Should Firms Stay "Private" or Should Firms Go "Public": Disentangling Treatment from Self-Selection Effects[☆]

Abstract

Using a unique sample of privately held and firms that went public on the European and Asian Stock Exchanges between 2007 and 2011, we investigate whether it is riskier to go public or remain private. To do so, we compare the firms' risk of financial distress and profitability of observably similar public and private firms by disentangling the effect of equity issue from other IPO's effect. In addition, we document if is the going public transition detrimental for the firm or the "status" of public company. Our results were as follows. First, we find that IPO firms are riskier and less profitable than their counterparts. These results are resilient to different empirical strategies that address selection bias. Second, we find an increase in the risk of financial distress in IPO firms when we evaluate the IPO impact net to this capital infusion. Third, we find that is the transition on equity market risky for firms and not the public company status per se.

1. Introduction

Are going public companies riskier and less profitable than "twin" private firms over the post-IPO period? Stated differently, is the decision of a firm to going public detrimental for its risk of financial distress and profitability after controlling for from self-selection bias and the effect of equity issue? Finally, what are the implications of a firm going public on its post-IPO market performance? If so, can we argue that is the going public transition detrimental in the short-medium term, but not the public company status per se?

These questions have considerable relevance as numerous successful companies across the world decide at a certain stage of their life to go public. Furthermore, despite the accumulation of empirical evidence the inability to find an adequate counterfactual and to disentangle the effect of equity issue from other effects leave these important issues unresolved. From a theoretical side, there are several arguments supporting the idea that the transition to public equity markets positively affects the level of financial soundness of the firms. Specifically, going public allows them to raise additional financial resources (e.g., Jain and Kini, 1994; Teoh, et al., 1998; Chemmanur, et al., 2010), to diversify company's wealth (e.g., Pagano, et al., 1998; Bernstein, 2015), to increase the liquidity of firm's securities which in turn should reduce the cost of equity financing (Bhide, 1993; Chemmanur, et al., 2010; Asker, et al., 2016; Acharya, and Xu, 2017) and to increase their reputation which should lead to an increase of a firm sales and profit margin (Forestieri, 2015). Nevertheless, there are at least two theoretical reasons for expecting that a going public firm may get worse performance than those would have been experienced it was remained private. The first reason is related to the agency problems associated with the transition to public equity markets that may undermine firm incentives to invest in innovation and encourage actions that are not in the long-term best interest of the firm (Berle and Means, 1932; Jensen and Meckling, 1976), such as aggressive dividend policy (DeAngelo and DeAngelo, 1990). The second reason relates to detailed disclosure requirements for public firms and the cost of regulation that can hinder profitability (Pagano and Röell, 1998). Conclusively, given the contrasting predictions, whether IPO firms experience a variation in their performance after the going public decision is an empirical puzzle that corporate finance literature has seek to solve. An early example is Jain and Kini (1994) who find that operating performance of U.S. firms declines subsequent to the IPO. Following the Jain and Kini (1994) pivotal paper, a large body of literature has tested the IPO long-run underperformance hypothesis using various firm-level

indicators, such as profitability, productivity, innovation, and amount of investments (among others: Pagano, et al., 1998; Lee and Wahal, 2004; Chemmanur, et al., 2010; Bernestein, 2015). Overall, these studies suggest that the IPO long-run underperformance is a robust phenomenon that extends across equity markets in several countries and time periods. Our empirical study fills a gap in the literature because previous studies don't have an adequate control group and do not adopt a methodology which allows them to respond to the historical dilemma if it is riskier to go public or remain private. This is because the effect of treatment – i.e. being public - derives from specific characteristics that a firm has at pre-listing year. Thus, to give a definitive answer to this dilemma, we need to find private firms that have the same trend in the level of financial soundness and profitability in the fictitious year pre-IPO compared to firms that go public[1]. In addition, to best of our knowledge, there are no studies that analyse the impact of IPO on the risk of financial distress and profitability by disentangling the equity issue and self-selection effects. These analyses allow us to isolate the effect of share capital and selection bias issues associated with the decision of going public. This last point is particularly important in light of the fact that firms choose to go public at a specific stage in their life cycle, and as a result this approach may produce biased estimates of the IPO effect (Jain and Kini, 1994; Bernstein, 2015). Given its importance, it is surprising that previous studies that have analysed the effects of the IPO have not considered it. To our knowledge, there are few studies that estimate the IPO effects on the firm outcome while controlling for the endogenous nature of the decision to go public. Bernstein (2015) deals with endogeneity concerns by using a control sample of innovative firms that file an initial registration statement with the Securities and Exchange Commission (SEC) in an attempt to go public, and then either complete or withdraw their filing. Acharya et al. (2017) adopt several econometric models accounting for selection bias by using a large panel data set of private and public firms built from Standard & Poor's (S&P) Capital IQ. However, these studies investigate the impact of going public process on firms' innovation and focuses on U.S. firms. Thus, as far as can be ascertained, we are the first to examine the IPO's impact on the firms' financial distress risk and profitability after correcting for endogenous selection issues. To do this, we analyse different matched sample until we find the matched private sample who has the same trend as our IPOs[2]. This allows us to identify the causal relationship between firms transitioning from private to public (i.e. "treatment group") and firms

[1] As we will show later, in the year pre-IPO there is a marked trend towards an increased in the level of financial soundness due to the increase in share capital that occurs during IPO process.
[2] We conduct a graphic analysis of the trend in the level of financial sundness and the profitability for IPO firms.

that remain private (i.e. "control group") by using difference-in-differences estimator. Specifically, private firms have been selected through a matching technique (namely, the propensity score approach: Rosenbaum and Rubin, 1983) from a list of more than 180,000 firms to mitigate the concern about the non-randomness of public and private firms[3]. The difference-in-differences approach is then used to isolate the treatment effect by differencing out the influence of cross-sectional heterogeneity or common time trends on the risk of financial distress and profitability of the treatment and the control groups[4].

In our final specification, we analyse a unique sample consisting of 295,827 firms, of which 730 firms went public on the European and Asian Stock Exchanges between 2007 and 2011 and 295,097 firms remain private over the same period. The choice to focus on the European and Asian IPO markets depends mainly on two reasons. First, this choice takes into account that they are highly representative of the worldwide IPO market. Accordingly, in the period 2007-2011 European and Asian's IPO market produced 2,704 IPOs, whilst only 968 IPOs were produced in the U.S. IPO market (Zephyr Bureau Van Dijk). Second, there is a lack of data on the U.S. privately held firms necessary for a direct analysis of the choice between public and private firms[5] (Asker, et al., 2016). Thus, by focusing on the European and Asian IPO markets we can collect accounting data on private firms that able us to select through sample matching techniques (i.e. the propensity score approach) a valid control group (Saunders and Steffen, 2011). This aspect is crucial to overrun the self-selection bias associated with the decision to go public of which, to the best of our knowledge, suffer previous studies. Our findings suggest that IPO firms are riskier and less profitable than their counterparts. These results are resilient to different techniques used to evaluate the impact of IPOs net to self-selection effect and the level of profitability and financial distress risk recorded by the firm at the IPO time.

[3] We then employ an econometric method to directly adjust for selection bias from unobservables. Specifically, we estimate the treatment effect model using an inverse Mills ratio to explicitly correct for selection bias.

[4] Identification of this approach relies on the assumption that the closely matched private firms act as a counterfactual for how the transition firms would have performed without going public.

[5]The huge difficulty in matching database including accounting data on both public companies and private firms has likely led to a lack of empirical research addressing this concern. In the United States, only the approximately 15,000 SEC registrants plus certain regulated entities (and firms for which lenders or contracts impose such requirements) have publicly available financial statements (Pacter 2007; Hope et al., 2013). Thus, financial data for U.S. private firms have not been widely accessible. To fill this gap, over the last few years, new database has been created by Sageworks Inc. and S&P IQ. Otherwise, in Europe and Asia, Orbis Bureau Van Djik reports accounting data of both, but only the 10 most recent years of private firms' accounting data. Since to properly analyze the IPO's impact on firms' performance researchers need to observe financial data at least 1 year before the IPO and 3 years after the listing year, this restriction limits, temporally and numerically, the IPO sample selection.

Consistent with prior literature, we also document a constant drop in profitability in each individual year after the listing year. In the same way, we find an increase in the risk of financial distress in IPO firms when we evaluate the IPO impact net to this capital infusion.

Our paper also contributes to existing literature that explores the long-run risk return characteristics of IPO stocks. For example, Ritter (1991) and Loughran and Ritter (1995) show that stocks performing either IPOs generate surprisingly low returns over holding periods of 2 –5 years following the issue date. Eckbo and Norli (2005) examine the risk-return characteristics of a rolling portfolio investment strategy where more than 6000 Nasdaq initial public offering (IPO) stocks are bought and held for up to 5 years. In this regard, we assess whether IPO companies are riskier even if we consider the market variables (i.e., Sharpe Ratio) by creating another sample that includes companies that went public at least 10 years before our IPOs sample[6]. As a robustness of previous findings, we also consider accounting measures of firms' financial distress risk and profitability.

The rest of the paper is organized as follows. We review prior literature in Section 2. In Section 3, we describe the data, sample, profitability, and risk of financial distress measures. In Section 4, we implement the empirical analyses. In Section 5 we provide an analysis between IPO and Historical Listed firms. We conclude in Section 6.

2. Literature Review

IPOs are among the most important decision made by private firms. This decision is theoretically affected by many different factors and it is very difficult to capture all of them in a single model. This has given rise to a large body of empirical research that has focused on different aspects of IPO, by using different firm-level variables related to productivity, innovation, amount of investments and the risk of financial distress (e.g., Mikkelson,et al, 1997; Pagano, et al., 1998; Lee and Wahal, 2004; Chemmanur, et al., 2010; Megginson et al., 2016). Nevertheless, there is a small empirical literature contrasting listed and unlisted firms. This is mainly due to the lack of data on privately held firms necessary for a direct analysis of the choice between

[6] Unfortunately, the difference in the trend in the period pre-IPO does not allow us to carry out an analysis difference in differences.

going public and remaining private (Asker, et al., 2016). In particular, the available empirical literature on the decision to go public was initially focused on the ex-ante characteristics and ex-post effects of the investment policy (Pagano et al., 1998; Ljungqvist, and Wilhelm, Jr., 2001; Brav, 2009; Saunders and Steffen, 2011; Mortal, and Reisel, 2013), but more recently has devoted to investigate the role of innovation both for public and private firms (Bernstein, 2015; Acharya, and Xu, 2017).

Recently, there are emerging literature contrasting public and private firms. Brav (2009) investigate differences in capital structure decisions between public and private firms. Michaely and Roberts (2012) show that listed firms pay relatively higher dividends than unlisted. Bernstein (2015) shows that IPO firms are more likely to acquire external innovation than firms that withdraw their IPO. Using a large dataset of private firms, Asker et al. (2016) show that public firms are less responsive to changes in their investment opportunities than private firms. Acharya and Xu (2017), documents the innovation and firms' dependence on external capital, comparing public and private firms.

Our study is related to two main strands of literature that can explain the impact as to how going public decision can affect the firm's performance. It is closely related to a large literature that studies the determinants of IPO (among others: Pagano et al., 1998; Ljungqvist, and Wilhelm, Jr., 2001; Brav, 2009) and is also related to a body literature that studies the impact of IPO on firm's performance (among others: Jain and Kini, 1994; Mikkelson, et al., 1997; Chemmanur, et al., 2010).

2.1. The IPO impact on firm's performance

Empirical research on the link between going-public decision and long-run performance has a long history. Since early studies (e.g, Ritter, 1991; Loughran and Ritter, 1995) have documented on a drastic decline in performance in the post-IPO period, the phenomenon has been extensively studied and remains intriguing. Indeed, literature has continued to evolve on both the theoretical and the empirical side by investigating the relationship between going public and firm's performance, in terms of innovation (e.g., Bernstein, 2015; Acharya and Xu 2017), investment (e.g., Pagano et al. 1998, Asker, et al., 2016, Gilje and Taillard 2016), profitability (e.g., Jain and Kini, 1994; Pástor, et al., 2009), and product market performance (e.g., Chemmanur, et al., 2010).

In particular, these studies present three main views on the impact of IPOs in the lung-run.

One view focuses on the likely increase in agency costs when a company becomes public (Jensen and Meckling, 1976; Kim et al., 2004; Latham and Braun, 2010). An early paper by Jensen and Meckling (1976) document that a reduction in management ownership that typically occur when a firm goes public is likely to lead to the agency problem. This is due to the growing conflict of interests between initial owners and shareholders and as the managers have an incentive to increase perquisite consumption, company performance may be affected[7].

A second view focuses on the theoretical assumption in which managers attempt to window-dress accounting numbers before going public (Teoh et al., 1988; Stein, 1989; Alhadab, Clacher, and Keaset al., 2016; Kouwenberg and Thontirawong, 2016). This implies an initial overestimation in the pre-listing period, with a decrease in performance in the ex-post IPO period[8].

A third view for the decline in operating performance is due to the fact that entrepreneurs time coincide with unusually good performance periods, which they know cannot be sustained in the future[9] (Ritter, 1984; Helwege and Liang, 2004). In sum, the theories rely on the post-IPO decline in operating performance refer to the presence of information asymmetries and the conflict of interests between initial entrepreneurs and new shareholders. This would imply that IPO firms have negative performances compared to private firms in the years following the listing.

Despite so different views that document the long run underperformance hypothesis, there is no general consensus about these negative returns (Ritter and Welch, 2002; Brav, 2009). As discussed by

[7] In this context, managers could use proceeds from the IPO for projects that do not maximize value, as a result of perquisite consumption (Jensen and Meckling,1976; Kim et al., 2004).

[8] According to signal-jamming model, managers may be tempted to manipulate pre-IPO earnings by increasing investor convictions (Stein, 1989). This refers to the earnings management theory (Teoh et al., 1988). This theory argues that IPO issuers tend to engage in opportunistic earnings management prior to IPO issuances more aggressively than non-IPO firm (Alhadab, Clacher, and Keaset al., 2016; Kouwenberg and Thontirawong, 2016). This is because firms are incentivized to declare higher earnings by increasing accruals, so as to obtain a better share price in the public offer.

[9] As argued by Ritter (1991), the long-run underperformance phenomenon is more pronounced in "hot" market periods. However, our study of the impact of the IPO in the long-ru would allow us to verify whether the post-IPO decline in operating performance is due even in the cold-IPO market period. One main reason is that, our sample period includes global financial crisis during 2007-2009 years. The theory proposed by Ibbotson et al. (1994), that seeks to explain the observed long-run underperformance of IPOs is based on the idea that some investors being excessively optimistic about an IPO firm's prospects. These optimistic investors will be the buyers of the stocks and their valuation of the company will be far higher than the valuation held by more pessimistic investors. Hence, we can expect that level of optimism by investors, during the crisis years, could be significantly lower than in non-crisis years. In addition, according to Henry and Gregoriou (2013), the global financial crisis of precipitated one of the longest IPO "droughts" in history. As a result, our sample period could be considered as a cold-IPO market.

Ritter and Welch (2002), the long-term performance of IPOs is very sensitive to the choice of econometric methodology and to the choice of sample period. Thus, at the minimum, there is a need to apply different econometric techniques to fully overcome the endogeneity issues that relate the going-public decision. Our empirical analysis of the impact of IPO on firms' performance is based on counterfactual analysis and this allow us to disentangle the effect of treatment from the long-run impact. In addition, although there are a large number of studies that document the impact of IPO on firm's performance, in term of profitability, there has been very little empirical research focusing on the relationship between IPO and firm's financial soundness (e.g., Andrade and Kaplan, 1998; Megginson et al., 2016). In contrast to earlier studies, we provide a more complete picture of the IPOs' risk of financial distress in the long run[10]. As argued by Hellmann 2006, depending on the financing instrument used, the post-investment capital structure can undergo several changes. In the case of IPOs, a first step is certainly the infusion of social capital in the listing year. Indeed, unlike private companies, for firms that go public, the portfolio firm's capital structure is influenced by the injection of share capital.

This would imply that the level of financial soundness of IPO firms is higher than private firms, because of the infusion of share capital that occurs during an IPO[11].

3. Data

To reply to our research questions, we build a unique dataset including accounting and financial data on European and Asian IPOs and privately held firms for 2005–2015[12]. Creating this dataset involves a multistep-process and the use of various databases.

First, we obtain the list of European and Asian IPO firms that went public from 1 January 2007 to 31 December 2011 from Zephyr Bureau Van Dijk (BVD) database. The sample period starts in 2005

[10] To measure the level of financial soudness, literature provides several indices that capture the risk of financial distress of firms based on business characteristics that can be observed by balance sheet and income statements. In our study we employ the Z''-score (Altman, 1968) and ZM-score (Zmijewski, 1984) indexes that have been designed for private companies and that can be easily adapted to the latter (see Section 3.2 for more details).

[11] In this sense, financing through IPO can be considered as a viable alternative to the bank capital.

[12] We collect data starting from 2005 because it has been not possible to obtain from Orbis Bureau Van Dijk (BVD) accounting data relative to European and Asian private firms before. Indeed, one limitation of Orbis BVD is to make available to users only the financial statements for the last 10 years.

because we need information about firms' characteristics at least two years before the IPO year and stops in 2011 as we estimate the impact of IPO over the four post-IPO years. Following previous studies (e.g., Mazzola and Marchisio, 2002; Anderson and Reeb, 2003; Martinez, et al., 2007), we exclude financial firms, such as banks, insurance companies, and pension funds, inasmuch are not directly comparable to industrial and other service firms. This yields an initial sample of 1.820 IPOs. Then, we match IPO firms on Thomson Reuters Eikon database using the ISIN code, to extract accounting data for going public companies. In doing so, we excluded companies for which we do not find accounting information even only for a fiscal year between the pre-IPO year and the four post-IPO years. As this sample selection criterion is very strict, it yields a reduced sample of 730 IPOs. Table 2 presents sample distribution by country and region. European IPO firms account for about 56.8% of the sample, while the other 43.2% of the sample is distributed across all Asean countries.

Second, we obtain European and Asian privately held firms' financial statements information from Orbis Bureau Van Dijk (BVD) database. Specifically, we get a list of non-financial private firms, which are incorporated in Europe or Asia. From this initial list, we exclude firms for which we do not find accounting information even only for a fiscal year between the 2005 and 2015. Thus, we obtain a final list of 295.097 privately held firms[13]. A potential concern regarding the use of this group of firms as a control sample is that the going public decision is not random but influenced by various factors, like firm-specific characteristics. In addition, the stock exchange companies admit firms to the official list just if they meet the stock exchange's listing requirements. As a result, IPO firms can be significantly different from private firms and these divergences, rather than the going public decision, may be responsible for any differences in post-IPO operating performance.

3.1 Matched sample and propensity score approach

As discussed above, in selecting matching firms for IPOs, we are aware that going public is a choice that a firm faces at some point in its life cycle and that this decision is not casual.

[13] We use the year that an IPO firm goes public as the fictitious IPO year for its matched private firm.

To mitigate this endogeneity concern, we apply a matching procedure based on propensity scores developed by Rosenbaum and Rubin (1983). The same approach has been used by other studies, such as Saunders and Steffen (2011), Brav et al. (2018), to deal with the self-selection issue. The main strength of the propensity score is its capability to control for a large set of observable characteristics, but like almost all matching techniques, it does not take into account unobservable factors. Our aim is to identify firms that are observably similar on dimensions likely to affect profitability and risk of financial distress in a way that imposes minimal functional-form assumptions on the data.

In our context, a propensity score is a probability that a firm will go public conditional on a set of independent variables. The matching algorithm starts with the estimation of a logit model for the endogenous choice variable (IPO = 1 for IPO firms, 0, otherwise) with a vector of *X* variables. Then, the predicted probability is used as the propensity score and each IPO firm is matched with the private firm with the closest propensity score. In the probit model, we control for the following variables that may explain whether a firm goes public. First, Chemmanur and Fulghieri (1999) argue that IPOs take place in an environment where insiders have private information about firm value, but outsiders can produce this information by incurring costs. In presence of asymmetric information, smaller and younger firms, and those operating in industries characterized by higher information production costs are more likely to remain private. To take into consideration these predictions, we use the natural logarithm of the total asset (*TA*), the natural logarithm of the firms' age *(Age*), and a set of industry dummies. Second, Pagano et al. (1998) argue that IPOs profitability may affect the likelihood of an IPO, because of the effect of the listing requirements. As such, we use the ratio of EBIT/TA (*Roa2*) as an additional determining factor[14]. Third, consistent with the argument that firms choose to go public in periods of unusually good performance levels (e.g., Jain and Kini, 1994), we consider in our matching model also the growth sales (*Growth*). Finally, to capture the effect that going public decision may also be driven by the presence of private equity investors or venture capitalists (e.g., Lerner, 1994), we use private equity/venture capital dummy variable (*PE/VC*).

[14] According to Pagano et al. (1998), the effect of profitability on the decision to go public is ambitious for two main reasons. First, a more profitable company needs less external equity, suggesting a negative impact of profitability on the probability of an IPO. Second, a company experiencing a temporary surge in profits may list, hoping that investors will mistakenly perceive its high profitability as permanent and will over- value its shares. In this regard, we expect profitability to increase the probability of going public.

Table 3 reports the maximum likelihood estimates of this probit model, as well as their standard errors. Not surprisingly, firms' size is an important determinant of an IPO. A one standard deviation increase in the logarithm of sales increases the probability of an IPO by one-third of a percentage point.

The presence of PE/VC in the firms increase the probability of listing, as expected. In this regard, for PE-investors perspective, an IPO may represent an important "exit strategy" to maximize their wealth.

Growth of Sales also increase the probability of going public decision and this is consistent with Jain and Kini (1994) firms go public in periods of unusually good performance levels.

Both are significant at 1% level. The firm's age has a negative impact on the decision to go public, and is statistically significant at the 1% percent level. Even profitability has a positive impact on the probability of going public, significant at the 10 percent level. This is consistent with the probit model by Pagano et al. (1998).

The core part of our analysis is the development of a matching estimator based on individual pre-treatment firm's characteristics by using a propensity score methodology. Rosenbaum and Rubin (1983) show that treated and untreated subjects with the same propensity scores should have identical distributions for all baseline variables to avoid biasing the estimated treatment effects. So, we first check whether the balancing property is satisfied for our matched sample of treated and control firms. The comparison group is matched on a set of covariates based on variables that influence the decision to go public from the probit model *TA, Age, Roa2, Growth, Industry, PE/VC*. For these matches, I match each treatment firm in year t (IPOs'year) to a control firm, matching on region[15]. Fig.1 shows a successful matching procedure. Fig. 1 Panel B suggests that the balancing property condition is fulfilled, i.e., the propensity scores for IPO and private firms do not differ significantly. Then, we compare IPO and private firms by plotting density estimates for distributions of the *TA, Age, Roa, Roa2* covariates for the matched sample in Fig. 2. Although the differences between the control sample and the sample exposed to treatment are clearly mitigated, considering so many variables in the propensity score it is inevitable that some tiny differences still exist[16].

[15] We apply one-to-one nearest-neighbor matching with no replacement and a caliper of 0.25.

[16] As robustness, our approach in unreported analysis we use other four matched samples. For the other first sample, we considering the same variables for the matching, but one year before the IPO. For the second sample, we consider Age, Total Assets, the volatility of the stock market index, the growth of sales, industry and country dummy. For the last third and four sample, our baseline match follows Gao et al. (2013) and Asker et al. (2015) in using Total assets and industry. Joh (2003) find that profitability affects in firm size, so it is important to hold size constant in our tests. Matching on size and industry does so by creating a sample of small public and large private firms. In the spirit of Acharya et al. (2017),

3.2 Profitability and risk of financial distress indicators

In order to estimate the impact of going public decision on the profitability and the risk of financial distress of a firm, we employ several accounting-based indicators widely used by previous literature (e.g., Francis et al., 2016; Schepens, 2016; Megginson et. al., 2016).

Our first profitability indicator is the return on assets (*ROA*), which is estimated as the ratio between net income on total assets. Alternatively, we measure the profitability through the ratio of the earnings before interest and taxes on total assets (*ROA2*). The risk of financial distress is measured through the *Z''-score*[17] (Altman, Hartzell and Peck, 1995) that is computed as follows:

a) Altman, Hartzell and Peck (1995) model:

$$Z'' - score = 6.56\left(\frac{WC}{TA}\right) + 3.26\left(\frac{RE}{TA}\right) + 6.72\left(\frac{EBIT}{TA}\right) + 1.05\left(\frac{EQ}{TL}\right)$$

where *WC* = working capital; *TA* = total assets; *RE* = retained earnings; *EBIT* = earnings before interest and taxes; *EQ* = book value of total equity; *TL* = total liabilities. The four indicators used to measure the *Z''-score* denote the degree of liquidity, profitability, operating efficiency, and capital structure equilibrium, respectively. An increase in the *Z''-score* value is associated to a lower risk of financial distress[18].

3.3. Descriptive statistics and univariate tests: IPO firms and matched control firms

Table 4 presents descriptive statistics related to firm-specific variables and firms' performance (risk of financial distress and profitability) variables for going public companies and matched control firms in the pre-IPO year. Furthermore, for each variable of interest, we perform t-tests and z-test on the difference-in-mean and median between the group of IPO firms and the matched control group. It is worthwhile to note that the use of the propensity score approach has significantly mitigated the differences between the two groups of

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we additionally match on firms' age. For the third sample, we matched in the year before the listing. For the fourth sample, we matched in the year of the listing. The results are in unreported regressions are similar.

[17] We use *Z''-score* instead of *Z-score* (Altman, 1968) because as explained by Altman (2005, p.303) *Z''-score "could be applied to non-manufacturing, industrial firms and to private and public entities".*

[18] Altman defines the following zones of discrimination: Z > 2.99 - safe zone, 1.80 < Z < 2.99 - grey zone, Z < 1.80 - distress zone.

firms. In sum, we find that IPO firms in the pre-listing year are in average more mature, bigger (albeit firms'size is almost equal), less leveraged and show a higher growth (139%) compared to control firms.

Furthermore, IPO firms exhibit less risk of financial distress and higher profitability. In terms of *Z"-score,* we find that IPO firms show in average a value of 3.56 compared to a value of 3.43 for matched control firms. According to Altman (1995), IPO and private firms with this score are in the "safe zone" and have a rating of A. In terms of profitability, we find that IPO firms show in average a *ROA* of 6.7% compared to a value of 4.6% for matched control firms, and a *ROA2* of 10.4% compared to a value of 6.7% for matched control firms.

Table 5 shows univariate tests relative to mean (median) values of the indices measuring profitability and financial distress risk from the IPO calendar year to four years later. According to previous studies (e.g., Jain and Kini, 1994; Pagano et al., 1998), we find a significant decline in profitability in the post-IPO years. For example, while IPO firms exhibit a mean ROA of 6,7% in the pre-IPO year, they show an average ROA of 2.6% in the fourth post-IPO year. Interestingly, we find that four years after the listing year, IPO firms have a lower profitability than private matched firms. Indeed, in the same period, the matched control sample shows a ROA of 4%. In the same way to the above-discussed findings, we document that the level of financial soundness of IPO firms after the going public process follows a different trend. More in details, the mean *Z"-score* of IPO firms that is 3.56 in the year before the IPO, experiences a jump in the IPO year (4.20), and then falls from the first post-IPO year (3.45 in the fourth post-IPO year).

Furthermore, we find that four years after the listing year, IPO firms are more financial distressed than similar private firms (3.45 vs 3.87). This is surprising considering that IPOs raise equity capital and so the level of financial soundness increase in the course of an IPO. This is also confirmed by the fact that in the transition from pre-listing year to the IPO's year, we show an increase in the level of financial soundness of the firm (3.56 vs 4.20), clearly attributable to the stock capital increase that typically occurs during an IPO process.

4. Empirical analysis

4.1 Going public and firm's performance: disentangling self-selection and treatment effects

In this section we try to understand if going public companies experience a change in their performances (in terms of profitability and risk of financial distress) over the post-IPO period and, if so, to what extent it is attributable to the transition to public equity markets (*treatment effect*), or to the fact that firms plan their IPOs to coincide with periods of a strong set of results (*self-selection effect*). In addition, we try to disentangle equity issues effects from other (permanent) effects. In this respect, while a new equity issue may have a dilutive effect on firm's profitability indicators (e.g., Mikkelson et al., 1997), especially in the short-term, it certainly determines, *ceteris paribus*, a reduction of its risk of financial distress by significantly increasing the ratio between the equity book value and total assets.

Thus, in order to properly evaluate the relationship between going public and firm performance, we first estimate OLS regressions where a firm's profitability (*ROA* and *ROA2*) and financial distress risk (*Z''-score*) are a function of two dummies – one that equals 1 for IPO firm during the listing year (IPO^{in}) and 0 otherwise, the second one (IPO^{in}) for IPO firm during the listing year, the other one (IPO^{post}) that equals 1 for IPO firms during the four years after the IPO – and various other firm-specific characteristics, macroeconomic variables, and industry and state dummies. In Table 1, we report a detailed description of the variables we use in our analyses while the OLS estimation (Eq. 1) is the following:

$$Perf = \alpha + \zeta_i + \gamma_{in} IPO^{in} + \gamma_{post} IPO^{post} + \beta_1 TA + \beta_2 Age + \sum \beta_i Year + \sum \beta_j State + \sum \beta_k Industry + \varepsilon_{i,t} \quad (1)$$

To test the effect of IPO on firm's performance also a net to equity issues effect, we perform the following Wald test (Eq. 2):

$$\gamma_{in} - \gamma_{post} > 0 \quad (2)$$

.

where, $Perf$ represents firms' performance (profitability and risk of financial distress); ζ_i represents year-fixed effects; *TA* is the natural logarithm of the total asset; *Age* is the natural logarithm of the firms age; *Year* denotes the year of IPO; *State* denotes the head-quarters countries of firms; *Industry* denotes the sector of firms, and ε is the random error term.

Results are reported in Table 6. First, we find that the coefficient of IPO^{in} is positively and significantly related (at the 1% confidence level) to profitability measures and negatively and significant (at the 1% confidence level) related to the risk of financial distress. In terms of economic significance, the regression analysis indicates that, in the IPO year, going public firms exhibit in average a higher profitability (+0.612% in terms of *ROA* and +1.26% in terms of *ROA2*) than those of matching firms. Furthermore, we find that IPO firms also show a higher level of financial soundness (+0.710 units of *Z"-score*). Overall, these results seem to confirm the hypothesis that firms time their IPOs to coincide with years of high financial performance. This condition, in fact, helps going public firms to pass the screening from the stock exchange company and allows them to obtain a high evaluation by the IPO market participants.

Second, we find that the IPO^{post} dummy is negative and significant (at the 1% confidence level) related to both profitability variables. In terms of economic significance, we find that the transition to public markets reduces *ROA* and *ROA2* of 0.964% and 0.569% respectively. While this evidence seems to be consistent with the long-run underperformance hypothesis (Jain and Kini 1994; Pagano, et al., 1998; Chemmanur, et al., 2010), we also observe that going public helps firms to strengthen their financial soundness. Indeed, we find IPO^{post} dummy is positive and significant (*t*=2.52) related to the *Z''-score*. In terms of economic relevance, we observe that the IPO is associated to a positive of *Z''-score* of 0.710 units. Interestingly, the coefficient of the dummy IPO^{post} is lower compared to the coefficient of the dummy IPO^{in} with regards to *Z"-score* suggesting that the impact of IPO net to the equity issue effect may be detrimental not only to firms' profitability but also for their risk of financial distress. However, while the results of Wald tests, which are reported in the last rows of Table 6, confirm that firm profitability declines with the IPO regardless of the equity issues' dilution effects, they reveal just a weak evidence that going public increases the risk of financial distress while controlling for the positive impact related to the equity issue. For example, though the difference between the coefficients of the variable IPO^{post} and the variable IPO^{in} is significant at 1% confidence level for the *Z''-score*.

Figs. 3, 4, 5 provide a graphical description about the different trends of IPO firms in terms of Z''-score, Roa and Roa2[19]. In Fig. 4 and 5 we show that the profitability is higher pre-IPO years and after the event

[19] Specifically we plot by considering the mean of our variables.

we can observe a continuous decline in firms' profitability in each individual year following the going public. Furthermore, after the third year from the event, the profitability of IPOs is lower than matched private firms.

In terms of Z''-score, in Fig. 3 is clear that the trend of IPO is characterized by an increase in the level of financial soundness before the IPO due to the increase of share capital. Overall, this graph shows that during the IPO year firms exhibit an increase in the level of their financial soundness, but from the IPO year onwards, they exhibit a progressive increase in the risk of financial distress. After the second year of going public experience, the risk of financial distress seems higher than the matched private firms. One possible explanation for this negative effect is the fact that post-IPO there is a rebalancing of firms' financial structure begins to progressively increase the leverage. To confirm this hypothesis, we plot the mean of leverage for IPO firms in Fig. 6. The graph clearly demonstrates an increase in term of leverage post-IPO period.

Thus, we can conclude that the going public seems beneficial to a firm's financial soundness when we consider also the effects related to the equity issues, but it appears detrimental if we neutralize this one-time benefit and take in consideration just the other effects.

4.1.1 Robustness

As above discussed, the estimation reported in Table 6 may be biased by unobservable factors that could affect both a firm's performance and its decision to go public. To further ease this concern, we use several identification strategies enabled by our large panel data set of private and public firms.

The first approach adopted is the treatment effect model, which correct for selection bias by using the inverse Mills ratio. Specifically, the treatment effect model includes two equations. In the first step, a probit model (Eq. 3) is estimated to determine the decision to go public (the dummy variable IPO indicating the treatment condition).

$$IPO = \begin{cases} 1 \; if \; IPO^* > 0 \\ 0 \; if \; IPO^* \leq 0 \end{cases} = IPO^* \, \pi + \, \delta Z + \, \upsilon \tag{3}$$

The estimated parameters are used to calculate the inverse Mills' ratio, which is then included as an additional explanatory variable to adjust for the selection bias in the following OLS estimation (Eq. 4):

$$Perf = \alpha + \beta_1 IPO + \beta_2 TA + \beta_3 Age + \sum \beta_i Year + \sum \beta_j State + \sum \beta_k Industry + \beta_4 Mills + \varepsilon_{i,t} \quad (4)$$

The first-step estimation is reported in Table 3. The second step-estimation results which are reported in Table 7. The fact that the Inverse Mills ratio's coefficient is statistically significant in all regressions, provides evidence of sample selection bias in the one-stage estimates of IPO firm effects. In particular, the negative coefficient on the inverse Mills ratio indicates that the covariance between the error terms in the selection and outcome equations is negative. This negative sign implies that the unobserved factors that encourage the firm's decision to go public on the stock exchange are negatively correlated with profitability and risk of financial distress. Interestingly, the coefficients of the IPO^{post} dummy still remain negative and significant to the *ROA* and *ROA2*, whilst change in terms of risk of financial distress compared to the previous regression because the coefficient is negative and significant related to the Z''-score. In this regression we document an increase in the risk of the firm and a decline in profitability.

4.2. Quasi-experiments

4.2.1 Identification strategy

Our aim is twofold: to test if IPO firms respond to a change in their risk of financial distress and profitability by disentangling the effect of equity issue, and to test whether, under the same conditions, it is better to go public or remain private. To achieve these aims and to ease the concern about the non-randomness of public and private firms we estimate propensity score matching combined with the difference-in-difference (DID) approach (e.g., Blundell and Dias, 2000; Acharya et al, 2017). Matching and DID are two widespread methods that use pre-treatment outcomes to correct for selection bias (Chabé-Ferret, 2015). Matching compares the outcome of treated units to that of untreated units with the same observed characteristics, pretreatment outcomes possibly among them. DID compares how the outcomes of the treated change before and after the treatment to the change the untreated units experience over the same period of time. In this context, therefore, propensity score matching with DID approach is useful to compare firms transitioning from private to public

with those remain private[20] (Blundell and Dias, 2000). To investigate the dynamics, we require firms to have at least four consecutive years of data. As discussed above (Section 3) we select IPO firms that have data two years before and four years after the IPO. This analysis is used to estimate the treatment effect, by comparing the changes in the risk of financial distress and profitability of the IPO firms (before and after the implementation of the treatment) with those of the matched private firms.

Identification of DID design relies on the parallel trend assumption for control and the treatment group [21]. As shown above, the pre-IPO trend follows a particular trend in terms of Z''-score due to the fact that they raise equity during the IPO process. Thus, to find an appropriate counterfactual, we need to select private firms that have the same increase in the level of financial soundness in the fictitious pre-IPO year. In order to assess the validity of the parallel trend assumption underlying the DID design, we consider another control group of private firms, by using a different matching criteria. Specifically, our baseline match follows Gao et al. (2013) and Asker et al. (2015) in using size and industry[22]. Matching only for size and industry does so by creating a sample of small public and large private firms. In the spirit of Acharya et al. (2017), we additionally match on firms' age. Finally, we consider the natural logarithm and the growth of leverage to capture private firms that have the same trend in the level of indebtedness[23]. Fig.7 shows the distribution of propensity score by suggesting that the balancing property condition is fulfilled[24]. As before, we plot the density estimates for distributions of the *TA, Age, Roa, Roa2* covariates for IPO and matched private firms in year t (IPOs'year). We also plot for the distribution of leverage covariates as it is included in the matching technique. We now implement DID approach based on trend assumption.

To check this assumption, we first test whether pre-treatment effect dynamics are equivalent for two years pre-treatment period. In particular, we follow a test proposed by Mora and Reggio (2015, 2017) to test analytically the parallel trends assumption. In this test, the null hypothesis is that both treatment and comparison groups

[20] The criteria used is the same as that described above (Section 3). We consider the year that an IPO firm goes public as the fictitious IPO year for its matched private firm.
[21] This assumption is that the time trend is the same in both the control and the treatment group in the pre-event period.
[22]The matching technique is the same as before. We match each treatment firm in year t (IPOs'year) to a control firm. In this way, we are able to isolate the effect of equity capital increase. We also apply one-to-one nearest-neighbor matching with no replacement and a caliper of 0.25 as previously done.
[23] As shown in Fig. 6, in the pre-listing period, IPO firms are characterized by a significant reduction in the level of leverage.
[24] The number of observations is reduced to 724 IPO and 724 matched private firms. This is because, in the propensity score procedure, similar private firms are not found for some IPO firms.

have common pre-treatment dynamics. As shown in the table 8, the common trends assumption was met for all outcomes. In addition, we also provide a graphical snapshot of the trend of risk of financial distress and profitability compared treatment (firms that go public) and matched control groups (firms that remain private). Figs. 9, 10, 11 depict the trend for treatment and control group in terms of Z''-score, Roa and Roa2 respectively. Fig. 9 shows the same increase in the level of financial soundness for IPO and matched private firms in the pre-event period[25]. In addition, this graph display that after the injection of share capital the level of financial soundness of the matched private firms remains constant unlike the IPO firms that show a fall. Interestingly, the levels of Z''-score coefficient in the IPO's year (t=2) for IPO and matched private firms are almost equal (although not necessary condition for DID analysis). Figs. 10, 11 show that prior to the event, companies that transition from private to public have a better profitability than similar firms that remain private. After the event, there is a drop in profitability for IPO firms that becomes less than similar private firms. Even in fig. 10, the levels of Roa coefficient in the IPO's year (t=2) for IPO and matched private firms are very similar. Confirming the above observation, Tables 9 and 10 present descriptive statistics in the pre-IPO year (Tab. 9), IPO's year and four years after the listing year (Tab. 10).

Then, we turn to test the pattern described above more formally in a DID specification. After achieving the closely matched treatment and control groups, we apply the DID approach to difference out the cross-sectional heterogeneity or common time trend that affects both groups of firms. In particular, the DID specification that is estimated in Table 11, is:

$$Perf = \alpha + \beta_1 Time + \beta_2 IPO + \beta_3 DID + \beta_4 TA + \beta_5 Age + \sum \beta_i Year + \sum \beta_j State + \sum \beta_k Industry + \varepsilon_{i,t} \quad (5)$$

where *Time* is an indicator variable that takes a value one for all the years after the event date and zero otherwise and *IPO* is an indicator variable that takes a value one for firms in the treatment group and zero for targets in the control group. We compute the *DID* estimator as the difference of changes in the profitability and risk of financial distress of the treatment and control groups around the IPO.

[25] The matching criterion that we used allowed us to find private companies that in the fictitious pre-IPO year had an increase in the level of financial strength. These are probably firms involved in share capital increase operations.

As shown in Table 11, the coefficient DID is negative in all specifications and confirms that the treated group suffers a drop for the profitability (e.g., *ROA* decreases by about 1,7%) and undergo an increase in the risk of financial distress (e.g., *Z''-score* decreases by about 0.36 unit) compared to the pre-treatment period.

5. IPO Firms VS Historical Listed Firms

In this section, we provide a comparison between IPO firms and historical listed firms for a market risk evaluation after the IPO. Many previous studies that analyzed the dynamics of IPO stock are focused on the short-run market performance - i.e. the underpricing (e.g. Rajan and Searvaes, 1997; Habib and Ljungqvist, 2001) – very few researches have analysed the risk associated to the IPO stocks in the long-run. A notable exeption is Ritter (1991), that examined the long-run performance of U.S. IPO stocks[26]. Furthermore, these few papers may suffer from generalization problems because provide estimates based on single IPO market. Using a unique sample of data from Compustat, in this article, we analyze, for the first time in the literature, the risk associated to the IPO stocks comparing with stocks of listed firms that went public at least 10 years before our IPO sample (10-Y listed firms)[27]. Specifically, we select listed firms that are part of the same countries, the same industry and that have the same range of total assets and market capitalization. As a robustness of previous findings, we also analyse the dynamics of IPO firms' financial distress risk and profitability in pre- post IPO period compared with this group of listed firms.

Table 12 compares the profitability and financial distress risk of IPO firms and listed firms in the pre-listing year, IPO's year and four years after the listing year. We find a continue fall in profitability for IPO firms compared to pre-IPO year to four years after (-57% in terms of ROA and -47% in terms of ROA2). In terms of risk financial distress we also document a continue drop in the level of financial soundness of the firm after the listing year (-3% in transiction from pre-listing year to four years after and -19% in transiction from IPO's year to four years after). In addition, we find a linear trend for listed firms in terms of profitability and an increase in the level of financial soundness. Specifically, we find an higher ROA and lower Z''-score for 10-Y listed firms than for IPOs in the fourth year after the event.

[26] He found that in the long-run period, IPOs stocks are overprice.

[27] Ritter and Welch (2002), as non-IPO firms consider listed firms that went public at least 5 years before their IPO sample. We believe that considering at least 10 years before allows us to find established companies on the markets.

Now, we evaluate the relationship between going public and firms' risk of financial distress and profitability using the control sample of 10-Y listed companies. To try to disentangle equity issues effects from other (permanent) effects we compute the OLS regression as follow:

$$Perf = \alpha + \zeta_i + \gamma_{pre} IPO^{in} + \gamma_{post} IPO^{post} + \beta_1 TA + \beta_2 Age + \sum \beta_i Year + \sum \beta_j State + \sum \beta_k Industry + \varepsilon_{i,t} \quad (6)$$

where IPO^{in} is equals to 1 for IPO firms during the IPO's year and 0 otherwise, and IPO^{post} is equals to 1 for IPO firms during the four years after the IPO.

Furthermore, in order to properly evaluate the effect of IPO on firm's performance also a net to equity issues effect, we perform the following Wald test (Eq. 7):

$$\gamma_{in} - \gamma_{post} > 0 \quad (7)$$

The results are reported in Table 13. We find that the coefficients of IPO^{in} and IPO^{post} are positively and significantly related to profitability measures and negatively and significant (at the 1% confidence level) related to the risk of financial distress. Interestingly, the coefficient of the dummy IPO^{post} is lower compared to the coefficient of the dummy IPO^{in} with regards to *Z"-score* confirming that the impact of IPO net to the equity issue effect is detrimental not only to firms' profitability but also for their risk of financial distress. Furthermore, the Wald tests show that, in the transition to the IPO's year to the four years after the listing year this increase in the risk of financial distress and this decline in profitability is highly significant. Indeed, the difference between the coefficient of the dummy the dummy IPO^{in} and that of the dummy IPO^{post} is significant at 1% level of confidence. Thus, we can conclude that net the effects related to the equity, the post-IPO decline in firms' risk of financial distress and profitability is a phenomenon that is detrimental in the long-term.

5.1.1. Analysis of the long-run risk return characteristics of IPO stocks.

As pointed out in the introduction, we now examine the return of IPO stocks compared to their risk. On this basis, we collect data about stock prices for IPO firms and historical listed firms from Compustat to calculate standard deviation and returns. This approach is adopted here in order to verify if IPO firms can be considered risky also on financial markets. Fig. 12 illustrates the distribution of the natural logarithm of the mean of returns for IPO firms and 10-Y listed firms in four years after the IPO. Despite the two distributions almost perfectly overlap, 10-Y listed firms present higher returns.

Moreover, when we investigate the dynamics of return and risk in Fig. 14 and 15 respectively, we confirm the same trend in four years after the event and the fact that returns are less in each individual year following the listing year and the volatility of stock prices are higher.

To evaluate the long-run risk of IPOs, we propose a performance measure that consist in the annual Sharpe ratio[28]. In Figs. 16 and 17, we have plotted the ratio of risk and returns for IPO and 10-Y listed stocks, respectively. We find a low risk/return ratio for the IPO firms in the four years after the IPO compared with 10-Y listed firms, implying either that for an investor to hold in portfolio shares of companies that have been listed for few years is risky. This is also confirmed in Fig. 18 when we explore the dynamics of Sharpe Ratio in the short-run (2 years after the IPO event) and in the long-run (4 years after the IPO event) compared IPO and 10-Y listed firms. Indeed, we show that in average Sharpe Ratio is less for IPOs firms in each individual year after the listing year. Now, to shed new light on the relationship between going public and firm post-IPO risk we estimate OLS regression as follow:

$$Sharpe\ Ratio = \alpha + \zeta_i + IPO^{post} + \beta_1 TA + \beta_2 Age + \sum \beta_i Year + \sum \beta_j State + \sum \beta_k Industry + \varepsilon_{i,t} \quad (8)$$

Results are reported in Table 14. We find that the coefficient of IPO^{post} is negative and significant related (at the 1% confidence level) to $Sharpe\ Ratio$. Specifically, for the entire post-IPO period, the Sharpe Ratio coefficient is -0.0599, and this mean that firm that transition from private to public have worst risk adjusted performance. Again, our results strongly support the idea that there is a negative impact of the IPO on the risk

[28] We use the standard formula to calculate the Sharpe Ratio as follow: $\frac{r_p - r_f}{\sigma_p}$, where r_p is the annual return of firms; r_f is the risk-free rate (Euribor 12 months for European firms and Japanese Libor 12 months for Asean firms); σ_p is standard deviation of stock prices of firms.

of the firm. It seems, therefore, that the increase in risk over longer time periods for IPO firms is attributable to the going public transition and not the status of "public company".

5. Conclusion

In this study, we used a unique and representative sample of European and Asian firms to examine three related questions regarding the going-public decisions of private firms. In the first part of the paper, we investigated an important studied aspect of IPOs - i.e. the impact on firm profitability- and an important yet understudied aspect, namely, the impact on firm risk of financial distress by disentangling equity issues (one-time) effects from other (permanent) effects. In the second part of the paper, we investigated the relationship between going public and firms' performance (profitability and risk of financial distress) by addressing selection bias related to the choice of going public through treatment effect model and by gauging the treatment effect through the DID approach. In the third part of the paper, we examined explores the long-run risk return characteristics of IPO stocks by considering the market variables (i.e., Sharpe Ratio). Our results were as follows. First, after disentangling equity issues effects from other effects, we find that there is a continuous decline in firms' profitability in each individual year following the IPO year, while there is an increase in the risk of financial distress from the IPO year onwards. Second, we find that IPO firms are riskier and less profitable than "twin" private firms. This finding is resilient to different techniques used to evaluate the impact of IPOs net to self-selection effect and the level of profitability and financial distress risk recorded by the firm at the IPO time. Third, we document a negative market performance for IPO firms in post-event period. Thus, by arguing an increase in the risk in terms of market performance after the IPO, we can conclude that the going public transition is detrimental in the short-medium term and not the status of "public company".

We are confident that the findings of this paper are of special interest for many subjects, first of all firms' stakeholders. Indeed, it is unquestionable that the attraction of going public for a firm's CEO and its main shareholders can be very strong. The IPO represents a unique opportunity they have to gain great visibility and reputation, capitalize on the hard work done for their firm, and raise a large amount of cash for business investments. However, the results of our studies suggest that the lure of going public can be like the siren song. Accordingly, while several among very successful companies in Europe and Asia, like the Italian

Yoox, probably would not be what they actually are if they had not joined public market, many other firms have experienced the potential shortcomings of an IPO.

We believe that also regulators and policymakers that in many areas of the world, like in the European Union, are concerned to adopt more proportionate rules to support SME listing (e.g., European Commission, 2018), should pay close attention to our results to better direct their regulatory action.

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Table 1. Description of variables.

Variables	Symbol	Description
Dependent variables		
Financial distress indicator 1	*Z″-score*	Altman et al. model (1995) to predict financial distress. A higher Z″-score value indicates a lower financial distress risk.
Operating performance 1	*ROA*	The net income divided by total assets.
Operating performance 2	*ROA2*	The EBIT divided by total assets.
Independent variables		
IPO	*IPO*	Dummy variable which is set to 1 if the firm has launched an IPO and 0 otherwise.
IPO-pre	IPO^{pre}	Dummy variable which is set to 1 for one year pre IPO year and 0 otherwise.
IPO-in	IPO^{in}	Dummy variable which is set to 1 for IPO's year and 0 otherwise.
IPO-post	IPO^{post}	Dummy variable which is set to 1 for four years post IPO year and 0 otherwise.
IPO-post1	IPO^{post1}	Dummy variable which is set to 1 for the first year after the IPO and 0 otherwise.
IPO-post2	IPO^{post2}	Dummy variable which is set to 1 for the second year after the IPO and 0 otherwise.
IPO-post3	IPO^{post3}	Dummy variable which is set to 1 for the third year after the IPO and 0 otherwise.
IPO-post4	IPO^{post4}	Dummy variable which is set to 1 for the fourth year after the IPO and 0 otherwise.
Region	*dummy_region*	Dummy variable which is set to 1 if the region is Europe and 0 if the region is Asia.
Size	*TA*	Natural logarithm of the total asset.
Age	*Age*	Natural logarithm of the firm's age.

Industry	*Industry*	Dummy variables each equal to 1 if the firm operates in the corresponding sector and zero otherwise.
Leverage	*debt_ratio*	Total liabilities divided by total assets.
Sales Growth	*Growth*	The firm's sales growth rate over the previous one year.
Volatility of market index	*Volatility*	The standard deviation of return of domestic market index.
Private Equity	*PE/VC*	PE/VC is a dummy variable which is set at 1 when there is a presence of private equity/venture capital investors and 0 otherwise

Source: Zephyr Bureau Van Dijk, Orbis Bureau Van Dijk, Thomson Reuters Eikon, Compustat and Investing.

Table 2. Sample composition for IPO firms and the control group.

	IPO firms	
	Number	%
Europe		
Austria	2	0.27
Belgium	5	0.68
Bosnia	2	0.27
Bulgaria	7	0.96
Cyprus	5	0.68
Croatia	5	0.68
Denmark	7	0.96
Finland	3	0.41
France	46	6.30
Germany	65	8.90
Greece	7	0.96
Iceland	3	0.41
Ireland	4	0.55
Italy	24	3.29
Lithuania	2	0.27
Luxembourg	5	0.68
Netherlands	7	0.96
Norway	8	1.10
Polonia	46	6.30
Portugal	3	0.41
Romania	3	0.41
Russia	53	7.26
Serbia	5	0.68
Slovenia	1	0.14
Spain	11	1.51

Sweden	39	5.34
Switzerland	20	2.74
United Kingdom	27	3.70
Asia		
Indonesia	33	4.52
Malaysia	39	5.34
Philippines	12	1.64
Singapore	20	2.74
Thailand	14	1.92
Vietnam	197	26.99
Total	730	

Table 3: Probit Model

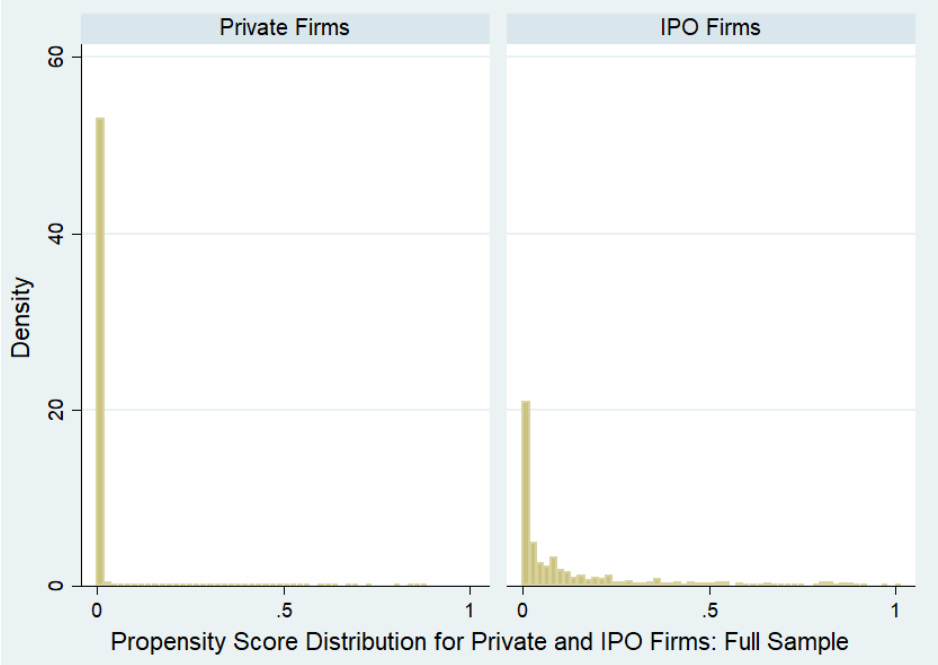
	(1) IPO
IPO	
TA	0.232***
	(38.25)
Age	-0.237***
	(-17.43)
Roa2	0.166***
	(2.65)
PE/VC	1.018***
	(7.48)
Volatility	0.000000420
	(0.08)
Industry	-0.00537***

	(-9.01)
_cons	-4.138***
	(-61.27)
N	295429

Notes: This table presents the probability to go public by estimating a probit model. The estimation method is maximum likelihood. The dependent variable is a dummy variable which is set to 1 if firms have launched in the year an IPO and 0 if firm remaining private. *TA* is the natural logarithm of the total asset. *Age* is the natural logarithm of the firm's age. *Roa2* is the EBIT divided by total assets. *PE/VC* is a dummy variable which is set at 1 when there is a presence of private equity/venture capital investors and 0 otherwise. *Volatility* is the standard deviation of return of domestic market index. *Industry* is the Nace code provides by Bureau Van Dijk.

Fig. 1

Panel A: Propensity score distribution of Private and IPO Firms: Full Sample



Panel B: Propensity score distribution of Private and IPO Firms: Matched Sample

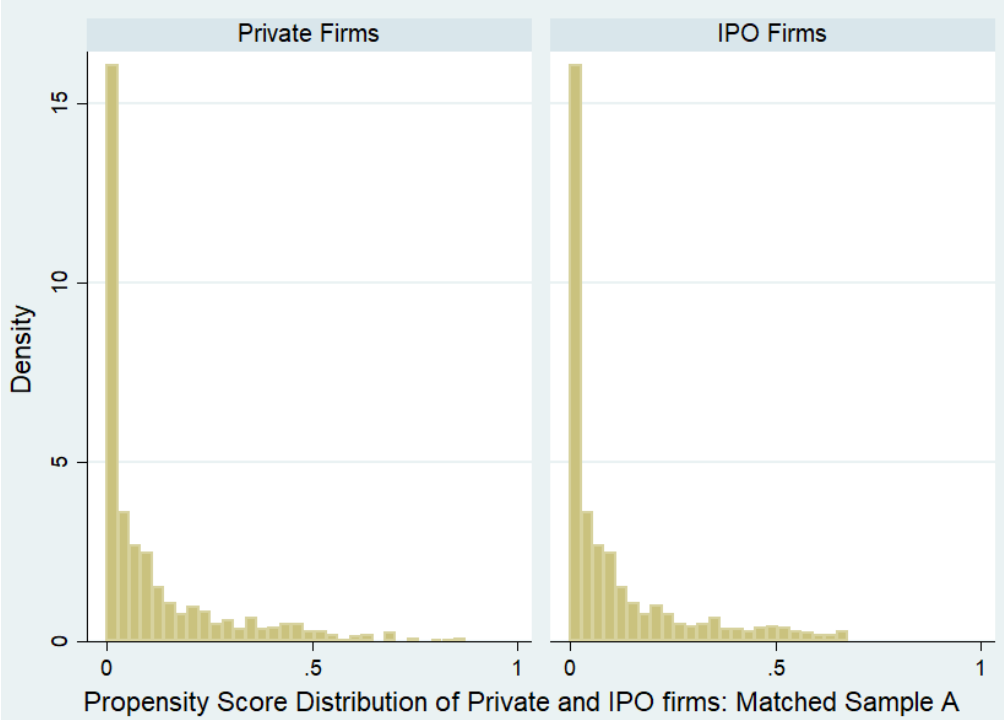
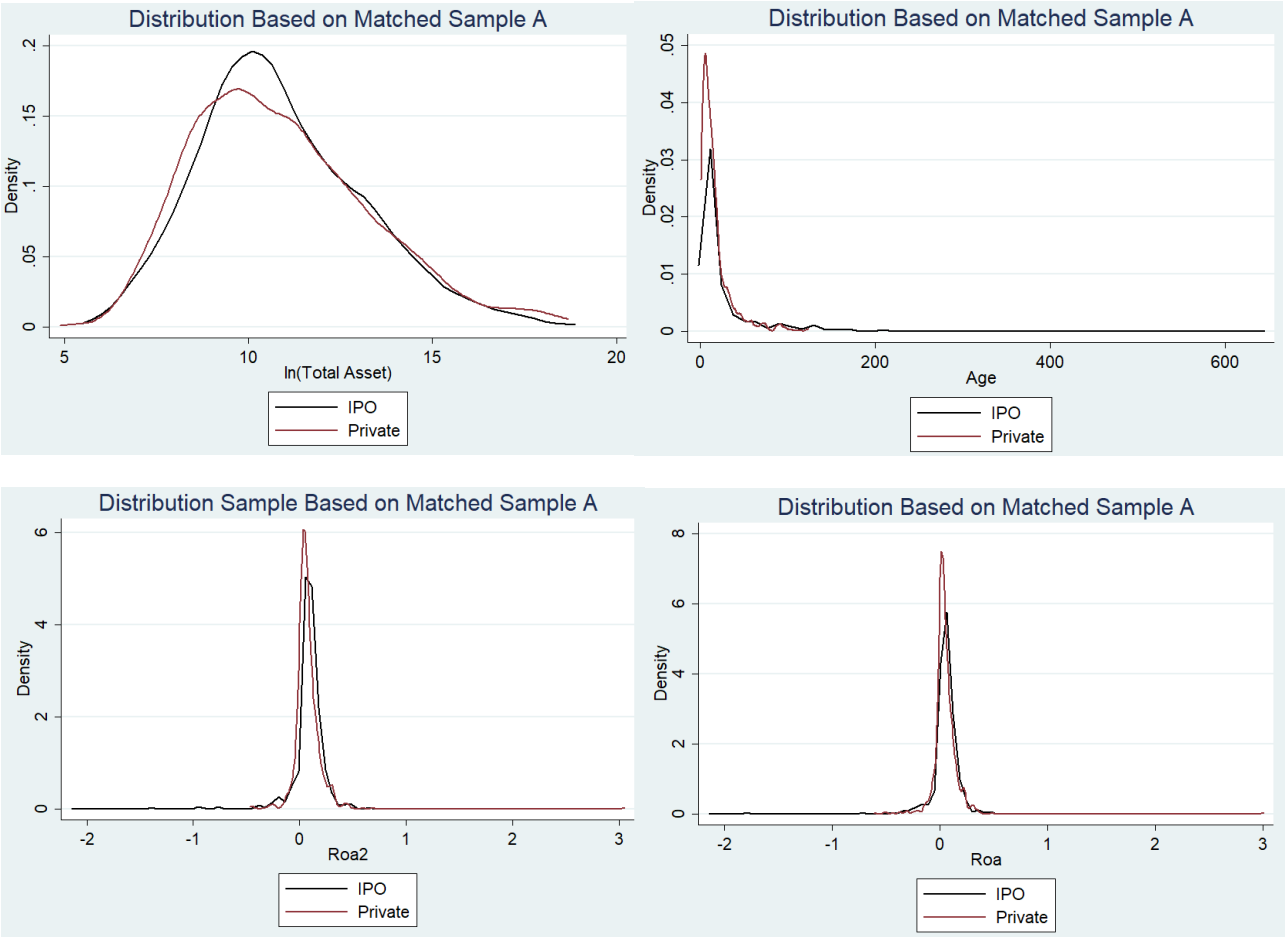


Fig. 2



Notes: These figures present the size, age and profitability distributions in the IPO's year of the matched public and private firms in the sample after propensity score matching.

Table 4 – Descriptive statistics and univariate test (year pre-IPO).

	Listed firms			Unlisted firms			Difference tests	
	N	Mean	Median	N	Mean	Median	T-stat (p-value)	Z-stat (p-value)
Panel A: firm characteristic								
TA (ln)	730	10.62	10.25	730	10.81	10.54	0.1283	0.0003
Age	730	22.79	9	730	16.00	10	0.0001	0.0000
Growth (%)	730	1.40	0.17	730	0.52	0.09	0.2214	0.0000
Leverage (%)	730	57.87	59.10	730	65.30	66.61	0.0000	0.1554
Panel B: firm performance								
Z"-score	730	3.56	2.92	730	3.43	2.82	0.4420	0.0143
ROA (%)	730	6.68	6.16	730	4.55	3.48	0.0000	0.6847
ROA2 (%)	730	10.41	9.89	730	6.72	5.33	0.0000	0.4802

Notes: This table shows the summary characteristics of listed and unlisted firms in the year pre-IPO for matched sample A. Panel A provides means and medians of various characteristics of public companies and private firms, along with associated t-statistics and z-statistics. Panel B provide means and medians of operating performance indicators (risk of financial distress and profitability) for public companies and private firms. Means and medians are measured considering both the full sample period (2007–2011).

Table 5 – Descriptive statistics and univariate test (years after IPO).

	Values				
Year (IPO year=1)	t=1	t=2	t=3	t=4	t=5
Roa (lower values indicate low profitability)	Mean (Median)	Mean (Median)	Mean (Median)	Mean (Median)	Mean (Median)
(1) IPO firms	0.059 (0.055)	0.045 (0.044)	0.038 (0.037)	0.035 (0.035)	0.026 (0.030)
(2) Control groups	0.046 (0.039)	0.044 (0.035)	0.045 (0.038)	0.044 (0.040)	0.040 (0.034)
	Wilcoxon test	Wilcoxon test	Wilcoxon test	Wilcoxon test	Wilcoxon test
(1) vs. (2)	-4.924***	-1.638	0.776	1.333	2.354**
	T-stat	T-stat	T-stat	T-stat	T-stat
(1) vs. (2)	-3.1893***	-0.2645	1.6783*	2.3311**	3.2107***
No. Observations (1)	730	730	730	730	730
No. Observations (2)	730	730	730	730	730
Roa2 (lower values indicate low profitability)	Mean (Median)	Mean (Median)	Mean (Median)	Mean (Median)	Mean (Median)
(1) IPO firms	0.093 (0.089)	0.077 (0.078)	0.068 (0.069)	0.065 (0.068)	0.056 (0.060)
(2) Control groups	0.070 (0.057)	0.070 (0.056)	0.068 (0.059)	0.067 (0.061)	0.066 (0.057)
	Wilcoxon test	Wilcoxon test	Wilcoxon test	Wilcoxon test	Wilcoxon test
(1) vs. (2)	-6.849***	-3.443***	-1.556	-0.949	0.573
	T-stat	T-stat	T-stat	T-stat	T-stat
(1) vs. (2)	-4.9321***	-1.5346	0.0572	0.5590	2.0828**
No. Observations (1)	730	730	730	730	730
No. Observations (2)	730	730	730	730	730
Z''-score (lower values indicate a larger distress)	Mean (Median)	Mean (Median)	Mean (Median)	Mean (Median)	Mean (Median)
(1) IPO firms	4.198 (3.476)	3.888 (3.301)	3.734 (3.086)	3.632 (3.056)	3.453 (2.910)
(2) Control groups	3.635 (3.075)	3.660 (3.177)	3.716 (2.878)	3.822 (3.314)	3.868 (3.453)
	Wilcoxon test	Wilcoxon test	Wilcoxon test	Wilcoxon test	Wilcoxon test
(1) vs. (2)	-3.461***	-1.326	0.036	1.211	2.670***
	T-stat	T-stat	T-stat	T-stat	T-stat
(1) vs. (2)	-3.2754***	-1.3507	-0.1062	1.1039	2.3881**
No. Observations (1)	730	730	730	730	730
No. Observations (2)	730	730	730	730	730

	Listed firms			Unlisted firms			Difference tests	
Years (T=3-6)	N	Mean	Median	N	Mean	Median	T-stat (p-value)	Z-stat (p-value)
Firms' performance								
Z"-score	2,920	3.68	3.09	2,920	3.76	3.31	0.2949	0.0006

ROA (%)	2,920	3.62	3.60	2,920	4.35	3.70	0.0004	0.7810
ROA2 (%)	2,920	6.66	6.83	2,920	6.79	5.82	0.5773	0.9607

Notes: This table shows univariate tests relative to mean (median) values and the indices measuring profitability and financial distress risk from the IPO year to four years later of IPO firms and control group for matched sample A. The test for the equality of distributions is Wilcoxon-Mann-Whitney rank sum test between treated and control groups, while test for mean difference is t-stat. Furthermore, we test whether the changes are significantly different from zero (denoted by asterisks) by using a Wilcoxon signed-ranks test for medians and t-stat for mean.
*, ** and *** indicate statistical significance at 10%, 5% and 1% levels, respectively.

Table 6

	(1) Z''-score	(2) Roa	(3) Roa2
IPO^{in}	0.710***	0.00612	0.0126***
	(5.21)	(1.93)	(3.51)
IPO^{post}	0.239*	-0.00960***	-0.00565*
	(2.51)	(-3.95)	(-2.06)
TA	-0.272***	0.000224	0.000249
	(-15.26)	(0.50)	(0.49)
Age	0.240***	0.00533***	0.00472***
	(6.36)	(5.73)	(4.61)
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Country FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
γ_{in}- γ_{post}	11.94***	24.71***	25.90***
	(0.0006)	(0.0000)	(0.0000)
_cons	4.954***	0.0931***	0.148***
	(3.68)	(3.96)	(5.18)
N	9501	9509	9509
R^2	0.150	0.112	0.122
adj. R^2	0.138	0.100	0.110

Notes: Panel regression analysis of firms' performance (profitability and risk of financial distress) of a sample of 730 European and Asian IPOs and 730 private companies is reported considering the casual treatment effect. The dependent variables are Z''-score (column I), Roa (column II), Roa2 (column III). IPO^{in} is a dummy variable that takes value 1 for firms considered in the IPO's year and 0 otherwise. IPO^{post} is a dummy variable that takes value 1 for firms considered in the four years after to the IPO and 0 otherwise. The control variables are: Age, natural logarithm of the firm age. TA, natural logarithm of the total asset. Firm, State, Industry and Year fixed effect are included in the estimates. γ_{in}- γ_{post} refers to the Wald test.
*, ** and *** indicate statistical significance at 10%, 5% and 1% levels, respectively

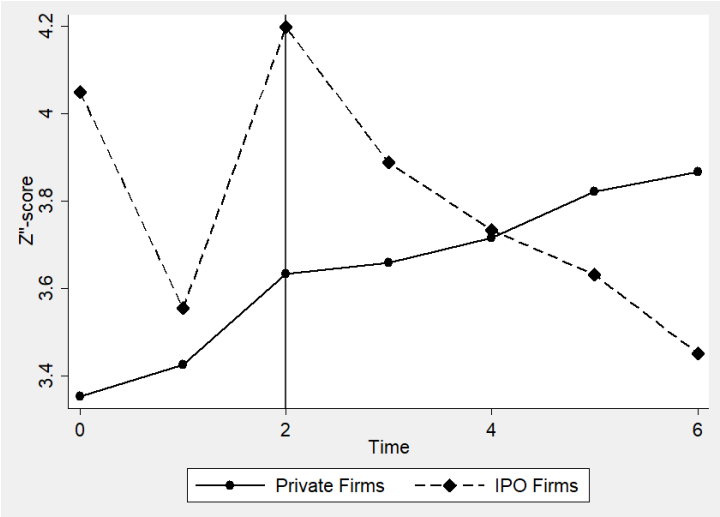
Table 7

	(1) Z''-score	(2) Roa	(3) Roa2
IPO^{post}	-1.278***	-0.116***	-0.139***
	(-5.04)	(-11.07)	(-10.74)
TA	-5.235***	-0.208***	-0.259***
	(-36.30)	(-30.62)	(-30.80)
Age	6.011***	0.207***	0.254***
	(40.35)	(29.46)	(29.30)
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Country FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Mills	-22.53***	-0.957***	-1.192***
	(-33.61)	(-30.27)	(-30.51)
_cons	112.5	4.786***	5.996***
	(0.26)	(32.32)	(32.75)
N	1178398	1181972	1181972
adj. R^2	0.158	0.270	0.299

Notes: This table reports results second-step estimation results of the treatment effect model for European and Asian IPOs. In this step we estimate inverse Mills ratio (Mills) to adjust for selection bias. The dependent variable is the measures of firms' performance: the return on asset (Roa), the ebit divided by total asset (Roa2), the Z″-score model by Altman et al. (1995) to predict financial distress (Z''-score). IPO^{post} is a dummy variable that takes value 1 for firms considered in the four years after to the IPO and 0 otherwise. The control variables include firm's logarithm of age (Age) and firm's logarithm of size (TA). Firm, State, Industry and Year fixed effect are included in the estimates. The coefficients on the control variables are reported. N is the number of observations.

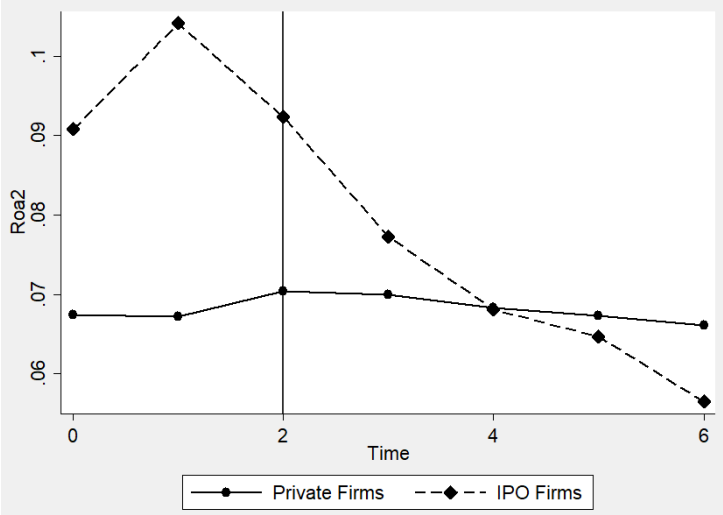
*, ** and *** indicate statistical significance at 10%, 5% and 1% levels, respectively.

Fig. 3



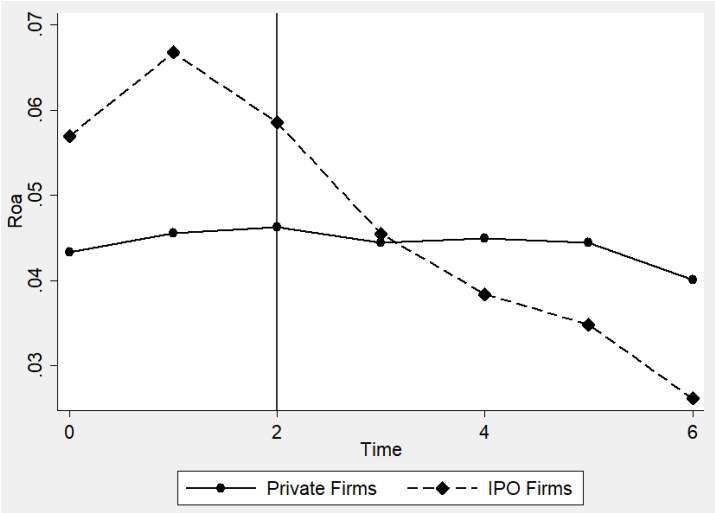
Notes: This figure presents the mean of risk of financial distress measure (Z''-score) in two years before the event, in the year of the event (Time=2) and four years after the event for matched public and private firms in the Sample A.

Fig. 4



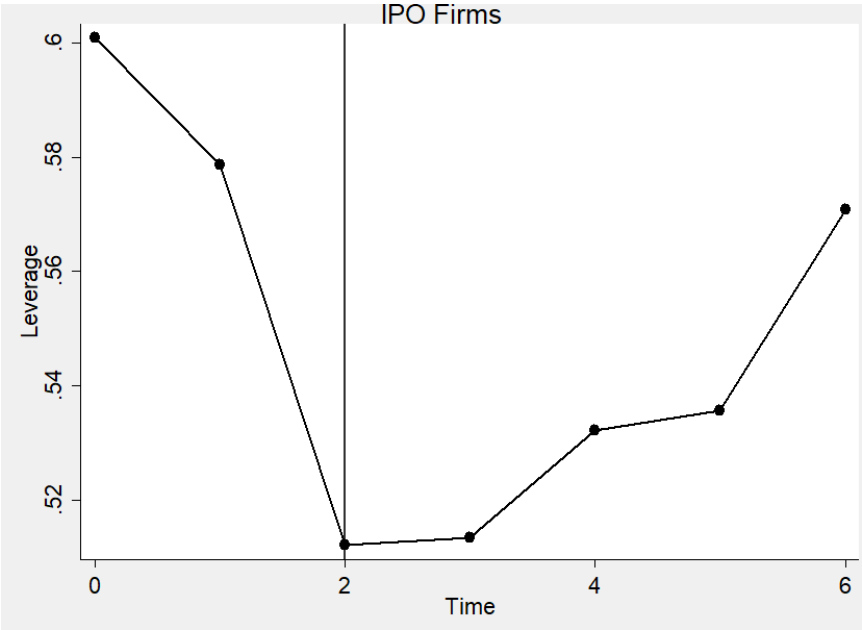
Notes: This figure presents the mean of profitability measure (Roa2) in two years before the event, in the year of the event (Time=2) and four years after the event for matched public and private firms in the Sample A.

Fig. 5



Notes: This figure presents the mean of profitability measure (Roa) in two years before the event, in the year of the event (Time=2) and four years after the event for matched public and private firms in the Sample A.

Fig. 6



Notes: This figure presents the mean of leverage in two years before the event, in the year of the event (Time=2) and four years after the event for IPO firms in the Sample A.

Fig. 7

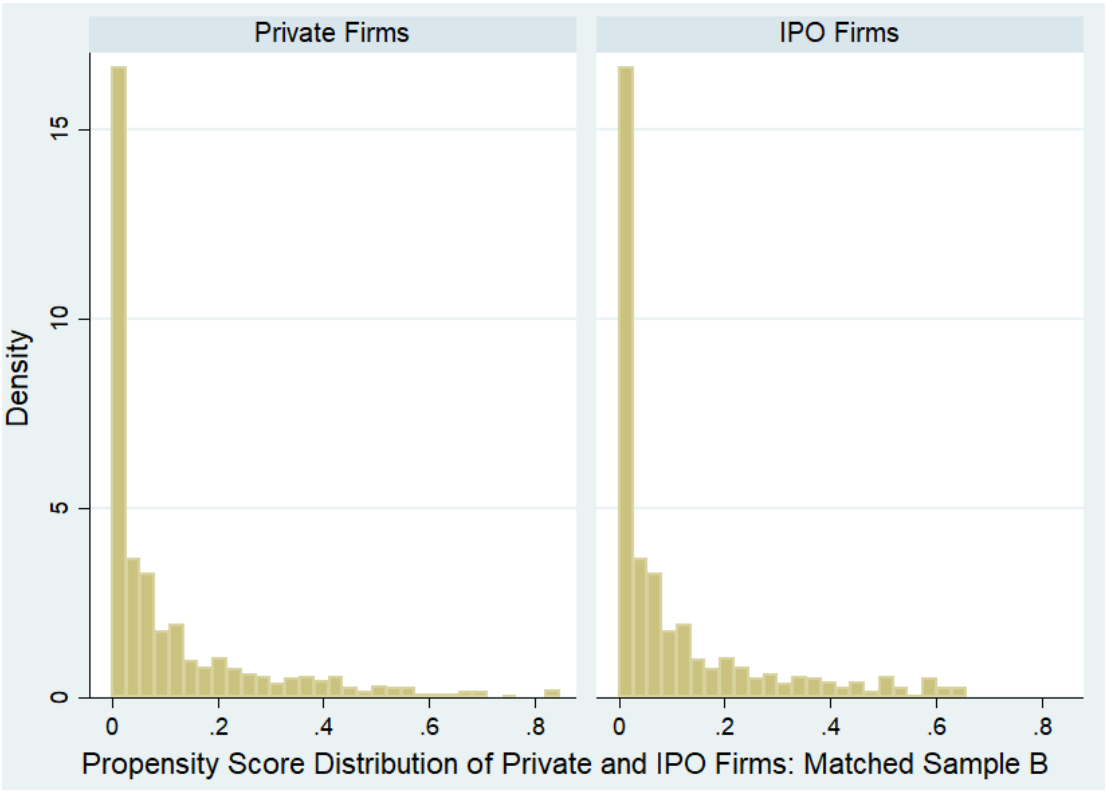
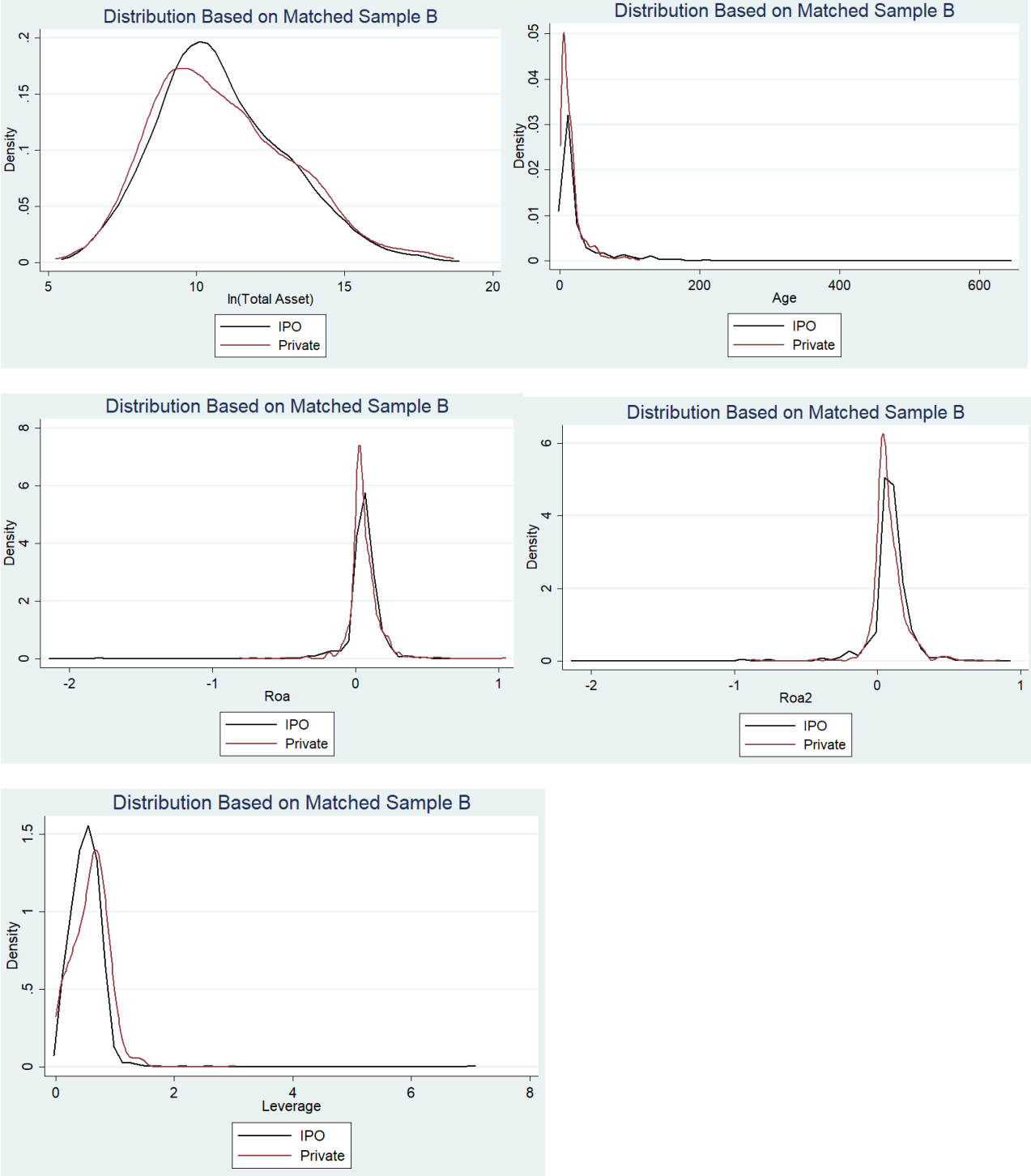
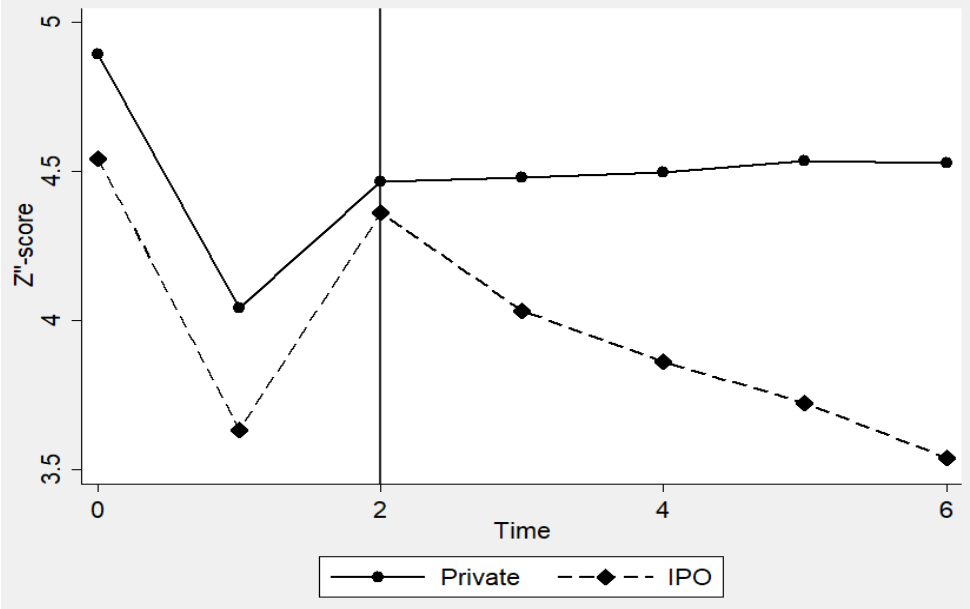

Private Firms
IPO Firms
Density
0
5
10
15
0
.2
.4
.6
.8
Propensity Score Distribution of Private and IPO Firms: Matched Sample B

Fig. 8



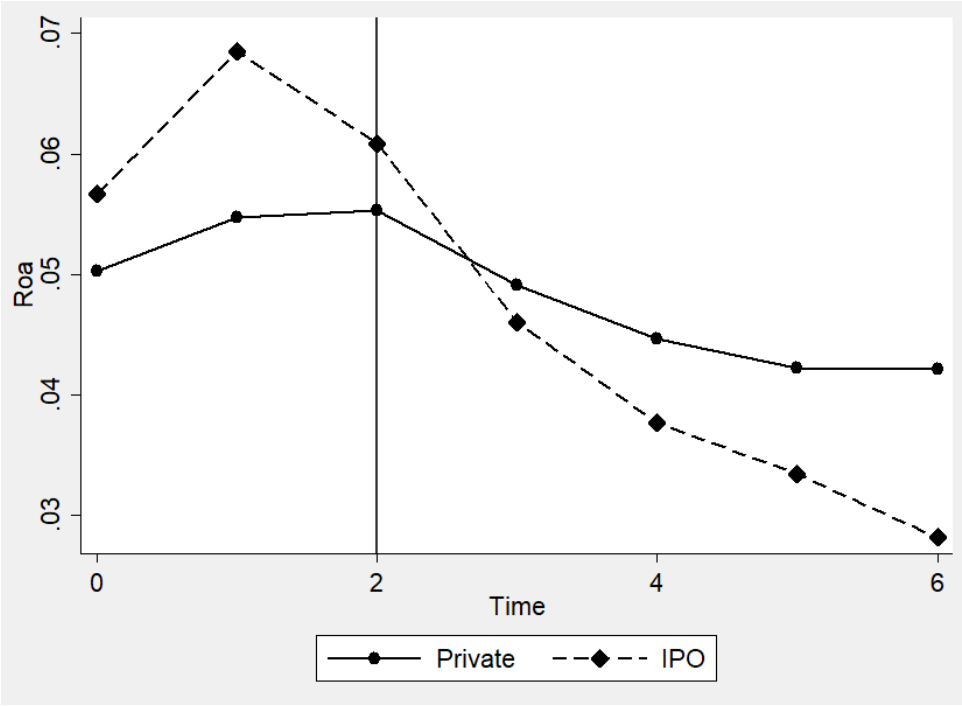
Notes: These figures present the size, age, profitability and leverage distributions in the IPO's year of the matched public and private firms in the sample after propensity score matching

Fig. 9



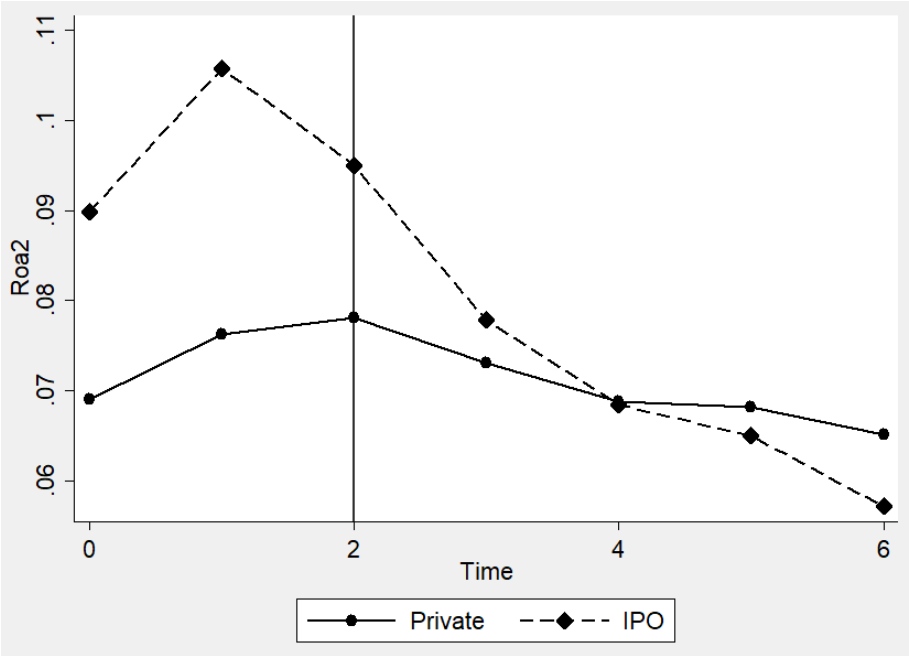
Notes: This figure presents the mean of risk of financial distress measure (Z''-score) in two years before the event, in the year of the event (Time=2) and four years after the event for matched public and private firms in the Sample B.

Fig. 10



Notes: This figure presents the mean of profitability measure (Roa2) in two years before the event, in the year of the event (Time=2) and four years after the event for matched public and private firms in the Sample B.

Fig. 11



Notes: This figure presents the mean of profitability measure (Roa2) in two years before the event, in the year of the event (Time=2) and four years after the event for matched public and private firms in the Sample B.

Table 8

	Z''-score		Roa		Roa2	
	F	p-value	F	p-value	F	p-value
Test for pre-treatment trends						
H0: Common Trends	1.272	0.2595	0.02805	0.867	0.2077	0.6486

Notes: This table reports the test of common trends in order to test the parallel trend assumptions in pre-treatment period.

Table 9

	Listed firms			Unlisted firms			Difference tests	
	N	Mean	Median	N	Mean	Median	T-stat (p-value)	Z-stat (p-value)
Panel A: firm characteristic								
TA (ln)	724	10.58	10.25	724	10.80	10.56	0.0830	0.0001
Age	724	23.06	9	724	15.63	10	0.0000	0.0000
Growth (%)	724	33.52	0.17	724	0.26	0.07	0.1818	0.0000
Leverage (%)	724	57.98	59.18	724	61.16	62.43	0.0630	0.5454
Panel B: firm performance								
Z''-score	724	3.63	2.90	724	4.04	3.40	0.0094	0.0000
ROA (%)	724	6.85	6.29	724	5.48	4.21	0.0010	0.7927
ROA2 (%)	724	10.58	9.92	724	7.63	5.68	0.0000	0.5750

Notes: This table shows the summary characteristics of listed and unlisted firms in the year pre-IPO for matched sample A. Panel A provides means and medians of various characteristics of public companies and private firms, along with associated t-statistics and z-statistics. Panel B provide means and medians of operating performance indicators (risk of financial distress and profitability) for public companies and private firms. Means and medians are measured considering both the full sample period (2007–2011).

Table 10

	Values				
Year (IPO year=1)	t=1	t=2	t=3	t=4	t=5
Roa (lower values indicate low profitability)	Mean (Median)	Mean (Median)	Mean (Median)	Mean (Median)	Mean (Median)
(1) IPO firms	0.061 (0.055)	0.046 (0.044)	0.038 (0.037)	0.033 (0.034)	0.028 (0.030)
(2) Control groups	0.055 (0.041)	0.049 (0.038)	0.045 (0.036)	0.042 (0.036)	0.042 (0.037)
	Wilcoxon test	Wilcoxon test	Wilcoxon test	Wilcoxon test	Wilcoxon test
(1) vs. (2)	-3.031***	-0.584	0.455	0.842	2.622***
	T-stat	T-stat	T-stat	T-stat	T-stat
(1) vs. (2)	-1.4214	0.7614	1.7151*	2.0380**	3.4733***
No. Observations (1)	724	724	724	724	724
No. Observations (2)	724	724	724	724	724
Roa2 (lower values indicate low profitability)	Mean (Median)	Mean (Median)	Mean (Median)	Mean (Median)	Mean (Median)
(1) IPO firms	0.095 (0.089)	0.078 (0.078)	0.068 (0.069)	0.065 (0.068)	0.057 (0.060)
(2) Control groups	0.070 (0.057)	0.070 (0.056)	0.068 (0.059)	0.067 (0.061)	0.066 (0.057)
	Wilcoxon test	Wilcoxon test	Wilcoxon test	Wilcox on test	Wilcoxon test
(1) vs. (2)	-6.849***	-3.443***	-1.556	-0.949	0.573
	T-stat	T-stat	T-stat	T-stat	T-stat
(1) vs. (2)	-4.9321***	-1.5346	0.0572	0.5590	2.0828**
No. Observations (1)	724	724	724	724	724
No. Observations (2)	724	724	724	724	724
Z''-score (lower values indicate a larger distress)	Mean (Median)	Mean (Median)	Mean (Median)	Mean (Median)	Mean (Median)
(1) IPO firms	4.363 (3.486)	4.034 (3.312)	3.862 (3.081)	3.724 (3.049)	3.540 (2.896)
(2) Control groups	4.465 (3.683)	4.499 (3.781)	4.499 (3.781)	4.534 (3.774)	4.530 (3.679)
	Wilcoxon test	Wilcoxon test	Wilcoxon test	Wilcoxon test	Wilcoxon test
(1) vs. (2)	0.148	2.333**	3.473***	4.223***	5.101***
	T-stat	T-stat	T-stat	T-stat	T-stat
(1) vs. (2)	0.5336	2.3224**	3.2903***	4.1344***	4.9762***
No. Observations (1)	724	724	724	724	724
No. Observations (2)	724	724	724	724	724

	Listed firms			Unlisted firms			Difference tests	
Years (T=3-6)	N	Mean	Median	N	Mean	Median	T-stat (p-value)	Z-stat (p-value)

Firms' performance								
Z''-score	2,896	3.79	3.08	2,896	4.51	3.77	0.0000	0.0000
ROA (%)	2,896	3.63	3.60	2,896	4.45	3.65	0.0001	0.7543
ROA2 (%)	2,896	6.71	6.82	2,896	6.88	5.72	0.4640	0.9481

Notes: This table shows univariate tests relative to mean (median) values and mean (median) changes of the indices measuring profitability and financial distress risk from the IPO year to four years later of IPO firms and private firms for matched sample A. The test for the equality of distributions is Wilcoxon-Mann-Whitney rank sum test between treated and control groups, while test for mean difference is t-stat. Furthermore, we test whether the changes are significantly different from zero (denoted by asterisks) by using a Wilcoxon signed-ranks test for medians and t-stat for mean.
*, ** and *** indicate statistical significance at 10%, 5% and 1% levels, respectively.

Table 11

	(1) Z''-score	(2) Roa	(3) Roa2
Time	0.473***	0.00457	0.00916***
	(3.64)	(1.55)	(2.77)
IPO	0.332**	0.0135***	0.0297***
	(2.00)	(3.30)	(6.53)
DID	-0.361**	-0.0171***	-0.0237***
	(-2.28)	(-4.61)	(-5.70)
TA	-0.343***	0.00181***	0.00119*
	(-16.68)	(3.89)	(2.30)
Age	0.265***	0.00423***	0.00400***
	(6.65)	(4.65)	(3.95)
Year	Yes	Yes	Yes
Industry	Yes	Yes	Yes
Country	Yes	Yes	Yes
_cons	7.558***	-0.0589	-0.0507
	(9.61)	(-1.94)	(-1.56)
N	9425	9433	9433
R^2	0.164	0.132	0.139
adj. R^2	0.152	0.120	0.127

Notes: This table reports the results for a difference-in-differences specification to examine the differences in trends between treated and control firms before and after the IPO dates for matched sample B. Firms' performance measures are: the return on asset (Roa), the ebit divided by total asset (Roa2), the Z″-score model by Altman et al. (1995) to predict financial distress (Z''-score). *Time* is a dummy variable to indicate the time when the treatment started. IPO is a dummy variable to identify the group exposed to the treatment. *DID* is the difference of differences in the firms' performance of the treatment and control groups from the t-test. The control variables are: Age, natural logarithm of the firm age. TA, natural logarithm of the total asset. State, Industry and Year fixed effect are included in the estimates.
*, ** and *** indicate statistical significance at 10%, 5% and 1% levels, respectively.

Table 12

	Values					
Year (IPO year=1)	t=0	t=1	t=2	t=3	t=4	t=5
Roa (lower values indicate low profitability)	Mean (Median)	Mean (Median)	Mean (Median)	Mean (Median)	Mean (Median)	Mean (Median)
(1) IPO firms	0.060 (0.063)	0.055 (0.055)	0.042 (0.044)	0.035 (0.037)	0.034 (0.034)	0.026 (0.030)
(2) Control groups	0.036 (0.039)	0.037 (0.04)	0.036 (0.039)	0.037 (0.039)	0.036 (0.038)	0.031 (0.034)
	Wilcoxon test	Wilcoxon test	Wilcoxon test	Wilcoxon test	Wilcoxon test	Wilcoxon test
(1) vs. (2)	-9.395***	-7.309***	-2.574***	0.088	0.135	1.267
	T-stat	T-stat	T-stat	T-stat	T-stat	T-stat
(1) vs. (2)	-8.6971***	-6.3802***	-2.0858**	0.5793	0.5371	1.5011
No. Observations (1)	724	724	724	724	724	724
No. Observations (2)	5,505	5,505	5,505	5,505	5,505	5,505
Roa2 (lower values indicate low profitability)	Mean (Median)	Mean (Median)	Mean (Median)	Mean (Median)	Mean (Median)	Mean (Median)
(1) IPO firms	0.097 (0.099)	0.088 (0.089)	0.072 (0.078)	0.066 (0.069)	0.063 (0.068)	0.055 (0.060)
(2) Control groups	0.052 (0.052)	0.053 (0.054)	0.051 (0.051)	0.051 (0.050)	0.049 (0.048)	0.045 (0.044)
	Wilcoxon test	Wilcoxon test	Wilcoxon test	Wilcoxon test	Wilcox on test	Wilcoxon test
(1) vs. (2)	-15.632***	-12.963***	-8.151***	-6.237***	-5.921***	-4.668***
	T-stat	T-stat	T-stat	T-stat	T-stat	T-stat
(1) vs. (2)	-14.9148***	-11.8495***	-6.8982***	-5.2066***	-4.7991***	-3.5819***
No. Observations (1)	724	724	724	724	724	724
No. Observations (2)	5,505	5,505	5,505	5,505	5,505	5,505
Z''-score (lower values indicate a larger distress)	Mean (Median)	Mean (Median)	Mean (Median)	Mean (Median)	Mean (Median)	Mean (Median)
(1) IPO firms	3.537 (2.897)	4.244 (3.486)	3.915 (3.312)	3.762 (3.081)	3.637 (3.049)	3.441 (2.896)
(2) Control groups	3.732 (3.120)	3.951 (3.231)	4.084 (3.308)	4.199 (3.414)	4.241 (3.475)	4.211 (3.449)
	Wilcoxon test	Wilcoxon test	Wilcoxon test	Wilcoxon test	Wilcoxon test	Wilcoxon test
(1) vs. (2)	1.220	-2.587***	0.460	2.523**	3.543***	4.552***
	T-stat	T-stat	T-stat	T-stat	T-stat	T-stat
(1) vs. (2)	1.1730	-1.7387*	0.9980	2.5802***	3.5659***	4.4807***
No. Observations (1)	724	724	724	724	724	724
No. Observations (2)	5,505	5,505	5,505	5,505	5,505	5,505

Notes: This table shows univariate tests relative to mean (median) values of the indices measuring profitability and financial distress risk from the one year before the listing, the IPO' year and four years later of IPO firms and historical listed firms (10-Y). The test for the equality of distributions is Wilcoxon-Mann-Whitney rank sum test between treated and control groups, while test for mean difference is t-stat. Furthermore, we test whether the changes are significantly different from zero (denoted by asterisks) by using a Wilcoxon signed-ranks test for medians and t-stat for mean.
*, ** and *** indicate statistical significance at 10%, 5% and 1% levels, respectively.

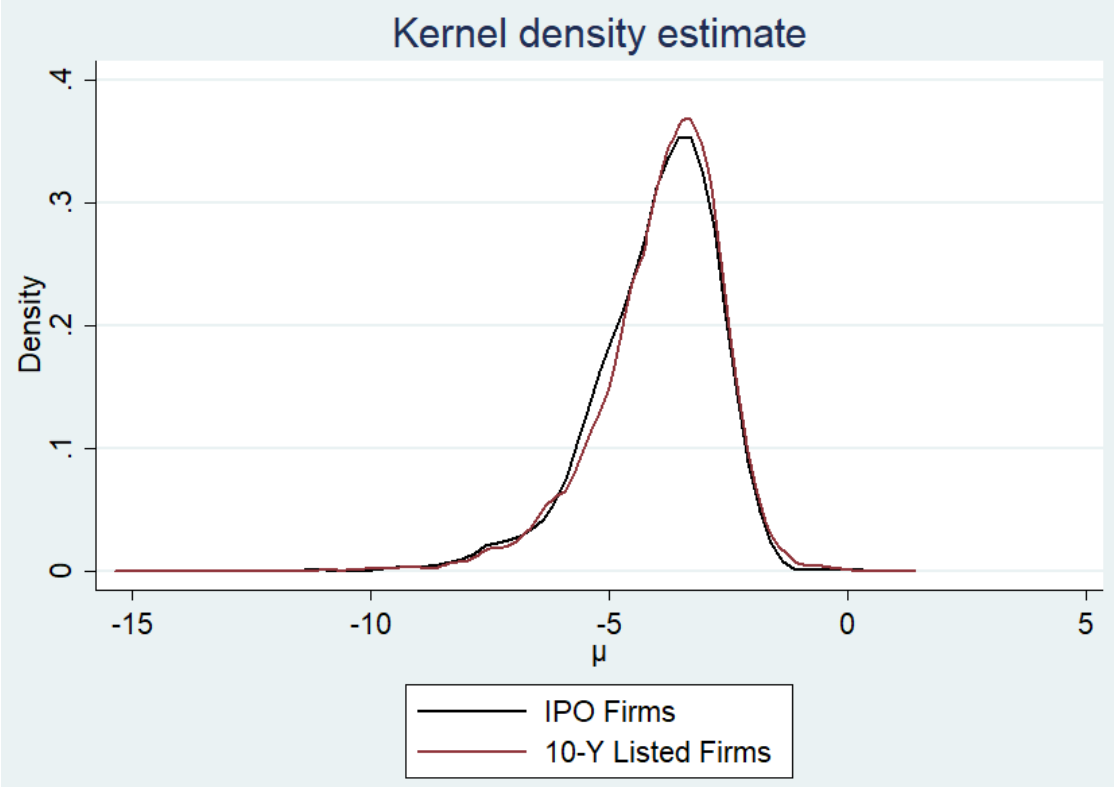
Table 13

	(1) Z''-score	(2) ROA	(3) ROA2
IPO^{in}	2.134***	-0.00557*	-0.0112***
	(12.39)	(-1.66)	(-3.14)
IPO^{post}	1.300***	-0.0256***	-0.0342***
	(11.04)	(-10.97)	(-13.91)
TA	-0.116***	0.00729***	0.00913***
	(-8.58)	(30.58)	(38.32)
Age	0.436***	0.00681***	0.00824***
	(11.01)	(9.65)	(11.31)
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Country FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
γ_{in}- γ_{post}	27.04*** (0.0000)	41.32*** (0.0000)	47.84*** (0.0000)
_cons	14.58***	0.0132	-0.00599
	(22.47)	(0.36)	(-0.17)
N	30429	30429	30429
R^2	0.105	0.120	0.162
adj. R^2	0.102	0.117	0.159

Notes: Panel regression analysis of firms' performance (profitability and risk of financial distress) of a sample of 724 European and Asian IPOs and 5,505 listed firms is reported considering the casual treatment effect. The dependent variables are Z''-score (column I), Roa (column II), Roa2 (column III). IPO^{in} is a dummy variable that takes value 1 for firms considered in the IPO's year and 0 otherwise. IPO^{post} is a dummy variable that takes value 1 for firms considered in the four years after to the IPO and 0 otherwise. The control variables are: Age, natural logarithm of the firm age. TA, natural logarithm of the total asset. Firm, State, Industry and Year fixed effect are included in the estimates. γ_{in}- γ_{post} refers to the Wald test.

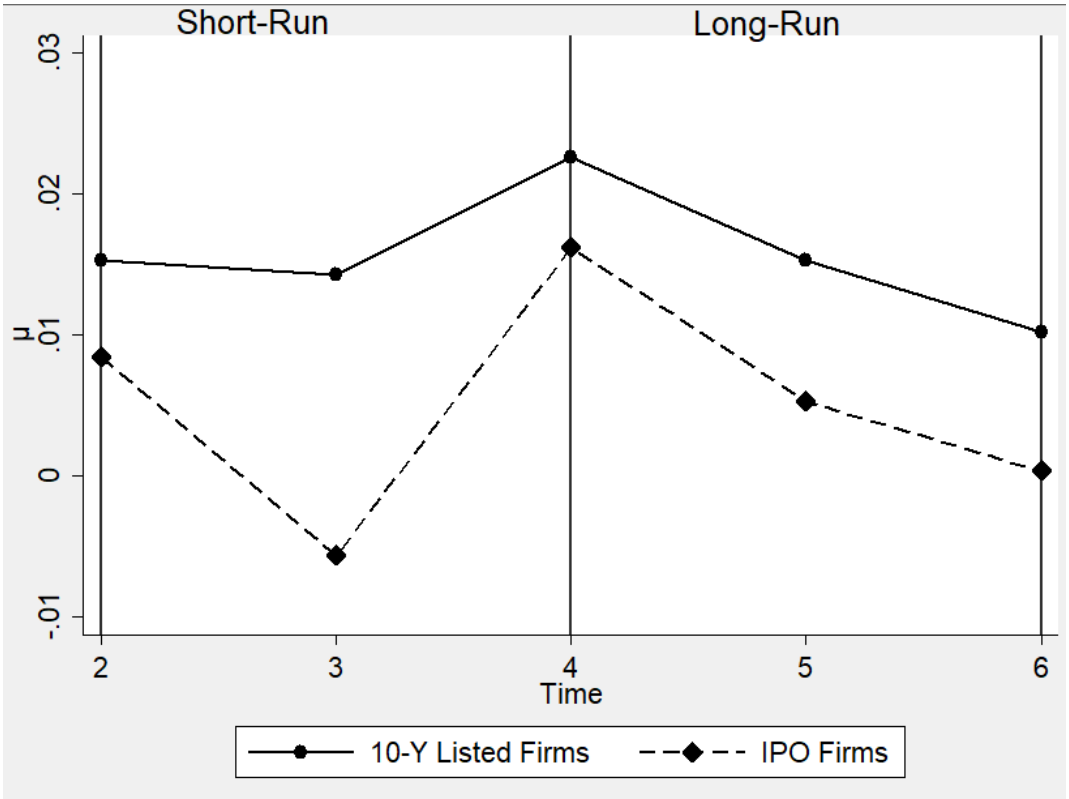
*, ** and *** indicate statistical significance at 10%, 5% and 1% levels, respectively

Fig. 12



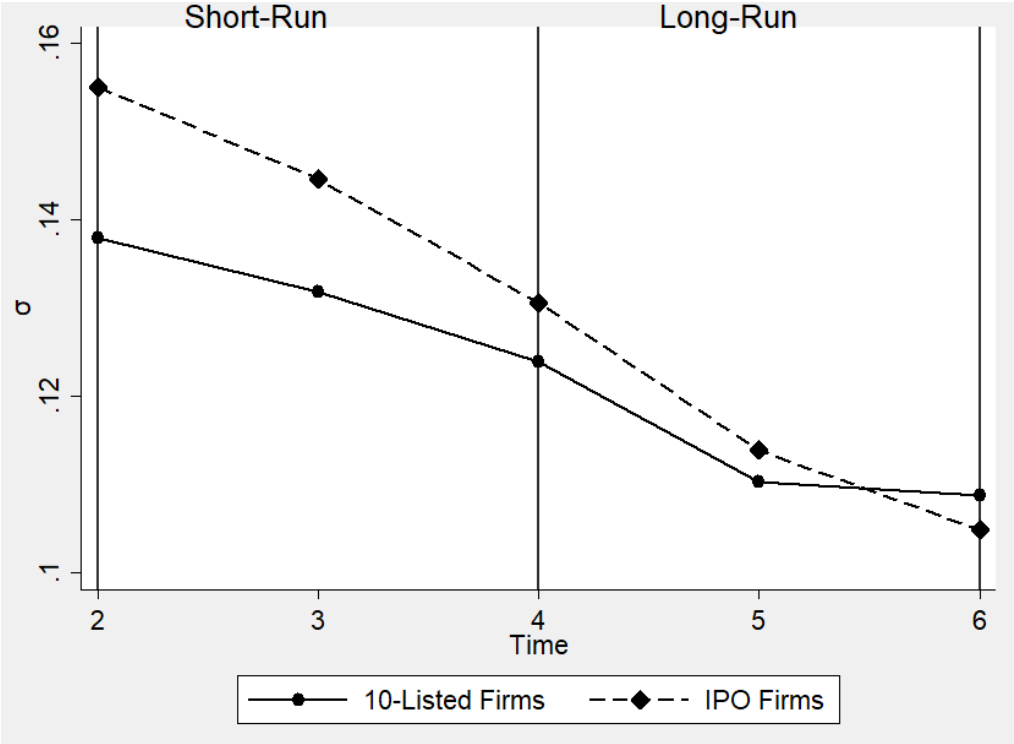
Notes: This figure presents the annual mean of stock price returns distributions in four years after the event of the IPO and historical (10-Y) listed firms in the sample.

Fig. 14



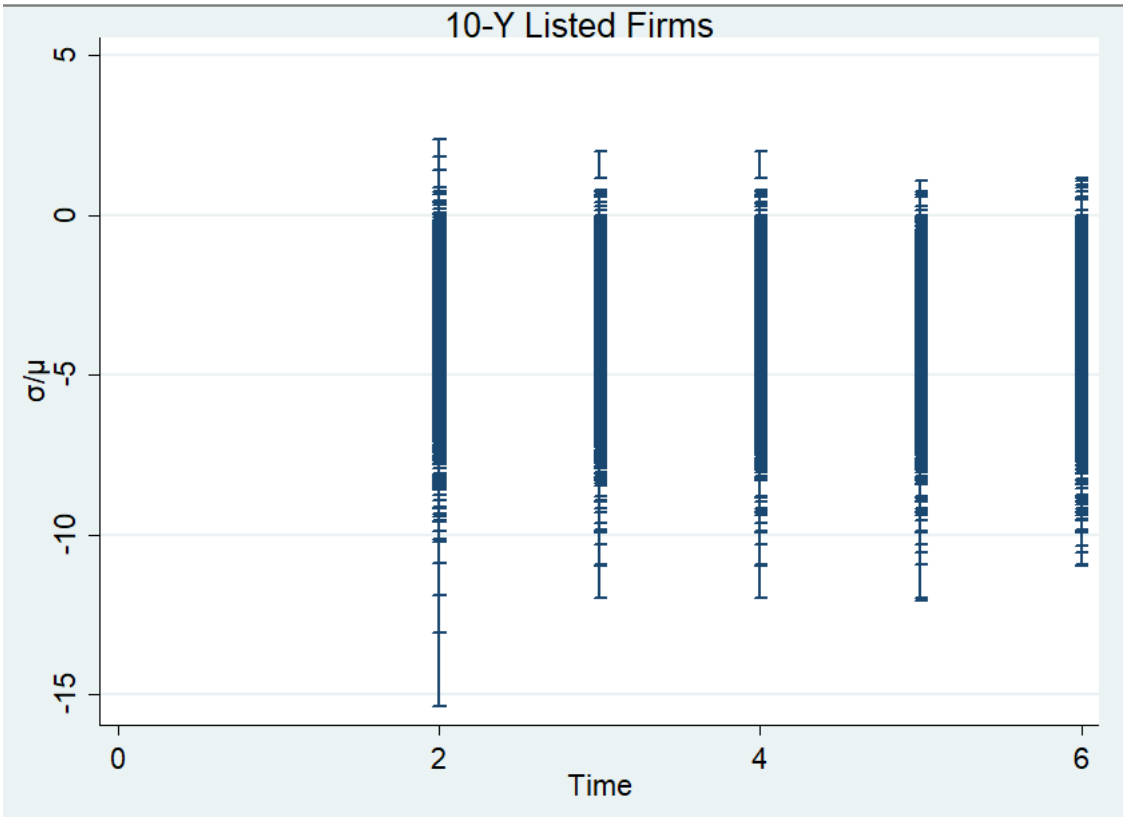
Notes: This figure presents the mean of the annual mean of stock price returns (μ) in two years after the event (Short-Run), and in four years after the event (Long-Run) for IPO and and historical (10-Y) listed firms in the sample.

Fig. 15



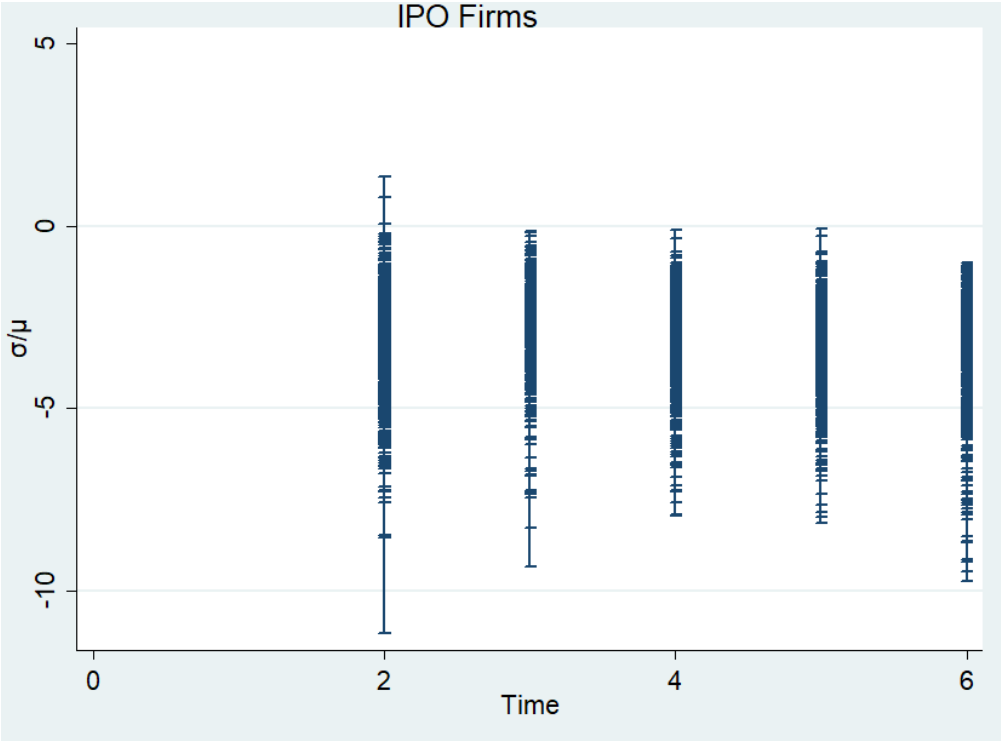
Notes: This figure presents the mean of the annual standard deviation of stock price returns (σ) in two years after the event (Short-Run), and in four years after the event (Long-Run) for IPO and and historical (10-Y) listed firms in the sample.

Fig. 16



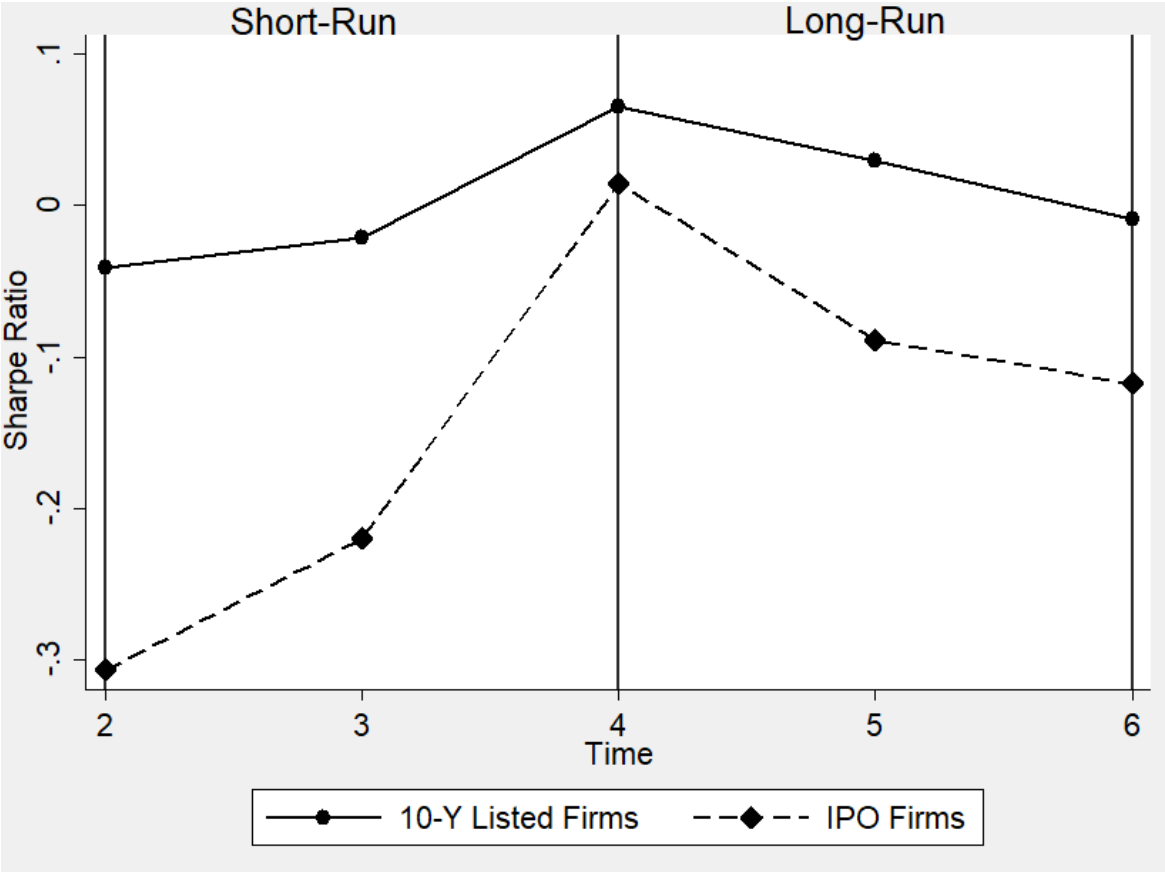
Notes: This figure presents the ratio of risk and return of stock prices (σ/μ) in for historical (10-Y) firms during the sample period.

Fig. 17



Notes: This figure presents the ratio of risk and return of stock prices (σ/μ) in for IPO firms during the sample period.

Fig. 18



Notes: This figure presents the mean of the Sharpe Ratio in two years after the event (Short-Run), and in four years after the event (Long-Run) for IPO and and historical (10-Y) listed firms in the sample.

Table 14

	(1) Sharpe Ratio
IPO^{post}	-0.0599***
	(-5.87)
TA	0.00240*
	(2.26)
Age	-0.00103
	(-0.29)
Firm FE	Yes
Year FE	Yes
Country FE	Yes
Industry FE	Yes
_cons	-0.582***
	(-4.64)
N	23433
R^2	0.215
adj. R^2	0.210

Notes: Panel regression analysis of firms' market performance of a sample of 724 European and Asian IPOs and 5,505 listed firms is reported considering the casual treatment effect. The dependent variable is Sharpe Ratio. IPO^{post} is a dummy variable that takes value 1 for firms considered in the four years after to the IPO and 0 otherwise. The control variables are: Age, natural logarithm of the firm age. TA, natural logarithm of the total asset. Firm, State, Industry and Year fixed effect are included in the estimates.

*, ** and *** indicate statistical significance at 10%, 5% and 1% levels, respectively