and following stock returns. Results are shown in Table 6. Column (1) of the table replicates Column (1) of Table 5, with the *High Underpricing* dummy replaced by *High Price Revision*, which is equal to one for above-median price revision. The interaction term, *Post*×*High Price Revision*, is not significant both statistically and economically, indicating that price revision has no explanatory power over the post-IPO reduction in borrowing costs. In Column (2), we add *Post*×*High Underpricing* to Column (1). That is, we run a horse race of underpricing and price revision. *Post*×*High Price Revision* remains insignificant, while *Post*×*High Underpricing* is even more significant. In Column (3), we further include two more stock returns in the regression, the first-week stock return and the first-month stock return, both excluding the first-day return. Again, *Post*×*High Underpricing* keeps highly significant, but none of the other interaction terms is significant. Finally, in Columns (4) to (6), we replicate Columns (1) to (3) respectively but replace the dummy variables of underpricing, price revision

and stock returns by their continuous variables. The results are completely consistent with the first three columns.

In sum, we find that price revision has almost zero explanatory power over the post-IPO reduction in borrowing costs, so do the two stock returns following the IPO day. Even after controlling for price revision, as well as the stock returns, the effect of underpricing maintains with the same level of significance. The results suggest that the first-day price jump, neither the earlier day nor the latter days, plays a unique role in driving issuers' post-IPO borrowing costs.

5.3 Underpricing Reflects Ex-ante Uncertainty?

In addition to price revision, the empirical literature has identified a long list of other factors that affect IPO underpricing, such as underwriter quality (e.g., Beatty and Welch, 1996; Loughran and Ritter, 2004), VC-backed or not (e.g., Lee and Wahal, 2004), firm age (e.g., Ritter, 1984; Ljungqvist and Wilhelm, 2003), firm size (e.g., Ritter, 1984), and issue size or gross proceedings (e.g., Beatty and Ritter, 1986).[11] The positive association between the benefit of going public and IPO underpricing, which we document in Section 5.1, could be driven by these other factors. To examine this possibility, we further control these factors in our tests. Specifically, we add to Equation (3) an interaction term between *Post* and one of the above factors, *Post*$\times$*Other Factor*. If one factor affects the post-IPO loan interest spread, we should see that it enters the regression significantly. The coefficient of *Post*$\times$*Underpricing* still captures the difference in the post-IPO reduction in borrowing costs between firms with high and low underpricing. We expect that this coefficient remains significantly negative even if these other factors are controlled.

Results are reported in Table 7. In Columns (1) to (6), we add to Equation (3) the interaction term between *Post* and respectively *Underwriter Ranking*, *VC-backed IPO*, log(*Gross Proceedings*), log(*Book Assets*), log(*Sales*) and *IPO Age*. Definitions of these variables are summarized in Appendix I. Column (7) has all the interaction terms in the same regression. In all seven columns, we include *Post*$\times$*Price Revision* as a control, and the dependent variable is log*AIS*. The coefficient of *Post*$\times$*Underpricing* keeps significantly negative at the 1% level, suggesting that controlling for the factors does not affect the positive association between IPO underpricing and the benefit of going public from the loan market. The economical magnitude remains at the same level except that it is slightly smaller when all factors are included in Column (7).

[11] Many of these factors are proxies for ex-ante uncertainty or information asymmetry, which are important drivers of IPO underpricing especially in information-based theory of IPO underpricing (e.g., Rock, 1986; Beatty and Ritter, 1986; Allen and Faulhaber, 1989; Welch, 1989; Benveniste and Spindt, 1989, etc.).

It is interesting that the coefficients of the interaction terms between the *Post* dummy and the above factors show little significance. In an unreported Probit regression using our sample of IPOs, we regress the *High Underpricing* dummy on price revision and the above factors, and industry and year fixed effects. We obtain a Pseudo R^2 of 0.283 and a Wald χ^2 of 275.23. Price revision is highly significant and itself has an R^2 of 0.192. Although the factors have significant explanatory power over IPO underpricing, they have little explanatory power over the post-IPO reduction in borrowing costs.

The results confirm that the positive association between the benefit of going public and IPO underpricing is not driven by the important factors that, documented in the literature, affect underpricing. This mitigates the concern that the positive association is driven by some omitted variables. For example, according to the winner's curse theory (Rock, 1986), higher information asymmetry among investors concerning the valuation of the IPO firm raises IPO underpricing. This information asymmetry should, arguably, be higher for more information-opaque firms, which obtain higher benefit of going public in terms of information creation and hence higher reduction in post-IPO borrowing costs. The winner's curse theory could thus also imply the positive association we document. However, our results barely change after controlling for proxies for ex-ante uncertainty or information asymmetry, as shown in Table 7. This makes it unlikely that the winner's curse theory is the main driver of our results.

5.4 Underpricing Reflects Unexpected Market Demand? Underpricing (or First-day Stock Return) vs. Longer-term Stock Returns

IPO underpricing could include various ingredients. One important ingredient is used to compensate informed investors for revealing their private pricing information, as the book-building theory (Benveniste and Spindt, 1989) implies. We show that this cannot be the main driver of our findings because price revision has no explanatory power over the post-IPO reduction in borrowing costs. Another important ingredient could reflect unexpected equity demand from the market, being a positive surprise of the issuer's market value to the issuer, as well as bank lenders. This surprise induces banks to lower the price of loans after IPO. The wisdom of crowds argues that statistical aggregates of the judgments of crowds are more accurate than those of the average individual by exploiting the benefit of error cancellation (e.g., Surowiecki, 2004). Accordingly, although the bank can access the borrower's information before IPO, it may not have an accurate valuation over the firm. On the first trading day, the bank updates the borrower's value after observing the market return or underpricing. In this case, the post-IPO

reduction in loan spreads is larger for firms with high underpricing, but this larger reduction reflects only higher-than-expected firm value, instead of real effects of underpricing.

If underpricing, or the first-day stock return, is a positive surprise to bank lenders, this surprise should disappear after we control for the stock return of the firm in longer periods after IPO, especially that between the IPO date and the first post-IPO loan issue date. We then replace underpricing by following stock returns in Equation (3), including the first month return (*1-month Return*), the first quarter return (*1-quarter Return*), the half-year return (*Half-year Return*), one year return (*1-year Return*), as well as the stock return between the IPO date and the first post-IPO loan issue date (*IPO-to-Loan Return*). As shown in Table 8, after controlling for the following returns, the effect of underpricing significantly negative. Just remember that all the returns include the IPO day. The results confirm that the positive association between IPO underpricing and the post-IPO reduction in borrowing costs cannot be explained only by underpricing being a positive surprise to lenders concerning the IPO firm's market value.

5.5 Evidence from Exogenous Variations of IPO Underpricing

In Section 5.1 to 5.3, we show that the post-IPO reduction in borrowing costs is larger for firms with high IPO underpricing. We interpret this larger reduction as a result of underpricing. To establish causality, we show that our results are not affected by the important factors that, documented in the literature, affect underpricing. However, there could still be some unobserved variables that drive both IPO underpricing and the benefit of going public from the loan market, resulting in their positive association. To further address the omitted variable concern, we employ exogenous variations in IPO underpricing. The idea is that we try to identify the part of variations in IPO underpricing that is exogenous to the long-term post-IPO borrowing costs.

The literature documents that an IPO firm's first-day return (i.e. underpricing) is positively related to recent market movements, such as the Nasdaq returns prior to IPO (e.g., Loughran and Ritter, 2002; Hanley and Hoberg, 2012; Loughran and McDonald, 2013). However, there is little reason to believe that such short-term market movements affect the IPO firm's borrowing costs in the next three years without through the channel of underpricing. After all, the stock market movements in the following years after IPO can be quite different from the short-term movements. Therefore, the Nasdaq return, as an instrumental variable (IV) for underpricing, fulfills both the relevance and exclusion restriction conditions. We thus conduct standard 2-stage Least Squares (2SLS) analyses, employing IPO underpricing caused by ex-

ogenous changes in short-term market returns to predict post-IPO borrowing costs. In the first stage, we estimate the impact of Nasdaq return on IPO underpricing:

$$\begin{aligned} \textit{High Underpricing}_j = \alpha + \beta \cdot \textit{Post}_i + \gamma \cdot \textit{Post}_i \times HighNasdaqReturn_j \\ + \lambda \cdot HighNasdaqReturn_j + \Theta \cdot \mathbf{X}'_{i,j,t} + \textit{FEs} + \epsilon_{i,j,t}, \end{aligned} \tag{4}$$

$$\begin{aligned} \textit{Post}_i \times \textit{High Underpricing}_j = \alpha + \beta \cdot \textit{Post}_i + \gamma \cdot \textit{Post}_i \times HighNasdaqReturn_j \\ + \lambda \cdot HighNasdaqReturn_j + \Theta \cdot \mathbf{X}'_{i,j,t} + \textit{FEs} + \epsilon_{i,j,t}, \end{aligned} \tag{5}$$

High Nasdaq Return is a dummy equal to one if the 3-week Nasdaq return prior to IPO is above median and zero otherwise. We use industry fixed effects, instead of firm fixed effects, because the dependent variable of the above two equations has no variation within a firm. We also include IPO, loan, and firm characteristics, and IPO issue year and loan year fixed effects.

In the second stage, we estimate the relationship between underpricing and post-IPO reduction in borrowing costs using the following specification:

$$\begin{aligned} \log AIS_i = \alpha + \beta \cdot \textit{Post}_i + \gamma \cdot \textit{Post}_i \times \widehat{\textit{High Underpricing}}_j \\ + \lambda \cdot \textit{High } \widehat{\textit{Underpricing}}_j + \Theta \cdot \mathbf{X}'_{i,j,t} + \textit{FEs} + \epsilon_{i,j,t}, \end{aligned} \tag{6}$$

where $\textit{High } \widehat{\textit{Underpricing}}$ and $\textit{Post} \times \widehat{\textit{High Underpricing}}$ are the predicted values from our first-stage estimation. A negative coefficient of the interaction term $\textit{Post} \times \widehat{\textit{High Underpricing}}$ would verify the causal effect of underpricing on the reduction in borrowing costs after going public.

Results for the 2SLS analyses are shown in Table 9. Columns (1) to (2) demonstrate our first-stage estimation, where the dependent variable is *High Underpricing* and *Post* $\times$ *High Underpricing* respectively, as specified in Equation (4) and Equation (5). We can see that the coefficients of the instrumental variables are both highly significant with an F-statistics of 23.37, suggesting that the instruments are strong and unlikely to be biased toward the OLS estimates (Bound, Jaeger, and Baker, 1995). Column (3) shows results of the second-stage estimation, where the dependent variable is $\log$*AIS*. We see a significantly negative coefficient of $\textit{Post} \times \widehat{\textit{High Underpricing}}$, confirming the positive effect of IPO underpricing on the benefit of going public from the loan market. Finally, Columns (4) to (6) respectively replicate the regressions in Columns (1) to (3), but replace the dummy variable *High Underpricing* with a continuous variable *Underpricing*. Results are still significant, although the significance level is some kind lower.

Both Column (3) and (6) show economically large effects of underpricing over the post-IPO reduction in borrowing cost. To sum up, our 2SLS analyses using exogenous variations of IPO underpricing verify the causal effect of underpricing on the post-IPO reduction in loan spreads.

5.6 Further Discussions

Traditional signaling theory of IPO underpricing takes underpricing as a signal of firm quality (e.g., Allen and Faulhaber, 1989; Grinblatt and Hwang, 1989; Welch, 1989; Chemmanur, 1993). Specifically, underpricing sorts good and bad firms in the following way. Good firms choose costly underpricing while recover the cost by selling additional equity in subsequent SEOs. Bad firms, however, cannot mimic, because there is sizeable probability that the market detects firm quality after IPO, preventing bad firms from recovering the loss from underpricing. Signaling through underpricing is costly for the issuer, but if successful, it may allow the firm to issue equity on better terms at a later date (i.e. SEOs). Empirical research has explored the benefit of going public from follow-up SEOs, but fails in finding consistent evidence (e.g., Jegadeesh, Weinstein, and Welch, 1993; Michaely and Shaw, 1994; Welch, 1996).

Our evidence from the loan market seems to be consistent with the signaling theory, but there is one question to be answered: Why would firms use underpricing as a signal of firm quality to lenders to lower cost of debt, but not to external equity investors to obtain higher valuation in follow-up SEOs? One may conjecture that the signal could be sent to both debt and equity markets, but the evidence from SEOs is not as significant as that from loans. First, many IPO firms have loans both before and after IPO, making it easy to identify the effect of going public on the cost of loans. Second, debt financing is the dominating source of external financing for business firms (e.g., Myers, 1984; Allen, Chui, and Maddaloni, 2004). In terms of both frequency and volume, SEOs are made not as large as debt issuance, making it difficult to identify the signaling benefits only from SEOs.[12]

It is, however, difficult for the signaling theory to fully explain our results. In the theory, underpricing is only a signal of firm value and, by itself, does not create direct value or have real effects (such as saving costs or raising performance). To compensate the issuer's loss due to

[12]Our sample of IPOs is constrained by loans in DealScan - each IPO firm has at least one loan within 3 years before IPO and one loan within 3 years after IPO. It is possible that the sample reflects certain self-selection of IPO firms and is hence not representative. To address this concern, we consider the universe of IPOs in 1990-2013. For all these 6,008 IPO firms, the total amount of loans made within 3 years after IPO is U.S. $1,103 billion (6,421 loans), while the total amount of equity issuance through SEOs is U.S. $459 billion (3,083 SEOs). If we consider 10 years after IPO, the two figures are U.S. $3,134 billion and U.S. $702 billion respectively. Although DealScan does not include all loans made by these firms (while SDC does include almost all SEOs), we still see a significantly larger loan issuance than equity issuance.

underpricing, information asymmetry between the IPO firm and investors should be persistent after IPO for the signaling to generate sufficient benefits. That is, without underpricing as a signal, firm types are largely undetected by the stock market even in a long period after firms go public. As going public significantly reduces information asymmetry no matter whether there is underpricing, such an argument is not convincing. In addition, for banks who as informed investors can access internal information of the firm before IPO, it is probably more efficient to screen borrowers using the design of loan contracts than using the signal through borrower's underpricing. As Ritter and Welch (2002) point out, "On theoretical grounds, it is unclear why underpricing is a more efficient signal than, say, advertising."

Therefore, to be consistent with our findings, underpricing should by itself create value, not only being a signal of hidden firm value. The direct value created reduces firms' borrowing costs, even if underpricing does not signal firm quality.

6 Conclusion

In this paper, we link IPO underpricing to the benefit of going public from the bank loan market. We show that IPO underpricing is associated with larger reduction in loan interest spreads of the IPO firm after going public. This association holds after controlling for firm and loan characteristics, year and firm fixed effects, and a list of factors (price revision, underwriter quality, VC-backed or not, firm age, firm size and issue size) that, documented in the literature, are important drivers of IPO underpricing.

Our findings highlight some real effects of IPO underpricing. Underpricing attracts market attention and media coverage, and hence benefits the IPO firm through creating advertising benefits, reducing information asymmetry and boosting the issuer's stock liquidity. The value created directly by underpricing reduces the the issuer's post-IPO borrowing costs. That is, the loss in the IPO market due to underpricing is compensated by the benefit of lower borrowing costs in the loan market after IPO. As the first study linking IPO underpricing to bank loan markets, we shed new light on the underpricing puzzle.

In the literature, there are various theories for underpricing. Our empirical findings could be consistent with some of the theories. First to say, our findings have nothing to do with the behavioural explanations of underpricing, which entail certain irrationality of the issuers or investors (e.g., Loughran and Ritter, 2002). The findings are not directly linked to either the agency-related explanations that rely mostly on the presence of agency issues of underwrit-

ers (e.g., Reuter, 2006; Ritter and Zhang, 2007), or the control-based theory that emphasizes ownership change after going public (e.g., Brennan and Franks, 1997; Stoughton and Zechner, 1998). The most possible alternative explanations are information-based.

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Appendix I: Variable Definitions

AIS: All-in-spread-drawn, which is the interest spread above LIBOR plus annualized upfront fees, in terms of basis points. Data source: *DealScan*.

Book Assets: Total book assets in millions of 2010 U.S. dollars. Data source: *Compustat* plus manually collected from *SEC Form S-1*.

Book Leverage: Total liabilities scaled by total assets, i.e. (dlc + dltt)/at. Data source: *Compustat* plus manually collected from *SEC Form S-1*.

Cash Ratio: Cash and short-term investments scaled by total assets, i.e. che/at. Data source: *Compustat* plus manually collected from *SEC Form S-1*.

Fin_Covenant: Dummy variable that equals one if a loan has financial covenants, and zero otherwise. Data source: *DealScan*.

High Underpricing: Dummy variable that equals one if underpricing meets one of the following two criteria: (1) first-day return in percentage is above median; (2) first-day return in dollar amount (first-day return $\times$ IPO proceedings) is above median. When the variable is reported in the tables, the column headers indicate how it is created. Data source: *SDC*, *CRSP* plus manually collected.

IPO Age: Firm age in the IPO issue year. Data source: *Jay Ritter's website*.

Gross Proceedings: Principle amount raised in IPO in millions of 2010 U.S. dollars, also called issue size. Data source: *SDC*.

Issue Size: Principle amount raised in IPO in millions of 2010 U.S. dollars, also called Gross Proceedings. Data source: *SDC*.

Loan Amount: Loan facility amount in millions of 2010 U.S. dollars. Data source: *DealScan*.

log(*Book Assets*): The natural logarithm of total book assets in millions of 2010 U.S. dollars. Data source: *Compustat* plus manually collected from *SEC Form S-1*.

log(*Firm Age*): The natural logarithm of one plus firm age in the current year, which is defined as the years elapsed since the founding year. Data source: *Jay Ritter's website*.

log(*Loan Amount*): The natural logarithm of the loan facility amount in millions of 2010 U.S. dollars. Data source: *DealScan*.

log(*Maturity*): The natural logarithm of the loan maturity measured in months. Data source: *DealScan*.

log(*Gross Proceedings*): The natural logarithm of principle amount raised in IPO in millions of 2010 U.S. dollars. Data source: *SDC*.

Maturity: Loan maturity measured in months. Data source: *DealScan*.

Offer Price: The price at which the IPO is first sold to the public. Data source: *SDC* plus manually collected.

First-week Return: Percentage return from first-day closing price to first week closing price. Data source: *CRSP*.

High First-week Return: Dummy variable that equals to one if *First-week Return* is above median. Data source: *CRSP*.

First-month Return: Percentage return from first-day closing price to first month closing price. Data

source: *CRSP*.

High First-month Return: Dummy variable that equals to one if *First-month Return* is above median. Data source: *CRSP*.

Post: Dummy variable that equals one if a loan is issued after firm goes public.

Price Revision: Percentage difference between offer price and midpoint of filing price. Data source: *SDC* plus manually collected.

High Nasdaq Return: Dummy variable that equals one if the 3-week Nasdaq return prior to IPO day is above median. Data source: *CRSP*.

High Price Revision: Dummy variable that equals one if the *Price Revision* of the IPO is above median. Data source: *SDC* plus manually collected.

Profitability: The ratio of net income to book value of assets, i.e. ni/at. Data source: *Compustat* plus manually collected from *SEC Form S-1*.

Tangibility: PP&E (property, plant, and equipment) scaled by total assets, i.e. ppent/at. Data source: *Compustat* plus manually collected from *SEC Form S-1*.

Top Underpricing: Dummy variable that equals one if IPO underpricing in percentage is in the top tercile. Data source: *SDC*, *CRSP* plus manually collected.

Underpricing (%): Percentage return from offer price to first-day closing price. Data source: *SDC*, *CRSP* plus manually collected.

Underpricing ($): Dollar amount left on the table in an IPO, i.e. (first-day closing price $-$ offer price) $\times$ the number of shares offered. Data source: *SDC*, *CRSP* plus manually collected.

Underwriter Ranking: A ranking of the lead underwriter on a scale of zero to nine, where nine is the highest underwriter prestige. If the rating for specific period is not available, we employ the rating in the most proximate period. Data source: *Jay Ritter's website* plus manually collected.

VC-backed IPO: An indicator equal to one if the firm was funded by a venture capital firm at the time of the IPO filing. Data source: *SDC* plus *VentureXpert*.

With Underpricing: Dummy variable that equals one for positive IPO underpricing. Data source: *SDC*, *CRSP* plus manually collected.

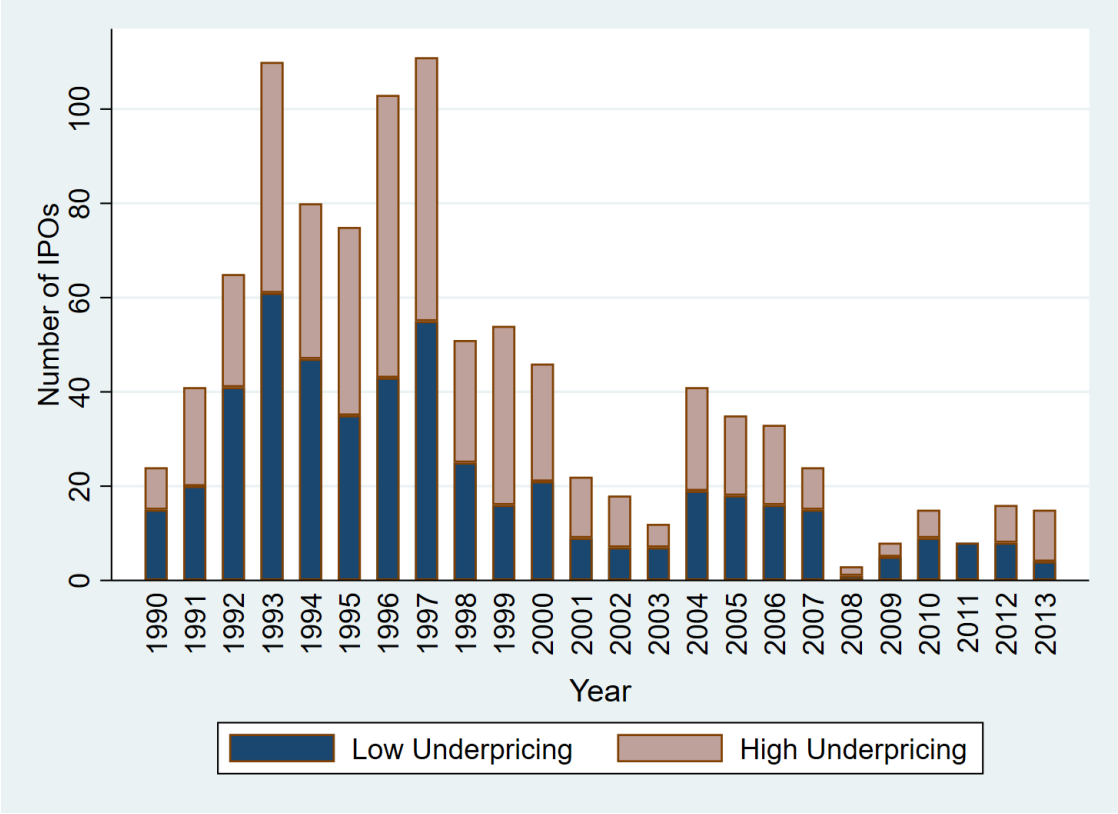

Figure 1: The Number of IPOs over Years

This figure shows the number of IPOs in our sample over years from 1990-2013. The total sample consists of 1,010 IPOs, and we divide them into firms with high (i.e. above-median) underpricing and low (i.e. below-median) underpricing. To construct the sample, we start with all non-utility and non-financial firms in the SDC Global New Issues Database, which complete IPO on the NYSE, AMEX and NASDAQ stock exchanges between 1990 and 2013. We then exclude REITs, units, ADRs, and offerings with the stock price below U.S. $5, and further require every firm to have at least one loan (with non-missing all-in-spread-drawn in DealScan) within 3 years before IPO and one loan (with non-missing all-in-spread-drawn in DealScan) within 3 years after IPO.

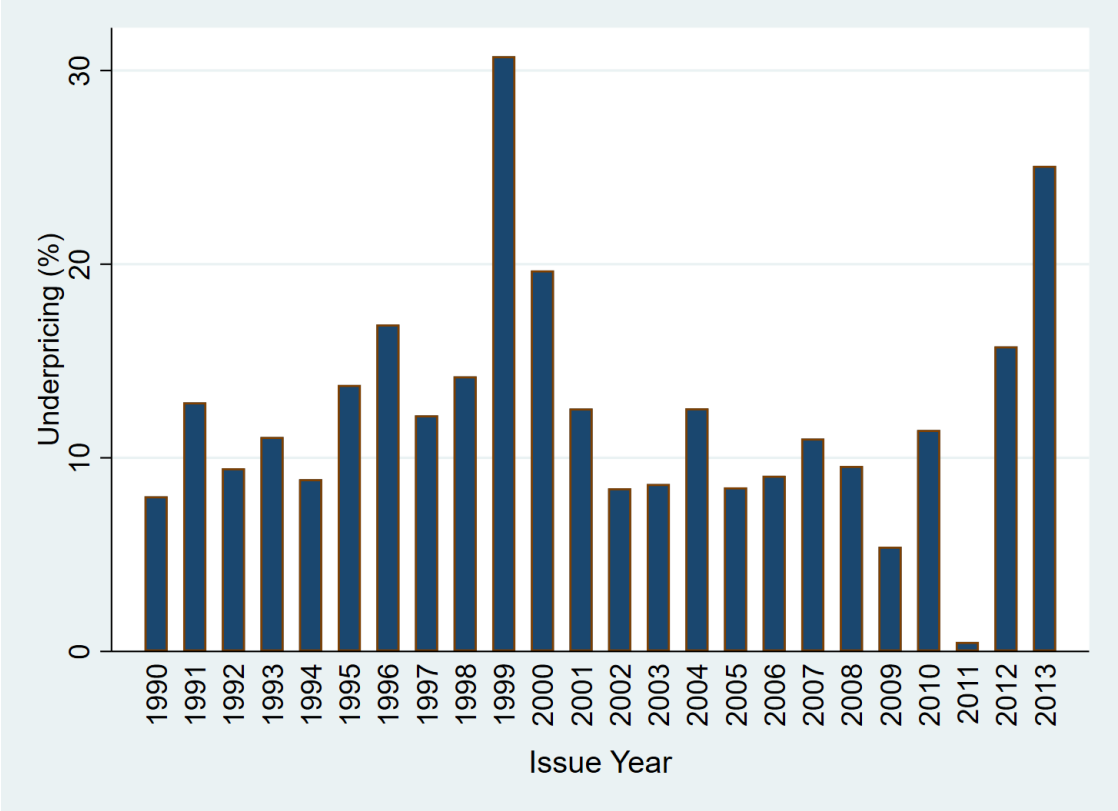

Figure 2: Average Underpricing Over IPO Issue Years

This figure shows the average underpricing of our IPO sample over years. There are in total 1,010 IPOs in 1990-2013. To construct the sample, we start with all non-utility and non-financial firms in the SDC Global New Issues Database, which complete IPO on the NYSE, AMEX and NASDAQ stock exchanges between 1990 and 2013. We then exclude REITs, units, ADRs, and offerings with the stock price below U.S. $5, and further require every firm to have at least one loan (with non-missing all-in-spread-drawn in DealScan) within 3 years before IPO and one loan (with non-missing all-in-spread-drawn in DealScan) within 3 years after IPO.

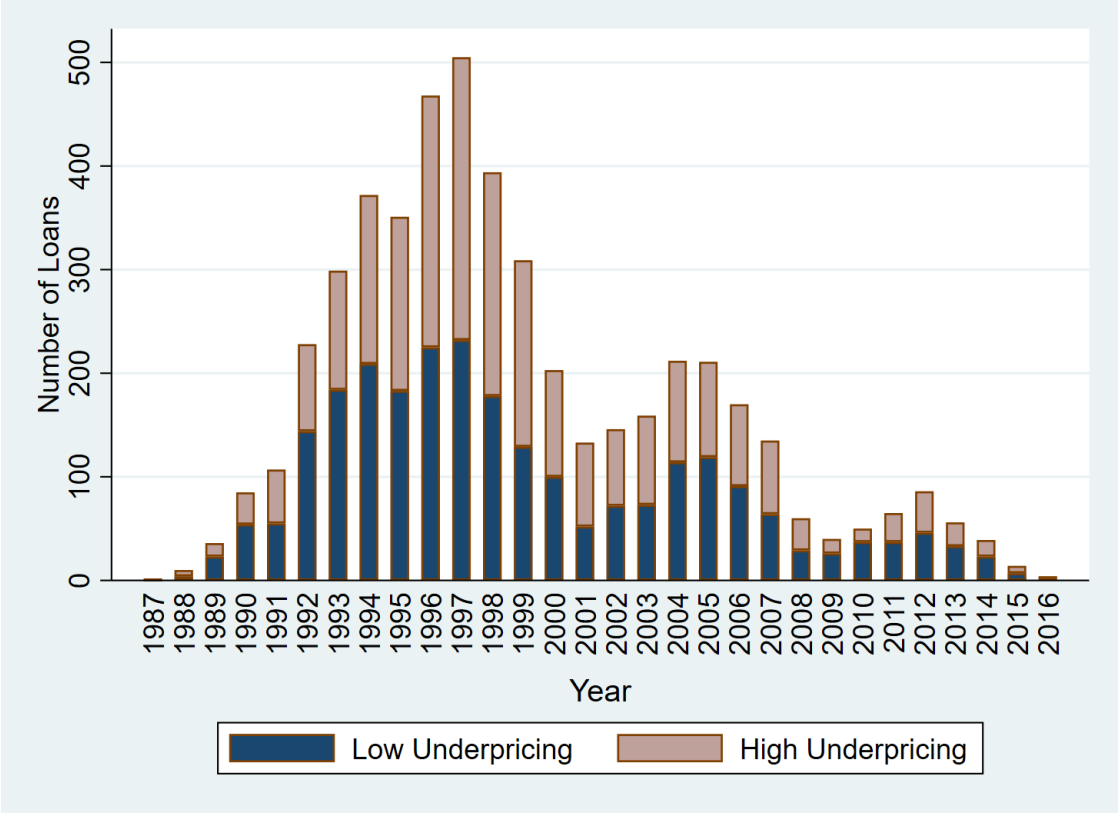

Figure 3: The Number of Loans over Loan Issue Years

This figure presents the distribution of the number of loans in our sample form 1987 to 2016. The full sample consists of 4,948 unique bank loan facilities, each of which is made by an IPO firm between 3 years before IPO and 3 years after IPO. We require the firms to be non-utility and non-financial firms, which complete IPO on the NYSE, AMEX and NASDAQ stock exchanges between 1990 and 2013. We also exclude REITs, units, ADRs, and offerings with the stock price below U.S. $5, and require every firm to have at least one loan (with non-missing all-in-spread-drawn in DealScan) within 3 years before IPO and one loan (with non-missing all-in-spread-drawn in DealScan) within 3 years after IPO. We show the distribution of loans for two subsamples: loans issued by IPO firms with high (i.e. above-median) underpricing and loans issued by IPO firms with low (i.e. below-median) underpricing.

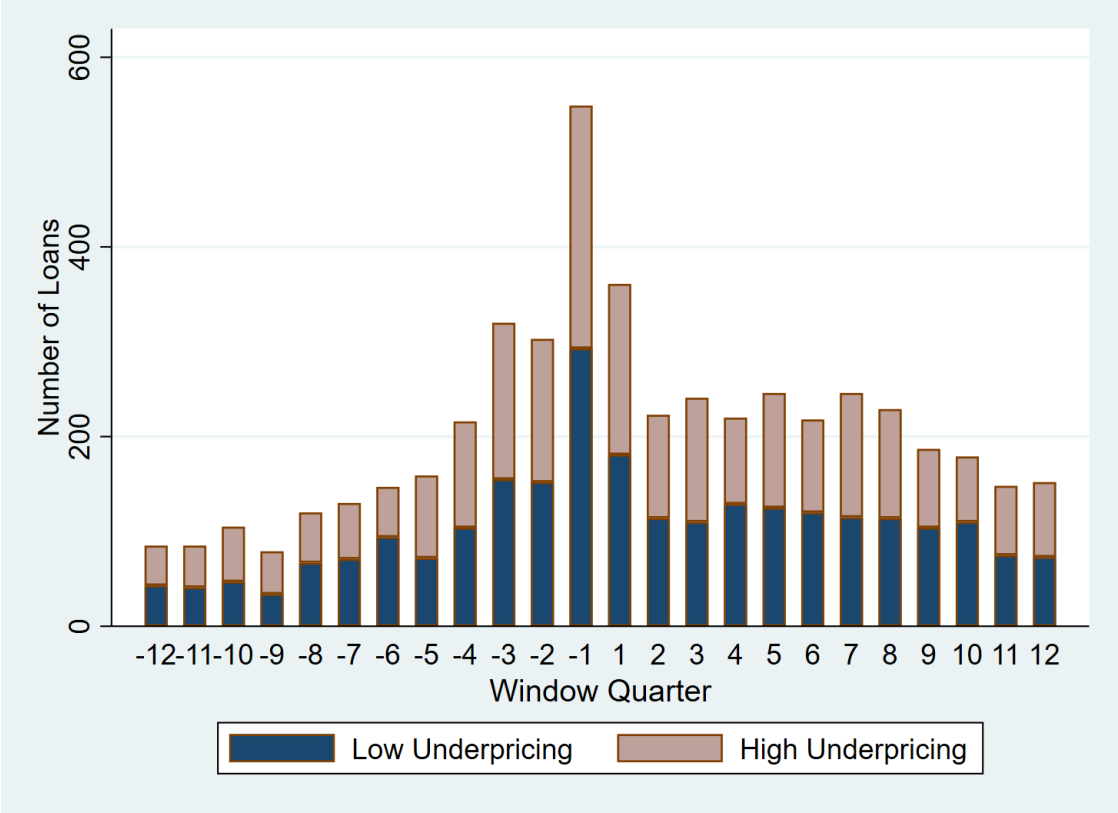

Figure 4: The Number of Loans over Window Quarters

This figure shows the distribution of the number of loans in our sample across the 24 quarters between 3 years before IPO and 3 years after IPO. The full sample consists of 4,948 bank loan facilities in 1987-2016 made by 1,010 IPO firms. We require the firm to be non-utility and non-financial firms, which complete IPO on the NYSE, AMEX and NASDAQ stock exchanges between 1990 and 2013. We also exclude REITs, units, ADRs, and offerings with the stock price below U.S. $5, and require every firm to have at least one loan (with non-missing all-in-spread-drawn in DealScan) within 3 years before IPO and one loan (with non-missing all-in-spread-drawn in DealScan) within 3 years after IPO. We show the distribution of loans for two subsamples: loans issued by IPO firms with high (i.e. above-median) underpricing and loans issued by IPO firms with low (i.e. below-median) underpricing.

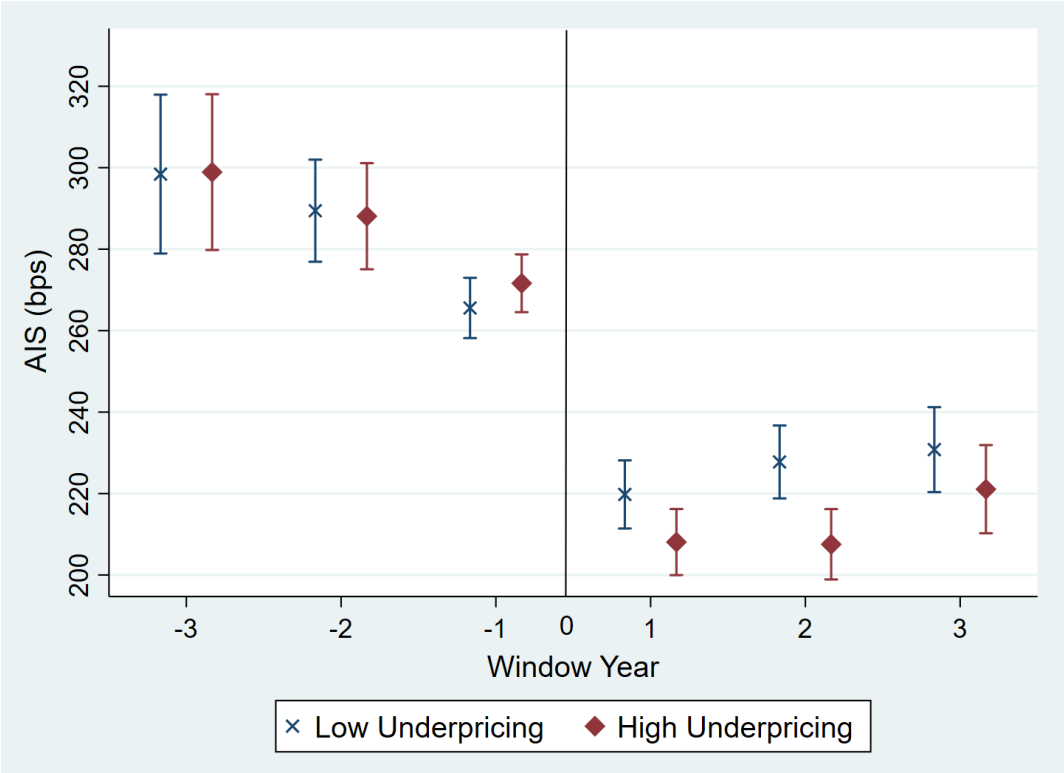

Figure 5: Loan Spread Before and After IPO

This figure shows the average loan interest spread (AIS) of the bank loan facilities in our sample across the three window years before and after IPO. The full sample consists of 4,948 unique bank loans between 1987 and 2016, each of which is issued by an IPO firm between 3 years before IPO and 3 years after IPO. We compare two subsamples: loans issued by IPO firms with high (i.e. above-median) underpricing and loans issued by IPO firms with low (i.e. below-median) underpricing.

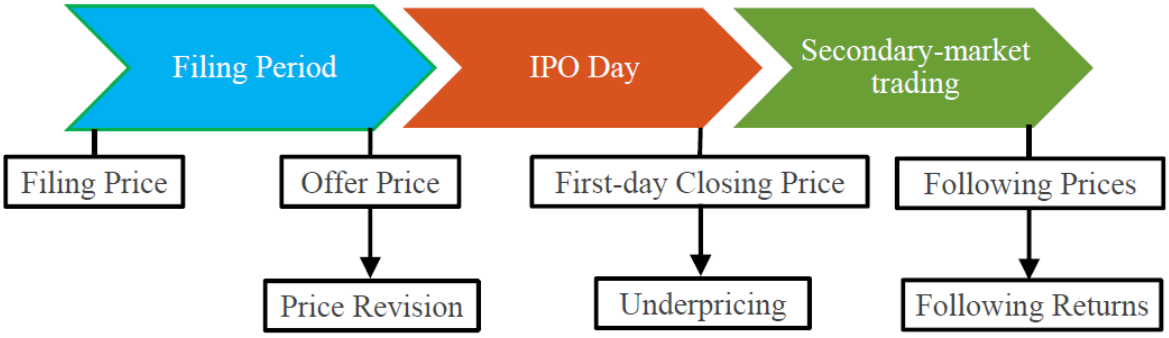

Figure 6: Timeline of IPO Pricing

This figure shows the time line of IPO pricing. We split the IPO period into three subperiods: the filing period, the IPO day and the following secondary trading period. Respectively at the end of each subperiod, the lender can observe the price revision, underpricing, and following stock returns.

Table 1: Summary Statistics for IPOs

This table reports summary statistics for key IPO variables for the 1,010 IPOs in our full sample and two subsamples split by median underpricing. To construct the full sample, we start with all non-utility and non-financial firms in SDC Global New Issues Database, which completed IPO on the NYSE, AMEX and NASDAQ stock exchanges between 1990 and 2013. We then exclude REITs, units, ADRs, and offerings with the stock price below U.S. $5. We further require every firm to have at least one loan (with non-missing all-in-spread-drawn in DealScan) within 3 years before IPO and one loan (with non-missing all-in-spread-drawn in DealScan) within 3 years after IPO. Panel A, and B report statistics for key IPO variables for the full sample, the subsample with high (i.e. above-median) underpricing and the subsample with low (i.e. below-median) underpricing respectively. All variables are winsorized at the 1^{st} and 99^{th} percentiles, and are summarized in Appendix I. All dollar amounts are in 2010 real dollars.

Panel A: Full Sample

Variables	N	Mean	SD	p1	p25	p50	p75	p99
Gross Proceedings (U.S. $ million)	1,010	169.12	232.03	11.29	46.21	90.36	183.30	1,488
VC-backed IPO (dummy)	1,010	0.24	0.43	0.00	0.00	0.00	0.00	1.00
Underwriter Ranking	905	8.04	1.35	3.00	8.00	8.63	9.00	9.00
Offer Price (U.S. $)	1,010	18.67	5.89	7.17	14.50	18.21	21.78	37.47
Book Assets (U.S. $ million)	951	642.21	1,562	2.38	44.77	152.46	464.14	11,082
Firm Age in the IPO Year (years)	1,008	25.25	27.97	0.00	6.00	14.00	33.00	104.00
Book Leverage	949	0.50	0.35	0.00	0.25	0.48	0.67	1.94
Cash Ratio	950	0.09	0.14	0.00	0.01	0.03	0.09	0.73
Profitability	938	-0.00	0.21	-1.20	-0.02	0.02	0.08	0.41
Tangibility	951	0.32	0.26	0.01	0.11	0.24	0.48	0.93
Underpricing (%)	1,010	13.52	20.41	-10.29	0.77	7.46	18.41	119.57
Underpricing (U.S. $ million)	1,010	22.46	51.30	-19.14	0.44	6.05	22.17	354.08
High Underpricing (dummy)	1,010	0.50	0.50	0.00	0.00	0.50	1.00	1.00
Price Revision (%)	1,007	-0.82	12.34	-34.00	-7.69	0.00	7.14	26.67

Panel B: Subsamples with High Underpricing and Low Underpricing

	High Underpricing				Low Underpricing				Diff.
Variables	N	Mean	p50	SD	N	Mean	p50	SD	
Gross Proceedings	505	170.16	95.00	227.30	505	168.08	86.78	236.89	-2.08
VC-backed IPO	505	0.30	0.00	0.46	505	0.19	0.00	0.39	-0.11***
Underwriter Ranking	452	8.10	8.88	1.28	453	7.98	8.00	1.42	-0.12
Offer Price	505	19.83	19.49	5.69	505	17.50	16.81	5.85	-2.34***
Book Assets	476	566.21	128.77	1,474	475	718.36	193.08	1,644	152.14
Firm Age	504	22.21	11.00	26.25	504	28.30	17.00	29.31	6.09***
Book Leverage	475	0.46	0.43	0.32	474	0.53	0.51	0.37	0.07***
Cash Ratio	476	0.10	0.04	0.15	474	0.07	0.03	0.13	-0.03***
Profitability	471	0.00	0.03	0.21	467	-0.01	0.02	0.21	-0.01
Tangibility	476	0.32	0.23	0.26	475	0.33	0.26	0.25	0.01
Underpricing (%)	505	26.12	18.41	22.39	505	0.92	0.77	3.75	—
Underpricing (U.S. $)	505	41.94	20.60	64.04	505	2.99	0.44	20.20	—
Price Revision (%)	503	5.20	6.25	10.66	504	-6.84	-5.41	10.88	—

Table 2: Loan and Borrower Characteristics: Pre- and Post-IPO

This table compares the key loan and borrower characteristics for the 4,948 observations in our full sample. Each of the loans is issued by an IPO firm between 3 years before IPO and 3 years after IPO. Panel A, B and C are respectively for the full sample, the subsample with high (i.e. above-median) underpricing and the subsample with low (i.e. below-median) underpricing. We split the loans into pre- and post-IPO loans, with the last column reporting the pre- and post-IPO difference in means of the loan characteristics. All variables are winsorized at the 1^{st} and 99^{th} percentiles, and are summarized in Appendix I. All dollar amounts are in 2010 real dollars. *,**, and *** indicate that differences in means are statistically significant at the 10%, 5%, and 1% levels, respectively.

	Pre-IPO				Post-IPO				Diff.
	N	Mean	Median	SD	N	Mean	Median	SD	
Panel A: Full Sample (obs: 4,948)									
AIS (bps)	2,298	276.79	275.00	111.32	2,650	219.05	200.00	111.24	-57.74***
Maturity (month)	2,210	53.36	60.00	25.84	2,553	52.57	60.00	23.17	-0.79
Loan Amount ($ million)	2,298	170.01	59.39	457.28	2,650	219.25	98.98	382.37	49.23***
Fin_Covenant (dummy)	2,298	0.46	0.00	0.50	2,650	0.60	1.00	0.49	0.14***
Book Assets ($ million)	2,129	1,396	264.44	6,612	2,566	1,949	482.43	8,848	552.66**
Book Leverage	2,087	0.52	0.50	0.33	2,566	0.40	0.40	0.26	-0.12***
Cash Ratio	2,037	0.08	0.03	0.13	2,558	0.08	0.03	0.13	0.00
Profitability	2,078	0.00	0.02	0.14	2,560	0.01	0.03	0.12	0.01**
Tangibility	2,031	0.34	0.27	0.25	2,558	0.32	0.25	0.25	-0.01
Panel B: Subsample with High Underpricing (obs: 2,405)									
AIS (bps)	1,125	277.34	255.00	110.66	1,280	209.47	200.00	107.06	-67.86***
Maturity (month)	1,080	52.03	60.00	26.79	1,238	52.46	60.00	23.91	0.43
Loan Amount ($ million)	1,125	135.99	46.19	291.92	1,280	201.81	99.12	311.74	65.83***
Fin_Covenant (dummy)	1,125	0.48	0.00	0.50	1,280	0.64	1.00	0.48	0.15***
Book Assets ($ million)	1,048	943.40	205.35	2,761	1,239	1,434	477.04	3,534	490.52***
Book Leverage	1,018	0.48	0.46	0.34	1,239	0.36	0.36	0.26	-0.12***
Cash Ratio	1,002	0.10	0.04	0.15	1,234	0.10	0.04	0.14	0.00
Profitability	1,018	0.00	0.02	0.16	1,234	0.01	0.03	0.14	0.01
Tangibility	996	0.33	0.23	0.26	1,231	0.32	0.25	0.25	0.01
Panel C: Subsample with Low Underpricing (obs: 2,543).									
AIS (bps)	1,173	276.27	275.00	111.99	1,370	228.00	225.00	114.32	-48.27***
Maturity (month)	1,130	54.64	60.00	24.84	1,315	52.68	60.00	22.45	-1.96**
Loan Amount ($ million)	1,173	202.65	70.60	570.89	1,370	235.53	97.31	437.68	32.89
Fin_Covenant (dummy)	1,173	0.44	0.00	0.50	1,370	0.57	1.00	0.50	0.13***
Book Assets ($ million)	1,081	1,835	395.00	8,852	1,327	2,430	486.77	11,802	94.47
Book Leverage	1,069	0.56	0.55	0.31	1,327	0.44	0.44	0.26	-0.12***
Cash Ratio	1,035	0.06	0.02	0.10	1,324	0.07	0.02	0.11	0.01**
Profitability	1,060	0.01	0.01	0.12	1,326	0.02	0.03	0.11	0.01*
Tangibility	1,035	0.34	0.30	0.24	1,327	0.32	0.26	0.25	-0.02*

Table 3: Post-IPO Reduction in Borrowing Costs

This table examines the benefit of going public in terms of reducing borrowing costs in bank loan markets. The sample consists of 4,948 unique bank loans in 1987-2016, each of which is issued by an IPO firm between 3 years before IPO and 3 years after IPO. The dependent variable is either all-in-spread-drawn (AIS) or the logarithm of AIS , log*AIS*, indicated by column headers. *Post* is a dummy variable that equals to one if the loan is issued after the firm goes public. We add firm and year fixed effects, and a list of firm and loan controls. In the last three columns, we exclude loans made within one quarter before IPO, loans with maturity less than two years, and loans issued during hot market period (1998-2000). All variables are winsorized at the 1^{st} and 99^{th} percentiles, and are summarized in Appendix I. The model is estimated using OLS. Standard errors are clustered at the firm level to correct for heterogeneity and t-values are presented in parentheses. *, **, and *** indicate that the coefficient is statistically significant at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Sample	Full Sample				Exclude Quarter -1	Exclude Maturity ≤ 2	Exclude 1998-2000
Y-variable	log*AIS*	log*AIS*	log*AIS*	*AIS*	log*AIS*	log*AIS*	log*AIS*
Post	**-0.199*** **	**-0.177*** **	**-0.176*** **	**-41.051*** **	**-0.222*** **	**-0.181*** **	**-0.189*** **
	(-8.03)	**(-6.57)**	**(-6.81)**	**(-7.25)**	**(-7.28)**	**(-6.58)**	**(-6.53)**
log(Book Assets)		-0.011	0.003	-2.071	0.013	0.007	0.008
		(-0.54)	(0.17)	(-0.52)	(0.65)	(0.35)	(0.36)
Book Leverage		0.209***	0.190***	39.060***	0.171**	0.207***	0.237***
		(3.26)	(3.09)	(2.75)	(2.50)	(3.19)	(3.21)
Tangibility		-0.294	-0.304	-65.718*	-0.233	-0.353*	-0.317
		(-1.58)	(-1.57)	(-1.80)	(-1.07)	(-1.73)	(-1.48)
Profitability		-0.441***	-0.398***	-101.612***	-0.415***	-0.442***	-0.347***
		(-4.61)	(-4.15)	(-4.31)	(-4.14)	(-3.34)	(-2.72)
Cash Ratio		-0.064	-0.128	-47.969*	-0.176	-0.148	-0.060
		(-0.51)	(-1.00)	(-1.80)	(-1.29)	(-0.92)	(-0.42)
log(Firm Age)		0.004	0.005	4.409	-0.012	0.011	-0.025
		(0.06)	(0.08)	(0.32)	(-0.18)	(0.18)	(-0.36)
log(Loan Amount)			-0.070***	-15.625***	-0.061***	-0.067***	-0.074***
			(-7.35)	(-7.22)	(-5.98)	(-6.95)	(-7.24)
log(Maturity)			0.053***	10.359**	0.056***	0.206***	0.048**
			(2.80)	(2.53)	(2.72)	(6.15)	(2.28)
Fin_Covenant			-0.021	-7.179	-0.016	-0.023	-0.026
			(-0.92)	(-1.34)	(-0.67)	(-1.01)	(-1.05)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loan Purpose FE	No	No	Yes	Yes	Yes	Yes	Yes
Bank FE	No	No	Yes	Yes	Yes	Yes	Yes
N	4,948	4,481	4,327	4,327	3,803	3,712	3,660
adj. R^2	0.212	0.226	0.283	0.268	0.309	0.317	0.301

Table 4: Is the post-IPO Reduction in Borrowing Costs Mainly due to Increased Equity from IPO? A Comparison between IPOs and SEOs

This table compares the difference in the post-issue reduction in borrowing costs between IPOs and SEOs. For each IPO in our sample, we match a SEO through a propensity score matching approach. We use six variables (log*(Book Assets)*, *Book Leverage*, *Tangibility*, *Profitability*, *Cash Ratio*, *Issue Ratio*), in addition to year and industry fixed effects, to compute the propensity scores and Panel A compares the variables used to compute the propensity scores between IPOs and SEOs. Panel B shows results of DiD tests using loans issued by IPO and SEO firms. Specifically, in Columns (1) to (3) we use all SEOs made in the same sample period (1990-2013) as control group; while in Columns (4) to (6), we use the matched IPOs and SEOs as treated and control groups. The dependent variable is log*AIS*, and we include firm and loan year fixed effects in all columns. We add an interaction term, *Post*×*Treated*, to regressions of Table 3. *Treated* is a dummy variable that equals to one for IPOs and zero for SEOs. All variables are winsorized at the 1^{st} and 99^{th} percentiles, and are summarized in Appendix I. Standard errors are clustered at the firm level to correct for heterogeneity and t-values are presented in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

Panel A: Difference in Matching Variables

	IPOs			SEOs			Diff.	t-value
	Mean	SD	N	Mean	SD	N		
log(Book Assets)	5.637	1.617	569	5.649	1.538	569	0.01	0.13
Book Leverage	0.429	0.273	569	0.435	0.282	569	0.01	0.36
Tangibility	0.335	0.257	569	0.334	0.256	569	0.00	-0.05
Profitability	0.011	0.149	569	0.013	0.129	569	0.00	0.27
Cash Ratio	0.088	0.137	569	0.083	0.126	569	-0.01	-0.77
Issue Ratio	0.673	0.750	569	0.615	0.935	569	-0.06	-1.14

Panel B: DiD Regressions (Treated: IPOs; Control: SEOs)

	(1)	(2)	(3)	(4)	(5)	(6)
	Full Sample			Matched Sample		
Y-variable	log*AIS*	log*AIS*	log*AIS*	log*AIS*	log*AIS*	log*AIS*
Post × Treated	**-0.119*** **	**-0.046** **	**-0.041** **	**-0.111*** **	**-0.093*** **	**-0.086*** **
	(-6.45)	**(-2.36)**	**(-2.17)**	**(-3.55)**	**(-3.02)**	**(-2.87)**
Post	-0.121***	-0.086***	-0.073***	-0.142***	-0.087***	-0.071***
	(-9.76)	(-7.60)	(-6.58)	(-4.73)	(-3.14)	(-2.70)
Treated	0.169***	0.099***	0.087***	0.160***	0.120***	0.107***
	(10.89)	(6.19)	(5.63)	(5.78)	(3.96)	(3.58)
Firm Controls	No	Yes	Yes	No	Yes	Yes
Loan Controls	No	No	Yes	No	No	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Loan Purpose FE	No	No	Yes	No	No	Yes
Bank FE	No	No	Yes	No	No	Yes
N	23,099	21,851	21,236	6,070	5,781	5,572
adj. R^2	0.185	0.244	0.315	0.192	0.244	0.304

Table 5: DiD Tests: The Post-IPO Reduction in Borrowing Costs and IPO Underpricing

This table examines the relationship between the benefit of going public and IPO underpricing. The sample consists of 4,948 unique bank loans in 1987-2016, each of which is issued by an IPO firm between 3 years before IPO and 3 years after IPO. We run the following DiD regression:

$$\log AIS = \alpha + \beta \cdot \textit{Post} + \gamma \cdot \textit{Post} \times \textit{High Underpricing} + \lambda \cdot \textit{High Underpricing} + \Gamma \cdot \mathbf{X}' + FEs + \epsilon$$

The dependent variable is either all-in-spread-drawn (AIS) or the logarithm of AIS, log*AIS*, indicated by column headers. *Post* is a dummy variable that equals to one if the loan is issued after the firm goes public. In Columns (1) to (3), we examine the differences in borrowing costs for firms with high underpricing and low underpricing, captured by the coefficient of the interaction term between *Post* and *High Underpricing* dummy, which equals to one if IPO underpricing is above-median. In Columns (4)-(5), we compare the differences in borrowing costs for firms in the top tercile underpricing and bottom tercile underpricing, where *Top Underpricing* is a dummy variable that equals one if the firm's IPO underpricing is in the top tercile. In Column (6) we examine the marginal effect of underpricing on post-IPO reduction in borrowing cost, indicated by the coefficient of the interaction term *Post* and continuous variable of underpricing, *Underpricing*. In all columns, underpricing is defined by either the percentage change (indicated by column header, %) of the first-day closing price relative to the offer price or the dollar amount of money left on the table (indicated by column header, $). We include firm, year and loan purpose fixed effects, and a list of firm and loan characteristics as controls. All variables are winsorized at the 1^{st} and 99^{th} percentiles, and are summarized in Appendix I. The model is estimated using OLS. Standard errors are clustered at the firm level to correct for heterogeneity and t-values are presented in parentheses. *, **, and *** indicate that the coefficient is statistically significant at the 10%, 5%, and 1% levels, respectively.

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	(1)	(2)	(3)	(4)	(5)	(6)
Underpricing defined in	%	%	$	%	$	%
Y-variable	log*AIS*	*AIS*	log*AIS*	log*AIS*	log*AIS*	log*AIS*
Post× High Underpricing	**-0.111*** **	**-23.199*** **	**-0.092*** **			
	(-3.40)	**(-3.17)**	**(-2.65)**			
Post× Top Underpricing				**-0.147*** **	**-0.150*** **	
				(-3.33)	**(-3.46)**	
Post× Underpricing						**-0.002** **
						(-2.39)
Post	-0.126***	-30.644***	-0.129***	-0.105***	-0.103***	-0.152***
	(-4.11)	(-4.46)	(-3.91)	(-2.63)	(-2.60)	(-5.38)
log(Book Assets)	0.011	-0.370	0.005	-0.003	-0.014	0.010
	(0.61)	(-0.09)	(0.30)	(-0.10)	(-0.67)	(0.53)
Book Leverage	0.177***	36.300**	0.187***	0.130*	0.188**	0.183***
	(2.91)	(2.58)	(3.06)	(1.68)	(2.48)	(2.99)
Tangibility	-0.272	-59.195	-0.302	-0.286	-0.491**	-0.307
	(-1.40)	(-1.63)	(-1.57)	(-1.29)	(-2.30)	(-1.59)
Profitability	-0.407***	-103.379***	-0.389***	-0.274**	-0.394***	-0.416***
	(-4.26)	(-4.41)	(-4.07)	(-2.51)	(-3.72)	(-4.30)
Cash Ratio	-0.120	-46.313*	-0.123	-0.083	-0.112	-0.113
	(-0.94)	(-1.74)	(-0.97)	(-0.53)	(-0.76)	(-0.89)
log(Firm Age)	0.007	4.889	0.012	0.159**	0.136**	0.020
	(0.12)	(0.35)	(0.20)	(2.18)	(2.02)	(0.33)
log(Loan Amount)	-0.069***	-15.435***	-0.070***	-0.083***	-0.070***	-0.070***
	(-7.31)	(-7.19)	(-7.37)	(-7.54)	(-6.45)	(-7.41)
log(Maturity)	0.052***	10.280**	0.052***	0.060**	0.056**	0.053***
	(2.79)	(2.52)	(2.76)	(2.57)	(2.49)	(2.80)
Fin_Covenant	-0.016	-6.260	-0.019	-0.016	-0.040	-0.020
	(-0.72)	(-1.17)	(-0.85)	(-0.51)	(-1.45)	(-0.91)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Loan Purpose FE	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
N	4,327	4,327	4,327	2,511	2,745	4,327
adj. R^2	0.287	0.272	0.286	0.308	0.332	0.285

Table 6: Underpricing as Partial Adjustment of Prices? Underpricing vs. Price Revision

This table compares the differences between the effects of underpricing, price revision and other stock returns on the post-IPO reduction in borrowing costs. The dependent variable is the logarithm of all-in-spread-drawn (AIS), log*AIS*. *Post* is a dummy variable that equals one if the loan is issued after the firm goes public. *High Underpricing* is a dummy that equals to one if the IPO firm has above-median underpricing, defined as the percentage change of the first-day closing price relative the offer price. *High Price Revision* is a dummy that equals to one if the IPO's adjustment of its offer price from the midpoint filing price is above median. Column (1) replicates Column (1) in Table 5, but replaces *Underpricing* with *Price Revision*. In Column (2), we add *Post*×*High Underpricing* to Column (1). That is, we run a horse race of underpricing and price revision. In Columns (3) to (4), we replicate Columns (1) to (2) respectively but replace the dummy variables of underpricing, price revision by their continuous variables. We also include firm, year and loan purpose fixed effects, and a list of firm and loan characteristics in all columns. All variables are defined in Appendix I. The model is estimated using OLS. Standard errors are clustered at the firm level to correct for heterogeneity and t-values are presented in parentheses. *, **, and *** indicate that the coefficient is statistically significant at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)
Y-variable	log*AIS*	log*AIS*	log*AIS*	log*AIS*
Post× High Price Revision	-0.022	0.040		
	(-0.65)	(1.01)		
Post× High Underpricing		-0.130***		
		(-3.39)		
Post× Price Revision			-0.002	-0.000
			(-1.21)	(-0.09)
Post× Underpricing				-0.002**
				(-2.08)
Post	-0.164***	-0.140***	-0.178***	-0.152***
	(-5.09)	(-4.22)	(-6.83)	(-5.11)
Other Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Loan Purpose FE	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes
N	4,327	4,327	4,308	4,308
adj. R^2	0.283	0.288	0.282	0.284

Table 7: Underpricing Reflects Ex-ante Uncertainty? Controlling Factors that Affect Underpricing

This table reports robustness analyses for the regressions in Table 5. The dependent variable is the logarithm of all-in-spread-drawn (AIS), log*AIS*. *Post* is a dummy variable that equals one if the loan is issued after the firm goes public. *High Underpricing* is a dummy that equals to one if the IPO firm has above-median underpricing, defined as the percentage change of the first-day closing price relative the offer price. *High Price Revision* is a dummy that equals to one if the IPO's adjustment of its offer price from the midpoint filing price is above median. In addition to the interaction terms between *Post* and *High Underpricing* and *High Price Revision*, we include the interaction terms between *Post* and *Underwriter Ranking* in Column (1), *VC-backed IPO* in Column (2), log*(*Gross Proceedings) in Column (3), log(*Book Assets*) in Column (4), log(*Sales*) in Column (5), *IPO Age* in Column (6), and all these factors in Columns (7). These factors are important drivers of IPO underpricing, documented in the literature. We also include firm, year and loan purpose fixed effects, and a list of IPO, firm and loan characteristics. All variables are defined in Appendix I. The model is estimated using OLS. Standard errors are clustered at the firm level to correct for heterogeneity and t-values are presented in parentheses. *, **, and *** indicate that the coefficient is statistically significant at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Y-variable	log*AIS*	log*AIS*	log*AIS*	log*AIS*	log*AIS*	log*AIS*	log*AIS*
Post× High Underpricing	**-0.126*** **	**-0.131*** **	**-0.131*** **	**-0.128*** **	**-0.131*** **	**-0.130*** **	**-0.123*** **
	(-2.89)	**(-3.41)**	**(-3.44)**	**(-3.32)**	**(-3.37)**	**(-3.41)**	**(-2.78)**
Post× Underwriter Ranking	-0.032**						-0.037**
	(-2.47)						(-2.26)
Post× VC-backed IPO		0.032					-0.010
		(0.73)					(-0.20)
Post× log(Gross Proceedings)			-0.009				-0.034
			(-0.53)				(-1.24)
Post× log(Book Assets)				-0.000			0.093***
				(-0.04)			(3.86)
Post× log(Sales)					-0.015		-0.074***
					(-1.30)		(-3.52)
Post× IPO Age						-0.028	-0.029
						(-1.35)	(-1.07)
Post× High Price Revision	0.053	0.039	0.043	0.039	0.037	0.040	0.067
	(1.17)	(1.00)	(1.07)	(0.97)	(0.92)	(1.00)	(1.45)
Post	0.109	-0.144***	-0.099	-0.137*	-0.054	-0.054	0.280**
	(0.99)	(-4.29)	(-1.18)	(-1.88)	(-0.72)	(-0.73)	(2.13)
Other Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loan Purpose FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	3,725	4,327	4,327	4,193	4,089	4,327	3,493
adj. R^2	0.284	0.288	0.288	0.291	0.293	0.290	0.298

Table 8: Underpricing Reflects Unexpected Market Demand? Underpricing (or First-day Stock Return) vs. Longer-term Stock Returns

This table examines the effect of underpricing on post-IPO reduction in borrowing costs, controlling for longer-term stock returns. The dependent variable is the logarithm of all-in-spread-drawn (AIS), log*AIS*. *Post* is a dummy variable that equals one if the loan is issued after the firm goes public. *High Underpricing* is a dummy that equals to one if the IPO firm has above-median underpricing, defined as the percentage change of the first-day closing price relative the offer price. We include the interaction terms between *Post* and first-month return after IPO offer day (*1-month Return*) in Column (1), first-quarter return after IPO offer day (*1-quarter Return*) in Column (2), first-half-year return after IPO offer day (*Half-year Return*) in Column (3), first-year return after IPO offer day (*1-year Return*) in Column (4), and IPO-to-Loan Return (*IPO-to-Loan Return*) in Column (5). Column (6) replicates Column (5) but replace *IPO-to-Loan Return* with a dummy *High IPO-to-Loan Return*, which equals to one if IPO-to-Loan Return is above median and zero otherwise. Across all columns, we add the interaction term between *Post* and *Price Revision*. We also include firm, year and loan purpose fixed effects, and a list of firm and loan characteristics in all columns. All variables are defined in Appendix I. The model is estimated using OLS. Standard errors are clustered at the firm level to correct for heterogeneity and t-values are presented in parentheses. *, **, and *** indicate that the coefficient is statistically significant at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Y-variable	log*AIS*	log*AIS*	log*AIS*	log*AIS*	log*AIS*	log*AIS*
Post× High Underpricing	**-0.118*** **	**-0.090** **	**-0.080** **	**-0.096** **	**-0.088** **	**-0.080** **
	(-2.71)	**(-2.30)**	**(-2.08)**	**(-2.48)**	**(-2.20)**	**(-1.97)**
Post× 1-month Return	-0.000					
	(-0.06)					
Post× 1-quarter Return		-0.001**				
		(-2.33)				
Post× Half-year Return			-0.001***			
			(-3.86)			
Post× 1-year Return				-0.001***		
				(-2.98)		
Post× IPO-to-Loan Return					-0.001***	
					(-3.90)	
Post× High IPO-to-Loan Return						-0.126***
						(-3.53)
Post× Price Revision	0.001	0.001	0.000	0.000	0.001	0.001
	(0.56)	(0.45)	(0.14)	(0.17)	(0.50)	(0.57)
Post	-0.124***	-0.118***	-0.113***	-0.115***	-0.120***	-0.092***
	(-3.69)	(-3.46)	(-3.35)	(-3.39)	(-3.48)	(-2.59)
Other Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Loan Purpose FE	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
N	4,222	4,226	4,226	4,224	3,973	3,973
adj. R^2	0.291	0.293	0.298	0.295	0.314	0.313

Table 9: IV (2SLS) Tests: Evidence from Exogenous Variations of IPO Underpricing

This table examines the relationship between the benefit of going public and IPO underpricing through 2-stage Least Squares (2SLS) estimations. The instrumental variable is *High Nasdaq Return*, a dummy equals to one if the 3-week Nasdaq return before IPO is above median. In Columns (1) to (2), we report the first-stage regressions, where the dependent variables are *High Underpricing* and *Post* $\times$ *High Underpricing* respectively, and the F-statistics is reported at the bottom of the columns. We include the same control variables as in the corresponding second-stage regressions, including industry, loan year and issue year fixed effects, as well as a list of firm, IPO and loan characteristics. Column (3) presents our second-stage estimation, where the dependent variable is the logarithm of all-in-spread-drawn (AIS), $\log$*(AIS)*. The independent variables include the instrumented *High Underpricing* and instrumented *Post* $\times$ *High Underpricing*. Columns (4) to 6) replicate Columns (1) to (3), but replace *High Underpricing* dummy with a continuous variable, *Underpricing*. All variables are winsorized at the 1^{st} and 99^{th} percentiles, and are summarized in Appendix I. Standard errors are clustered at the firm level to correct for heterogeneity and t-values are presented in parentheses. *, **, and *** indicate that the coefficient is statistically significant at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	1^{st} Stage		2^{nd} Stage	1^{st} Stage		2^{nd} Stage
Y-variable	Post×High Underp.	High Underp.	log*AIS*	Post×Underpricing	Underpricing	log*AIS*
Post×High Nasdaq Return	**0.163*** **	0.053		**4.818*** **	1.185	
	(4.10)	(1.62)		**(3.49)**	(1.20)	
High Nasdaq Return	0.000	**0.108*** **		0.203	**3.336** **	
	(0.03)	**(2.63)**		(0.41)	**(2.53)**	
Post×High Underpricing			**-0.807** **			
			(-2.05)			
High Underpricing			0.800**			
			(2.00)			
Post×Underpricing						**-0.025** **
						(-1.90)
Underpricing						0.027*
						(1.86)
Post	0.384***	-0.049*	0.262	8.850***	-1.564	0.184
	(13.02)	(-1.77)	(1.36)	(9.83)	(-1.59)	(1.11)
Other Controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Loan Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Issue Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Loan Purpose FE	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
N	4,327	4,327	4,327	4,327	4,327	4,327
1st Stage F-Stat.		23.37			15.62	
2nd Stage Wald χ^2			3.44			2.80
p-value of χ^2			0.00			0.02