IPOs, Growth, and the Impact of Relaxing Listing Requirements[†]

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Abstract

We investigate the impact of relaxing listing requirements on firms' growth around initial public offerings (IPOs). Japan experienced several deregulations of listing requirements in the late 1990s. We use a dataset that covers both public and private firms for more than 30 years, which enables us to compare the firms' operating growth around IPOs as well as to compare the growth under both strict and relaxed listing requirements. When comparing the matched firms, we find that IPO firms' excess growth in profitability and productivity diminished after their IPOs, while their excess growth in terms of size (measured by sales and number of employees) still increased in the post-IPO period. This finding indicates that relaxing listing requirements enables high-growth firms to go public but does not lead to subsequent growth in productivity and profitability, although it does enable firms to be larger more after going public.

JEL Classification: G32, G38, L25
Keywords: IPOs; Deregulation; Firm growth

1. Introduction

Policymakers expect that relaxing listing requirements or building new stock exchanges will help firms to grow through initial public offerings (IPOs). In addition, IPO firms are expected to contribute to economic development through innovation and job creation. For these reasons, several stock exchanges relax the listing standards of existing markets or create new markets for start-ups to provide opportunities to raise capital.[1] In the US, although it is not a new stock exchange, the Jumpstart Our Business Start-ups (JOBS) Act, which allows growing private companies to raise capital investments, was enacted in 2012.[2]

The objective of this paper is to examine whether relaxing listing requirements can really help firms to grow through IPOs. Previous literature has investigated the change in operating performance around IPOs and finds that performance increases before IPOs and declines after IPOs (Jain and Kini, 1994; Chemmanur et al., 2009 and the others). However, little is known about the effect of relaxing listing requirements on firms' performance around IPOs. To examine this effect, we compare the excess growth, which is the difference between the growth of IPO firms and that of matching firms based on the propensity score, around the deregulations. As proxies for firms' growth, we employ three types of measurements: (1) productivity (total factor productivity, TFP), (2) profitability (operating profit), and (3) firm size, which is measured by sales and number of employees.

This paper uses a Japanese dataset to examine the impact of relaxing listing standards on IPO firms' growth for the following two reasons. First, several deregulations were enacted in the Japanese IPO markets during the late 1990s, including a relaxing of the listing standards for existing stock exchanges and the establishment of new stock exchanges for emerging companies. This setting enables us to understand the impact of going public on subsequent operating performance in two different listing environments: pre- and post-deregulation. Second,

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[1] For instance, the Alternative Investment Market (AIM) was established in 1995 as an alternative stock exchange to the Unlisted Securities Market (USM) in the UK. In Singapore, Catalist was established in 2007, and in China, Venture Board, an emerging market for start-ups, was established by the Shenzhen Stock Exchange in 2009.

[2] The following pages on the US government's website argue that job creation was one of the purposes behind the JOBS Act:
http://www.whitehouse.gov/economy/business/startup-america
http://www.whitehouse.gov/the-press-office/2012/04/05/president-obama-sign-jumpstart-our-business-startups-jobs-act

our data provide financial information not only for public firms but also for private firms over a period of more than 30 years, which enables us to examine the impact of deregulation by comparing growth rates pre- and post-deregulation. In Japan, private firms with more than 500 shareholders and more than 10 million yen (or approximately 100,000 US dollars) of public equity issued, and private firms with more than 100 million yen of private equity issued, are required to file with the Ministry of Finance. Nikkei Media Marketing collects these filings. Furthermore, this dataset enables us to compare IPO firms with private firms because Nikkei Media Marketing collects the accounting reports posted by large private firms that are not required to file.

Using data on public and private firms for a long period, we find the following results. First, we examine how the firms that are planning to go public differ from other private firms. We compare firms' growth at three years prior to an IPO and other private firms that do not go public within the next ten years. We find that pre-IPO firms' productivity and profitability are higher than those of other private firms in both the pre- and post-deregulation periods, suggesting that firms with higher productivity or profitability generally go public in both the pre- and post-deregulation periods. We also find that the standard deviation of profitability is higher in the post-deregulation period than that in the pre-deregulation period. This implies that relaxing listing requirements enables not only low-profit firm but also potentially growing firms to go public.

When comparing the firms' size, we find that firms in the pre-deregulation period are larger than private firms but, in the post-deregulation period, they are smaller than private firms. This indicates that several deregulations enable smaller firms to go public. Furthermore, the standard deviation of firms' size increases in the post-deregulation period, indicating that a variety of firms is able to go public due to the relaxed listing standards. Overall, these findings show that deregulations dramatically change the characteristics of IPO firms.

Second, we investigate excess growth around IPOs. The results differ among the growth measures. Regarding firms' productivity and profitability, the findings reveal that productivity and profitability increase in the pre-IPO period and decrease in post-IPO period. In contrast, the growth of a firm's size increases in both the pre- and post-IPO periods. These results are consistent with the previous literature that focuses on the growth around IPOs (Clementi, 2002; Spiegel and Tookes, 2008).

Lastly, as the main purpose of this paper, we investigate whether the excess growth changes after serial deregulations. Regarding the impact of deregulations, there are two predictions. One is that relaxing listing requirements enables low-quality firms to go public and that post-deregulation growth is *lower* than that during the pre-deregulation period. On the other hand, the second prediction is that relaxing listing requirements enables potentially growing firms that could not do so during the period of strict listing requirements to go public. Growth in the post-deregulation period is then *higher* than that in the pre-deregulation period. Regarding productivity and profitability, we find that firms listed in the post-deregulation period report higher growth before going public than those in the pre-deregulation period. However, the higher growth rate in terms of profitability and productivity diminishes after a firm goes public, which is consistent with the theoretical arguments by Clementi (2002) and Spiegel and Tookes (2008) as well as the recent empirical results of Bernstein (2015) and Asker et al. (2014), who argue that going public harms the strength of an IPO firm. In contrast, regarding size measurements, we find that firms in the post-deregulation period grow more both before and after IPOs than in the pre-deregulation period. The results are observed in two size measurements, sales and employment, which indicates that, although excess productivity or profitability growth diminishes, going public contributes to job creation.

Our article attempts to bridge two streams of literature concerning the IPO, the first of which analyzes the influence of the IPO market relaxing listing standards, while the second analyzes firms' operating growth around IPOs. First, this paper is related to studies that examine the impact of the listing standard and firms' performance. In this stream of research, while most of the existing literature focuses on comparing the stock performance of firms listed on the main and second-tier stock exchanges (e.g., Johan, 2010; Vismara et al., 2012), we focus on the operating performance around the deregulation. As described later, in the second stream of research, the operating growth around the IPO has been investigated. Furthermore, although prior empirical studies of post-IPO performance use earnings, firm size, and TFP (Jain and Kini, 1994; Pagano et al., 1998;

Chemmanur et al., 2009), less is known about the impact of relaxing listing standards on those companies' performance around deregulation.[3]

A second stream is the study of decisions to go public and firms' performance. As Chemmanur et al. (2009) note, over the last two decades an extensive body of theoretical work on IPO decisions has been conducted (e.g., Chemmanur and Fulghieri, 1999; Boot et al., 2006). Chemmanur et al. (2009) use private and public US manufacturing firms and examine dynamic changes in operating performance before and after the IPO. Our study extends their research by focusing on the relaxing of listing requirements, which has taken place around the world although the impact remains unclear.

The remainder of this paper is organized as follows. In Section 2, we review the related literature. Section 3 explains the deregulation of the Japanese IPO market during the 1990s and describes the data. Section 4 presents the results of the empirical analysis, and Section 5 presents our conclusions.

2. Previous literature on financial regulations and hypotheses

2.1 Previous literature on deregulations in financial markets and the consequence

There are two streams of research regarding the listing requirements and their consequences.[4] The first stream concerns the transparency of the listed firms. The degree of asymmetric information between firms and investors affects the pricing mechanism. Then, the disclosure system and the corporate governance mechanism affect the stock price formations (Shi et al., 2013; Akyol et al., 2014).[5]

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[3] One exception is Aslan and Kumer (2011), who find an excess growth of sales and ROA after IPOs.

[4] In other literature, the number of studies is not large, but one important discussion argues that the liberalization of the economy leads to financial liberalizations. Rajan and Zingales's (2003) 'interest group theory' argues that the trade and financial openness reduces the influence of interest groups. Consistent with their theory, Hauner et al. (2013) find that trade liberalizations lead to financial liberalizations.

[5] Recent studies argue that the sophisticating regulation mechanism mitigates the asymmetric information and lowering mispricing such as underpricing. Shi et al. (2013) use a 34-country IPO dataset and show that the stringency of disclosure requirements for IPO prospectuses is negatively associated with the extent of IPO underpricing; they also find that the disclosure effect on IPO underpricing is moderated by the extent of a country's capital market integration. Akyol et al. (2014) use a European dataset and find that the underpricing of the firms in the more transparent corporate governance code reduces after the adoption of the code. This indicates that

The second stream, which our research focuses on, investigates the linkage between the degree of requirements and the quality of firms. Several recent studies have examined the relationship between listing requirements and firms' performance (Johan, 2010; Espenlaub et al., 2012; Semenenko, 2012; Vismara et al., 2012; Cattaneo et al., 2015). They find that firms listed under lower listing requirements have lower stock returns or a lower survival rate. Vismara et al. (2012) compare the long-term performance of IPOs between the main and second-tier markets in European countries, including the main markets of the London Stock Exchange (LSE) and AIM. They find that the performance of AIM IPOs is poorer than that of LSE IPOs. While these studies examined the performance of IPO firms listed on different stock exchanges with different listing standards, little is known about the impact of relaxing the requirements of the same stock exchange on subsequent IPO firms' performance. Cattaneo et al. (2015) use a historical dataset in Italy and find that tightening the IPO listing requirements increases the survival rate of IPO firms.

2.2 Building the hypotheses

The first four hypotheses concern the productivity and profitability of IPO firms and predict that IPO firms' growth is *low* because deregulations enable lower quality firms to go public. The next four hypotheses also concern IPO firms' productivity and profitability but predict that the growth of IPO firms is *higher* because lowering listing requirements enables potentially growing firms that had previously been prohibited from going public by listing restrictions to actually to public. The last two hypotheses concern the impact of deregulations on firms' size.

How does relaxing the listing requirements affect the firm's subsequent operating performance? There are two opposite predictions about the productivity and profitability of IPO firms. First, lowering listing requirements enables lower quality firms to go public (Johan, 2010; Semenenko, 2012). Johan (2010) uses a Canadian IPO dataset and investigates whether listing requirements affect the short-term abnormal excess return. She finds that higher listing standards are related to lower underpricing, suggesting that lowering listing

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the sophisticated corporate governance mechanism serves as a remedy for information asymmetry between the issuers and investors, or issuers and financial institutions, which enables the enhancement of the price search mechanism.

requirements enables low-quality firms to go public. Using IPOs listed on the US exchanges between 1984 and 2005, Semenenko (2012) examines whether the listing rules of the exchanges work as an effective screening mechanism. His finding partially supports the idea that listing rules screen out lower-quality firms but do not work perfectly. These previous studies imply that, if relaxing the listing requirements enables low-quality firms to go public, the profitability or productivity in the post-deregulation period would be lower than in the pre-deregulation period.

H1 Productivity pre-IPO (a) Relaxing listing requirements enables low-productivity firms to go public; productivity in the pre-IPO period is lower in the post-deregulation period.

H2 Productivity post-IPO (a) Relaxing listing requirements enables low-productivity firms to go public; productivity in the post-IPO period is lower in the post-deregulation period.

H3 Profitability pre-IPO (a) Relaxing listing requirements enables low-profitability firms to go public; profitability in the pre-IPO period is lower in the post-deregulation period.

H4 Profitability post-IPO (a) Relaxing listing requirements enables low-profitability firms to go public; profitability in the post-IPO period is lower in the post-deregulation period.

As opposed to **H1** to **H4**, we can also predict that lowering the listing requirements results in potentially higher growth but does not satisfy the listing requirements regarding firms' size or firms' age for going public. In Japan, prior to the serial deregulations, small firms could not go public due to the high requirements concerning firms' size or profitability. Lowering the listing requirements enabled these firms to go public. The productivity in the pre-IPO period was higher in the post-deregulation period than in the post-deregulation period. Hence, we build the following two hypotheses:

H5 Productivity pre-IPO (b) Relaxing listing requirements enables productive firms to go public.

H6 Profitability pre-IPO (b) Relaxing listing requirements enables profitable firms to go public.

How do listing requirements affect post-IPO growth in terms of productivity and profitability? Although Clementi (2002) and Pástor et al. (2008) do not explicitly describe the impact of deregulation, they predict declines in both firms' excess productivity and profitability. Chemmanur et al. (2009) focus on investigating the productivity around IPOs—examining whether relaxing listing requirements changes the relationship between the decision to go public and subsequent operating performance is beyond their scope.

We predict that firms' high profitability or productivity growth declines after they go public for several reasons. The first is based on the degree of asymmetric information between insiders and investors that affects firms' IPO decision (Chemmanur and Fulghieri, 1999; Spiegel and Tookes, 2008; Farre-Mensa, 2014). Chemmanur and Fulghieri (1999) show that firms with lower asymmetric information choose to go public because of the lower disclosure cost. Spiegel and Tookes (2008) show that going public forces IPO firms to disclose private information about their competitiveness to rivals, which reduces excess profitability or productivity during the post-IPO period. Furthermore, several studies investigate the reasoning behind firms choosing to go private (Bharath and Dittmar, 2010; Pour and Lasfer, 2013). Bharath and Dittmar (2010) investigate the reasons behind firms choosing to go private and find that, if the information production cost is high, the firm chooses to go public. Moreover, Pour and Lasfer (2013) investigate the characteristics of firms that go private and argue that firms that obtain less benefit from listing choose delisting.

In addition, IPOs may harm firms' investment (Asker et al., 2014) or innovation (Bernstein, 2015) behavior, which could lead to lower productivity or profitability after IPOs. Based on these arguments, we build the following hypotheses regarding the impact of deregulation on post-IPO productivity and profitability growth:

H7 Productivity post-IPO (b) Relaxing listing requirements does not affect post-IPO productivity.

7

H8 Profitability post-IPO (b) Relaxing listing requirements does not affect post-IPO

profitability.

There are two predictions concerning IPO firms' productivity and profitability. First, our empirical analyses reject the first prediction, **H1** to **H4**, of lower profitability and productivity around IPOs, indicating results consistent with the second prediction, **H5** to **H8**, of high growth in the pre-IPO period and lower or steady growth in the post-IPO period.

The last two hypotheses confirm firms' size growth around the IPO. The previous literature has argued that the growth of smaller firms is higher than that of larger firms in both the industrial organization literature (Hall, 1987) and the broader economic literature (Haltiwanger et al., 2013; Hsieh and Klenow, 2014; Kueng et al., 2014). Based on these arguments, the impact of relaxing listing requirements on growth measures would be higher in the post-deregulation period when smaller firms have been enabled to go public. If growth is remarkable for smaller firms and IPOs provide firms with growth, firms' subsequent growth should be prominent in the post-deregulation period. Furthermore, the theoretical model proposed by Clementi (2002) predicts that, although firms' productivity declines in the post-IPO period, their size growth increases both in the pre- and post-IPO periods. We therefore test the following hypotheses:

H9 Size pre-IPO Relaxing listing requirements positively affects firms' size growth in the

pre-IPO period.

H10 Size post-IPO Relaxing listing requirements positively affects firms' size growth in the

post-IPO period.

3. Institutional background, data, and matching method

3.1. Japanese IPO markets and deregulation

Following the collapse of the land price bubble in 1990, Japan suffered a long-term recession. To overcome this, numerous institutional changes were made to the equity market and the banking sector. As part of the deregulation process, the IPO market in Japan was changed in two ways. First, the listing requirements were relaxed dramatically after 1999. For instance, the second section of the Tokyo Stock Exchange (TSE) had previously required firms to have been in operation for more than five years. The reforms lowered the criterion from five years to three years.

Second, the existing stock exchanges launched new stock markets for start-ups, which required lower listing standards. For example, in 1999, the TSE established Mothers (Market of the high-growth and emerging stocks), which placed no requirements on firms' age, net assets, or profits.[6] At the same time, other local stock exchanges established stock markets for start-ups: NASDAQ Japan (in the Osaka Stock Exchange) in May 2000, Centrex (Nagoya Stock Exchange) in October 1999, Q-board (in the Fukuoka Stock Exchange), and Ambitious (in the Sapporo Stock Exchange). These stock exchanges have less stringent listing standards aimed at promoting IPOs by young companies that have growth potential but lack sufficient capital. The aim of relaxing the listing requirements and creating new markets was to provide attractive firms with high-growth potential that did not meet the old listing requirements with opportunities to raise capital. The details of the deregulation in Japan are summarized in Appendix A. Through institutional changes, smaller, risky, or less profitable companies were enabled to go public.

3.2. Data sources

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[6] The aim behind establishing Mothers can be seen on its website: "On November 11, 1999, Tokyo Stock Exchange established a new market named Mothers (market of the high-growth and emerging stocks), in order to provide venture companies access to funds at an early stage of their development and to provide investors with more diversified investment products."
(http://www.tse.or.jp/english/rules/mothers/)

The IPO firms' information comes from two sources: the *Factbook of Japanese Equity Issuance*, which was published by *Shoji Houmu* until 2001,[7] and the *Factbook of Japanese IPO* published by *Pronexus*. The financial data come from the Nikkei NEEDS-Financial QUEST (NEEDS) provided by Nikkei Media Marketing. Due to the different accounting report formats, we exclude financial institutions. We further exclude the regulated utility (e.g., water, electricity, gas, and telecommunications) industries from our main analyses. All financial items are deflated by using the CPI index from 2010. NEEDS covers the financial data of not only public but also private firms that are required to file accounting reports with the Ministry of Finance. In Japan, private firms with more than 500 shareholders and more than 10 million yen (about 100,000 US dollars) of public equity issued, or more than 100 million yen (approximately 1 million US dollars) of private equity issued are required to file financial reports with the Ministry of Finance. Nikkei Media Marketing collects this information and the filings for the Ministry of Finance. Furthermore, Nikkei Media Marketing collects accounting information from relatively large private firms by sending questionnaires or through face-to-face interviews administered by its agents.

The NEEDS database has two advantages. First, it does not suffer from a survivorship bias because the database includes bankrupt firms. Second, the Nikkei covers more than 30 years.[8] This long period enables us to investigate the effects of environmental change on the performance of IPO firms. On the other hand, the weakness is the cross-sectional coverage. Only relatively large firms are required to file financial reports for the Ministry of Finance. However, we believe that this coverage restriction does not affect our results. In this paper, we compare the outcome of IPO firms with private firms using the matching method. Small companies would

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[7] *Factbook of Japanese Equity Issuance* had been published annually as special issues of *Junkan Shoji Houmu*, which is a magazine for practitioners working in corporate law and corporate finance. It covers the information of all IPO firms, including regional and OTC markets.

[8] Recently, a growing body of literature on corporate finance has used unlisted firms' datasets (e.g., Aslan and Kumar, 2011; Brav, 2009; Gao et al., 2013). In such studies, the dataset from Bureau van Dijk (BvD), the Sageworks Inc dataset, and Capital IQ are frequently used. However, the weakness of these datasets is their length. All include no more than 10 years of data. Brav (2009) compares capital structures between listed and unlisted firms using the BvD database between 1993 and 2003. The dataset used by Aslan and Kumar (2011) covers the period between 1996 and 2006. Asker et al. (2014) use the dataset from Sageworks, which covers US private firms. Their sample starts in 2000. Gao et al. (2013) use the dataset from CapitalIQ.

therefore not be candidates for the matching firms. Another concern is that the number of private firms in the NEEDS dataset may be small. To address this concern, we checked the composition of public and private firms in our dataset. Although there are fewer private firms than public firms, on average, 35% of the sample is comprised of private firms in any period.

Table 1 presents the number of firms for each year. The first column reports the number of public firms that were listed during the sample period, and the second column reports the number of private firms that were unlisted during the sample period, as well as the financial reports recorded in NEEDS. The third column reports the number of firms that went public in each year, and the fourth column reports the number of IPOs listed on new markets. On average, 2,500 firms are public (column 1) for each year in our sample. The number of private firms is approximately 716 per year (column 2) and smaller than that of public firms, but on average, about a quarter of the sample is comprised of private firms in any period. The table shows that a sufficient number of private firms are included in the NEEDS dataset. In our sample period, 3,135 firms went public. Until 1989, the number of IPO firms was less than 70. However, in 1990 and 1991, when Japan experienced a land price boom and its collapse in land prices, the number of IPO firms increased. Between 1994 and 2007, except in 1999, the number of IPO firms was more than 100; in 2001, the number of IPO firms was 198.

Table 2 presents the number of public and private firms across industries at the Nikkei two-digit industry levels as of 1980, 1990, 2000, and 2010. The table shows that the composition of public and private firms differs by each industry and each year. For example, for cross-sectional variation, although only 1.8% of the firms in the steel industry were private in 2010, 62.7% of firms in the railroad industry were. For the time-series variation, the composition of private firms gradually decreases from the 1980s up until 2010. In retail service, the percentage of private firms was 39.3% in the 1980s, which had decreased to 7.7% by 2010. These differences in the composition of industries may affect our results; therefore, in our analysis, we choose the IPO firms' matched firms from the same industry.

3.3. Matching method

We compare the excess growth in pre- and post-deregulation periods rather than the raw growth rate because it faces the problem that the quality of the firms or macro conditions have changed over time. In the following empirical sections, we mainly use the matched sample based on the propensity score matching method because the characteristics of the IPO firms may differ from those of non-IPO firms. One way to test the effects of IPOs on firm growth is to compare the growth of IPO firms with that of matching non-IPO firms around IPOs. Because these matching firms should not have unobservable factors related to the IPOs, there are two candidate subgroups for the matching: the *public* subsample, which is public firms more than five years from their IPO, and the *private* subsample, consisting of private firms that will not go public within five years.[9]

We use propensity score matching without replacement. For the control group, five-nearest-neighbors matching is used. We estimate the propensity score by industry-year level using a logit model:

$$p_{i,t} = \Phi(\alpha + X\beta), \tag{1}$$

where $p_{i,t}$ is the binary variable, taking the value of one if the firm i goes public in the year t and the year is between three years before and five years after its IPO, and zero otherwise. If firms are more than three years prior to or more than five years after their IPOs, we classify the firm-year observations into public or private firms. For the control variables, X, we use the natural logarithm of total assets, ROA, the tangible asset ratio, the cash-to-asset ratio, and the natural logarithm of employment. All the control variables are lagged variables.

However, propensity score matching is not a panacea for overcoming the endogeneity. As Roberts and Whited (2013) note, propensity score matching does not identify the source of endogeneity. For example, the intention to go public may affect subsequent growth, but with such private information, it is difficult to identify or choose the most suitable instrument variables.

3.4. Measurements of firm growth

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[9] We also eliminate firm-year observations of firms that will go public within five years because firms prepare for three to four years before they go public. Therefore, the fundamentals of firms going public within five years are likely to be different from those of other unlisted companies.

We use three measurements as proxies for firm growth: productivity, profitability, and firm size. First, for productivity, we use TFP (Chemmanur et al., 2009). We estimate TFP through the semi-parametric approach proposed by Olley and Pakes (1996). Second, we use profitability, which is defined as operating profit divided by total assets. This measure is widely used as a proxy for operating performance in the previous literature such as Jain and Kini (1994). Third, for firm size, we use sales growth, which is defined as the ratio of sales in the current year to sales in the previous year, and employment growth, which is defined as the ratio of the number of employees in the current year to the number of employees in the previous year. Unlike total assets often used in the previous literature, sales and the number of employees are not affected by the proceeds from primary shares around IPOs. Recent studies investigate the influence of IPOs on employment (Borisov et al. 2012; Ritter, 2013; Kenney et al., 2012).

3.5. Summary statistics

Table 3 presents the summary statistics of characteristics of IPO firms, public firms, and private firms. Panel A presents the characteristics of these firms for the pre-deregulation period, and Panel B presents for the post-deregulation period. The pre-deregulation period is from 1978 to 1995, and the post-deregulation period is from 2000 to 2011. We exclude the sample between 1996 and 1999 because the deregulation had been conducted in several ways for several years. Before the deregulation, IPO firms were smaller than public firms on average but larger than private firms (Panel A). On the other hand, after the deregulation, IPO firms were smaller than both public and private firms (Panel B). In addition, the two panels show that IPO firms are on average more profitable, have higher cash and cash-equivalent, and have lower financial leverage than both public and private firms in both the pre- and post-deregulation periods.

4. Which firms choose to go public?

We begin our analysis by comparing the level of firm growth measures between the pre-IPO subsample, which is three years prior to the IPO, and private firms, which do not go public within ten years. We restrict

firms in private firm subsamples, as those do not go public within ten years, which is consistent with the definition used in subsequent analyses.

4.1. Operating performance by level in the pre-IPO period

Fig. 1 plots the levels of TFP of IPO firms three years prior to the IPO and that of the matched private firms. The left graph represents the level of TFP of IPO firms in the pre-deregulation period, and the right graph represents those of the post-deregulation period. The figures show that the deviation of the distribution post-deregulation increases and the peak moves toward the right, compared with that of the pre-deregulation period. This is also observed in the summary statistics in Table 4. The top four rows report the summary statistics of TFPs. Row 1 is the TFP of IPO firms, and row 2 is that of private firms in the pre-deregulation period (until 1995). On average, the TFP of IPO firms is 15.29 and is higher than that of private firms (14.51), and the difference is statistically significant at the 5% level (t-statistics = 2.48). The median of IPO firms is 11.17, which is higher than that of private firms (9.49); the difference is statistically significant at the 1% level (z-statistics = 4.20). These results suggest that the TFP of IPO firms is higher than that of other private firms but not different from that of comparable firms. Next, we compare the TFP at pre-IPO firms with their private counterparts. The TFP of IPO firms is on average 27.85 and higher than that of other private firms (17.01), and the difference is statistically significant at the 1% level (t-statistics = 5.41). We also observe the difference when comparing by median; the difference is statistically significant at the 1% level (z-statistics = 9.93). These findings show that the productivity of IPO firms is higher than that of the entire private firm subsample but almost same as that of the matched firms. Furthermore, productivity under lower listing requirements seems to be higher.

Next, we compare the profitability of IPO firms with that of private firms. The two graphs in Figure 2 show that the profitability of pre-IPO firms is higher than that of private firms. The solid lines show the distribution of the growth levels of IPO firms. The two graphs show that the profitability of IPO firms is higher than that of private firms and that the difference is more pronounced in the pre-deregulation period than in the post-

14

deregulation period. This is caused by the listing requirements of the newly established market. As shown in Appendix A, some stock markets established approximately in 2000 as a part of deregulation enabled firms with negative profitability to go public. The profitability of pre-IPO and private firms is compared in Table 4. The findings reveal that the profitability of pre-IPO firms is higher than that of typical private firms. The profitability of IPO firms is 0.15 (0.13) in mean (median) and higher than that of private firms, which is statistically significant at the 1% level. After deregulation, profitability declines. The mean of IPO firms in the post-deregulation period is 0.13 and lower than that of the pre-deregulation period (0.15), which is caused by a relaxation of the profitability requirements. As shown in Figure 2, some stock exchanges allow firms with deficits to go public. In these cases, the deviation of profitability increased. This is shown in the increase of the standard deviation of profitability. The standard deviation of profitability for the pre-deregulation period is 0.09, and increases to 0.14 in the post-deregulation period.

Figures 3 and 4 show the graphs for sales and the number of employees, respectively. When comparing the pre- and post-deregulation periods, both figures show that the peak of the distribution of IPO firm size moves to the left. This indicates that smaller firms are more likely to go public after deregulation. We also find that the size of pre-IPO firms gets smaller in the post-deregulation period. In the pre-deregulation period, the mean of both the natural logarithm of sales and the number of employees of IPO firms is higher than those of private firms and statistically significant (*t*-statistics = 8.16 for ln(*Sales*) and = 8.18 for ln(*Emp*)), but these are lower in the post-deregulation period (*t*-statistics = −7.04 for ln(*Sales*) and = −6.42 for ln(*Emp*)). These results can also be observed when comparing median values. These results show that the IPO firms' size, on average, declines after the deregulation period.

Furthermore, Figure 5 shows the time series changes in firm size. We report the 25 percentile and median of firms' total assets prior to IPO. We use total assets in firm size measurements because in several stock markets, firm size is used as a listing restriction. We find that both the 25 percentile and the median of firm size have decreased since 1995. Before 1995, the 25 percentile of firm size was approximately 7 billion yen to 8 billion

yen, and it decreased to approximately 1 billion yen in the 2000s. This also shows that reducing listing standards enables small firms to go public.

Overall, the comparisons of the levels of performance measures indicate that the characteristics of IPO firms are different from those of other private firms. The serial deregulations in the IPO market change the IPO firm characteristics. In the pre-IPO period, firms planning to go public have higher productivity and profitability. In addition, serial deregulations in IPO markets increase the deviation of firms' productivity or profitability. Deregulations in the IPO market reduce the size of IPO firms: firm size in the pre-IPO stage is larger in the pre-deregulation period and smaller in the post-deregulation period, that is not the case with private firms.

4.2. Going public decision

We conduct a probit analysis to understand firms' going public decisions. The dependent variable takes the value of one if the firm is three years prior to going public, and zero if the firm is private and does not go public within 10 years. The key independent variables are *Post Deregulation*, which equals one if the firm went public in 2000 or later; *TFP*; *Profitability*; two size measures (i.e., ln(*Sales*) and ln(*Emp*)); and an interaction term with *Post Deregulation*. We also add some control variables.

Table 5 shows the results of probit regressions and reports the estimated coefficients. Column 1 uses ln(*Sales*) and column 2 uses ln(*Emp*) as size measures. Both *TFP* and its interaction term with *Post Deregulation* are statistically insignificant. The estimated coefficient of *Profitability* is positive, indicating that highly profitable firms tend to go public, while the interaction term between *Post Deregulation* and *Profitability* is negative in two estimations. This means that in the post-deregulation period, the relationship between profitability and probability of going public weakens compared with the pre-deregulation period, which can be observed in Table 4 and Figure 2. In both columns, the estimated coefficient of firm size is positive and their interaction terms with *Post Deregulation* are negative, suggesting that the probability of going public is higher for smaller firms in the post-deregulation period. Our empirical evidence is consistent with the view that deregulations enable smaller firms to go public.

16

5. The impact of deregulations on firm growth

To investigate the impact of deregulations on firm growth, we compare the growth rates of IPO firms with those of matched firms before and after the deregulations. We report the results in Tables 6–9. As the matched firms, we use public firms in Panel A and private firms in Panel B. We set the period of the first accounting report after the IPO as the period $t = 0$, and compare the growth rate from $t = -3$ to $t = 5$. Because our purpose is to examine the impact of deregulations, in the post-deregulation subsample, we restrict the firms that went public on the newly established stock markets (i.e., Mothers, Heracules, Centrex, Jasdaq NEO, Q-Board, and Ambitious). In each table, columns [a] and [d] report the growth rate (in percentage) of IPO firms in pre- and post-deregulation, respectively, and columns [b] and [e] report those of the matched firms. Columns [c] (= [a] − [b]) and [f] (= [d] − [e]) report the differences in growth between IPO firms and matched firms in pre- and post-deregulation, respectively. Lastly, column [g] (= [f] − [c]) is the difference in excess returns between pre- and post-deregulation. Because our focus in this paper is to understand the impact of the serial deregulations on firm growth, we evaluate our hypotheses by using column [g].

5.1. Impact of deregulations on productivity

Table 6 reports the results for TFP growth. In Panel A, column [a] reports the average TFP growth of IPO firms around the IPO in the pre-deregulation period. The peak of TFP growth is two years prior to their IPOs, and the level is 0.057. After that, the growth rate declines and then becomes negative in periods $t = 1, 2,$ and 3. In column [c], the TFP growth of IPO firms is lower than that of matched public firms both before and after their IPOs; the differences are statistically significant (except $t = 4$). Next, we focus on the post-deregulation period. In contrast to the result in the pre-deregulation period, the growth of IPO firms before their IPOs is higher than that of matched public firms (column [f]). When comparing TFP growth before and after deregulation, the difference is positive and is at a maximum of 29%, but it becomes weaker or disappears in the post-IPO period (column [g]).

Panel B shows that the TFP growth for IPO firms is also lower than that of matched private firms (column [c]). The result suggests that firms that have lower productivity growth choose to go public and that the post-IPO growth of such firms is still low in the pre-deregulation period. In the post-deregulation period, the growth of IPO firms is higher; the difference is statistically significant before the IPO with the exception of the period $t = -1$ and those are negative, especially in the first two years after the IPO (column [f]).

Lastly, we compare the excess growth of TFP before and after deregulation in column [g], which is the difference between the excess TFP growth in the pre-deregulation period (column [c]) and that in the post-deregulation period (column [f]), respectively. In both Panels A and B, the TFP growths before IPO are higher than those of matched firms, This indicates that relaxing the listing requirements enables firms with higher productivity to go public; however, positive growth is not sustained after IPOs, which is consistent with **H5** and rejects **H1**.

However, the difference in excess growth does not sustain. In the post-IPO period, productivity growth after going public decreases in comparison with what was observed before going public. For instance, in Panel A, the difference in excess growth is positive and is at a maximum of 29% before the IPOs, and then it becomes weaker or disappears in the post-IPO period. The result is consistent with **H7**: that relaxing listing requirements does not affect post-IPO productivity. These results imply that IPOs mitigate asymmetric information between the IPO firm and its competitors, thus reducing the competitiveness of the company. Furthermore, IPOs might decrease the firm's investment activities (Asker et al., 2014) or innovation process (Bernstein, 2015). Our evidence is consistent with these arguments.

5.2. Impact on profitability

Table 7 presents the results for profitability growth. Panels A and B show that firms that have higher profitability growth are more likely to go public after deregulation; however, this is not sustained in the post-IPO period. Column [g] in both Panels A and B report the difference in excess profitability growth between the post- and pre-IPO periods and show that the differences in excess growth are positive before IPOs and period t

= 0, which is just after the IPO. This indicates that firms with higher profitability growth on average choose to go public; however, the growth is not sustained after IPOs, which is consistent with **H6**, which predicts that relaxing listing requirements enables profitable firms to go public, and **H8**, which predicts that relaxing listing requirements does not affect post-IPO profitability.

In the pre-IPO period, the profitability growth of IPO firms is higher in both the pre- and post-deregulation periods. Pre-IPO profitability growth is higher in the post-deregulation period. These results suggest that relaxing the listing requirements enables profitable firms to go public. However, the difference diminishes in the post-IPO period.

Overall, the productivity and profitability growth of IPO firms are higher in the pre-IPO period, and the growth disappears or sometimes becomes negative in the post-IPO period. Further, when focusing on the impact of deregulation, we find that both profitability and productivity growth is higher in the post-deregulation period only pre-IPO, which indicates that relaxing listing requirements enables highly productive and profitable companies to go public.

5.3. Impact on firm size

We turn to the results of firms' size growth. As a whole, the results are consistent with hypotheses **H9** and **H10**, which predict that relaxing listing requirements positively affects firms' size growth in the pre- and post-IPO periods. The findings show that IPO firms grow in the pre- and post-IPO periods when compared with both private and public matching firms; excess growth is higher in the period of relaxed listing requirements.

Table 8 reports the sales growth around IPOs and the impact of deregulation in the IPO markets. Panel A compares IPO firms and public firms. The peak of sales growth is three years prior to the IPOs in the pre-deregulation period and two years prior to IPOs in the post-deregulation period. The sales growth of IPO firms is higher than that of matched firms before and after the IPO in both pre- and post-deregulations. In the pre-deregulation period, the difference is positive and statistically significant, at least at the 10% level, not only in the pre-IPO period, $t = -3, -2,$ and -1, but also in the post-IPO period, $t = 3, 4,$ and 5. In Panel B, in the pre-

deregulation period, the sales growth of IPO firms is higher and statistically significant except for $t = 0$, which has only a negative value. In the post-deregulation period, all the differences in sales growth between IPO firms and matched firms are positive and statistically significant at the 1% level, except for three periods, and one of the three is significant at the 5% level.

Next, we investigate the impact of deregulations on sales growth in IPO firms. In column [g] of Panel A, we find that the difference in excess growth is positive and statistically significant in all periods. We also find that, except for two periods, $t = 4$ and $t = 5$ in Panel B, the difference is positive and statistically significant. These results suggest that lowering listing requirements enables growing firms to go public and enables them to grow more after IPOs, which is consistent with **H9** and **10**.

Table 9 presents the change in employment growth as a proxy for firm size. We find that the results are consistent with **H9** and **10**, which predict that relaxing listing requirements positively affects firms' size growth in the pre- and post-IPO periods. The difference between the excess growth of the post- and pre- periods is positive and statistically significant in all periods (column [g] of Panels A and B). This indicates that in the aspect of employment, deregulation provides higher growth for IPO firms. The impact of deregulation is relevant in post-IPO periods. In both Panels, in the pre-deregulation period, the IPO firms' employment growth is pronounced in the pre-IPO period but diminishes in the post-IPO period. In the pre-IPO period, the employment growth of IPO firms is higher than that of matched private and public firms and is statistically significant at the 1% level—both compared with public firms (Panel A) and private firms (Panel B). On the other hand, in the post-IPO period, the difference is first diminished (in period $t = 0$, 1, 2) and then reappears (in $t = 4$ and 5). In contrast, the excess growth does not diminish in the post-deregulation period (column [f]). In the post-deregulation period, the excess growth does not diminish in the post-IPO period. The employment growth of IPO firms is higher in all periods when compared with public firms (Panel A), which is statistically significant at the 1% level and higher until $t = 3$ when compared with private firms (Panel B).

These results suggest that lowering listing requirements enables growing firms to go public and enables them to grow more after IPOs, which is consistent with **H9** and **H10**, which predicts that relaxing listing requirements positively affects firms' size growth in the pre- and post-IPO periods.

6. Conclusion

Although the institutional design of IPO markets has been debated around the world, the relation between the institutional design and performance has not been clearly established in the literature. This study examines whether IPOs stimulate firm growth and whether serial deregulation helps firms with growth potential to go public. Using a long-term panel dataset including both public and private firms, we investigate (i) the impact of IPOs compared with their public/private counterparts and (ii) how deregulations in the IPO market, relaxing listing requirements, or building new markets affect the growth of IPO firms. We use the following measurements as firm growth: (1) productivity, (2) profitability, and (3) the two size measurements of sales and number of employees.

First, we find that the growth of IPO firms differs between the quality and quantity measurements. When conducting the within-firm variation, we find that post-IPO growth declines in both aspects of quality and quantity. The drop in firms' profitability and productivity growth after an IPO is higher in the quality measurements. Furthermore, when compared with their matched firms, we find that post-IPO growth in the aspect of quality is negative, which indicates that IPOs do not necessarily affect the growth of IPO firms' quality.

Second, we investigate the impact of deregulations in IPO markets. We also observe the different effect of deregulations on quality and quantity measurements. We find that, regarding the aspect of quality, serial deregulations do not affect IPO firm growth, both measured by TFP and profitability growth. On the other hand, they have a positive impact on quantity growth, measured by sales and numbers of employee.

This paper contributes to the literature on IPOs specifically in terms of the influence of IPO markets relaxing listing standards and firms' operating growth around IPOs. This paper contributes not only to the academic

literature but also to the literature for policymakers. Although newly established markets or the relaxed listing standards of stock markets are expected to improve the economy by enabling small firms to access the public market, the influence is limited. Why do the deregulations not link to improve the productivity or profitability of IPO firms? This question is far beyond the scope of this study. One possibility is Stigler's (1971) private interest theory, which points out that some private benefit distorts the influence of deregulations and which causes effectiveness of the regulations.

Our findings indicate that although these relaxed listing standards enable such firms to grow faster in terms of firm size, they do not affect the quality of productivity and profitability. On the other hand, the previous literature emphasizes that lowering listing requirements enables low-quality firms to go public; however, our findings indicate that it enables more small firms to access outside financing, which is linked to job creation; this has received less attention in the previous literature. Although job creation is one of the main themes in economics, few studies investigate the relationship between firms' decision to go public and job creation (the few exceptions are Borisov et al., 2012, Ritter, 2013, and Kenney et al., 2012) or whether the development of financial system influences the job creations (Krishnan et al., 2014).

Appendix A: Deregulation of the Japanese IPO market in the 1990s

Japanese stock exchanges deregulated listing requirements and provided new stock markets for start-ups in the 1990s. The over-the-counter (OTC) market, which was the major market for start-ups wishing to go public, and other stock exchanges were deregulated in two ways in 1994: the relaxing of the listing requirements and the withdrawal of the restrictions on the number of IPOs that could take place. First, the OTC market created a new market called *Tentou Tokusoku* for start-ups. The purpose of this market was to enable R&D-based or human-capital-based firms to be listed (*Junkan Shouji Houmu,* 1995). However, only three firms went public on *Tentou Tokusoku,* and it vanished in 1998 after the law on listing requirements was revised. *Junkan Shouji Houmu* (1995) argues that evaluating these firms was difficult for securities companies, which led to a decrease in the number of firms listed on *Tentou Tokusoku*.

Despite this failure, other stock markets such as the TSE and the OSE were created specifically for start-ups. In 1999, the NASDAQ and Softbank, which is an IT-based company in Japan, announced the creation of a new stock market called NASDAQ Japan. However, the NASDAQ withdrew from the partnership in October of the same year because of low profitability. In December 2002, the OSE took over NASDAQ Japan and relaunched it as Hercules. Hercules was subsequently merged with the JASDAQ (see below) in October 2010. Meanwhile, the TSE created a new market for start-ups in November 1999, called the "Market of the High Growth and Emerging Stocks" (Mothers). The Tokyo Stock Exchange also established a stock market for sophisticated investors, named Tokyo AIM in 2009, which is joint program with London AIM. However, only two firms had been listed on the market when the cooperative relationship with LSE resolved in 2012, and it was renamed the Tokyo Pro Market.

Lastly, in July 2001, the OTC market was converted into a stock market and was renamed the JASDAQ following the Financial Reform Law of December 1998; it was to be run by the Japan Securities Dealers' Association (JSDA). JASDAQ created a new market focusing on new technology-oriented companies in 2007, which is named JASDAQ NEO. These three stock markets, JASDAQ, Hercules, and Mothers are often regarded as the top three markets for start-ups in Japan. In addition, other regional securities exchanges such as Sapporo, Nagoya, Osaka, and Fukuoka created their own stock markets for start-up companies.

The second change was that the stock markets and the OTC market withdrew the regulation about the maximum number of listings allowed each week. In 1991, the number of listings on the OTC market was restricted to one firm per week.[10] This number increased slightly thereafter, and in April 1994, the restriction was repealed (*Junkan Shouji Houmu,* 1993).

Owing to these deregulations, the number of IPOs increased throughout the 1990s, from 27 in 1992 to 187 in 1995, which was larger than the number in 1989 and 1990 during the real estate bubble. However, the IPO boom crumbled in 2008: just 49 IPOs took place in that year, one-third the number in the previous year. There

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[10] The purpose of this regulation was to maintain the liquidity of the firms that went public.

has been no recovery in the number of IPOs since then in our sample period. Table Appendix A summarizes the listing requirements for newly established stock markets.

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Table 1 Number of public and private firms included in the NEEDS database

This table presents the number of companies by category and year between 1977 and 2011. *Public firms* are those that were listed on stock exchanges during the sample period. *Private firms* indicate those that were not listed during the sample period. No. of IPOs indicates those firms that went public during the sample period. No. of IPOs for new markets indicates those firms that went public on new market during the sample period.

Year	*Public firms*	*Private firms*	No. of IPOs	No. of IPOs for new markets
1977	1,482	396	6	
1978	1,473	825	16	
1979	1,507	824	29	
1980	1,554	836	19	
1981	1,562	835	27	
1982	1,579	870	30	
1983	1,599	870	26	
1984	1,614	868	28	
1985	1,633	837	38	
1986	1,701	822	50	
1987	1,820	830	52	
1988	1,797	838	66	
1989	1,877	835	92	
1990	2,070	800	110	
1991	2,238	756	138	
1992	2,320	726	75	
1993	2,370	702	49	
1994	2,478	696	109	
1995	2,602	692	151	
1996	2,788	690	182	
1997	2,909	692	144	
1998	3,023	695	121	
1999	3,077	692	91	
2000	3,177	697	141	22
2001	3,317	701	198	68
2002	3,399	689	159	39
2003	3,443	683	135	40
2004	3,474	664	148	49
2005	3,569	671	170	63
2006	3,634	675	167	65
2007	3,731	675	169	73
2008	3,703	500	95	40
2009	3,602	481	38	14
2010	3,496	472	28	6
2011	3,426	514	38	7

Table 2 Distribution by industry

This table presents the number of companies by industry in 1980, 1990, 2000, and 2010. The industry classification is based on the Nikkei two-digit industry codes. We also report the number of public (private) firms. The percentage represents the number of private companies relative to the total number of companies in the same industry.

Industry name	as of 1980			as of 1990			as of 2000			as of 2010		
	No. of public firms	No. of private firms	% of private firms	No. of public firms	No. of private firms	% of private firms	No. of public firms	No. of private firms	% of private firms	No. of public firms	No. of private firms	% of private firms
Food Products	95	30	24.0%	111	48	30.2%	152	33	17.8%	135	21	13.5%
Textiles	66	7	9.6%	65	14	17.7%	71	8	10.1%	55	3	5.2%
Paper	30	11	26.8%	29	13	31.0%	31	9	22.5%	23	2	8.0%
Chemicals	141	46	24.6%	164	57	25.8%	208	29	12.2%	206	14	6.4%
Drugs	35	18	34.0%	39	17	30.4%	52	9	14.8%	52	11	17.5%
Oil	12	4	25.0%	11	3	21.4%	9	4	30.8%	13		0.0%
Rubber Products	17	6	26.1%	18	5	21.7%	25	2	7.4%	22	1	4.3%
Concrete and Glass Products	63	20	24.1%	65	26	28.6%	78	15	16.1%	64	7	9.9%
Steel Works	59	8	11.9%	60	8	11.8%	63	3	4.5%	56	1	1.8%
Precious Metals	96	37	27.8%	103	46	30.9%	148	28	15.9%	136	13	8.7%
Machinery	174	58	25.0%	203	65	24.3%	258	49	16.0%	245	17	6.5%
Electric Equipment	164	62	27.4%	214	55	20.4%	287	64	18.2%	296	19	6.0%
Shipbuilding and Repairing	8		0.0%	7		0.0%	7		0.0%	6		0.0%
Automobiles	59	25	29.8%	64	26	28.9%	90	15	14.3%	81	5	5.8%
Transportation Equipment	16	5	23.8%	18	3	14.3%	19	2	9.5%	13	1	7.1%
Measuring Devices	31	12	27.9%	38	10	20.8%	46	19	29.2%	52	9	14.8%
Manufacturing, Printing	47	26	35.6%	63	41	39.4%	113	29	20.4%	121	9	6.9%
Fish and marine products	5	3	37.5%	7	3	30.0%	10	5	33.3%	10	2	16.7%
Coal Mining	10	5	33.3%	9	5	35.7%	9	5	35.7%	9		0.0%
Construction	138	67	32.7%	158	79	33.3%	244	34	12.2%	185	17	8.4%
Wholesale	127	163	56.2%	204	191	48.4%	375	137	26.8%	379	45	10.6%
Retail	51	33	39.3%	103	81	44.0%	242	90	27.1%	276	23	7.7%
Real Estate	38	66	63.5%	54	78	59.1%	74	136	64.8%	121	43	26.2%
Railroad and Bus Transits	30	49	62.0%	31	57	64.8%	34	56	62.2%	28	47	62.7%
Trucking	15	12	44.4%	17	17	50.0%	37	10	21.3%	36	5	12.2%
Shipping	25	16	39.0%	23	19	45.2%	21	15	41.7%	16	3	15.8%
Air Transportation	5	1	16.7%	6	1	14.3%	7	2	22.2%	5	5	50.0%
Warehousing	28	17	37.8%	32	21	39.6%	39	18	31.6%	44	10	18.5%
Communication Services	7	37	84.1%	8	56	87.5%	21	86	80.4%	36	31	46.3%
Utilities - Electric	9	3	25.0%	10	3	23.1%	10	3	23.1%	11	2	15.4%
Utilities - Gas	9	11	55.0%	9	14	60.9%	11	12	52.2%	13	7	35.0%
Miscellaneous Service, Hotels	59	145	71.1%	127	263	67.4%	386	502	56.5%	751	200	21.0%

Table 3 Comparisons of firm characteristics between IPO firms and public (private) firms

This table presents the results of univariate tests between the characteristics of IPO firms and *Public* (*Private*) firms. ln(Total Assets) is defined as the natural logarithm of total assets. IPO firm in Panel B is firms listed on new markets (Mothers, Heracules, Centrex, Jasdaq NEO, Q-Board, and Ambitious). ROA is operating income divided by total assets at the end of the previous fiscal year. Tangible Assets is defined as tangible assets scaled by total assets. Cash/Assets is defined as (cash and deposit plus cash and cash equivalents) divided by current total assets. Loan/Assets is defined as (short-term loans payable and corporate bonds plus long-term loans payable plus bonds and convertible bonds) divided by current total assets. The significance of the difference in means is assessed using a *t*-test. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Panel A: 1978 to 1995

	IPO firms				Public firms						Private firms					
	No. of obs.	Mean [a]	Standard Deviation	Median	No. of obs.	Mean [b]	Standard Deviation	Median	Diff. [a] − [b]	*t*-statistics	No. of obs.	Mean [c]	Standard Deviation	Median	Diff. [a] − [c]	*t*-statistics
ln(Total Assets)	1,142	9.592	0.873	9.518	27,330	10.744	1.492	10.627	-1.152	-34.74 ***	12,546	9.127	1.380	9.169	0.465	11.19 ***
ROA	1,142	0.148	0.079	0.133	27,330	0.085	0.056	0.079	0.063	46.91 ***	12,546	0.097	0.075	0.085	0.051	22.00 ***
Tangible Assets	1,142	0.996	0.013	0.999	27,330	0.996	0.011	0.999	-0.001	-3.60 ***	12,546	0.994	0.032	0.999	0.001	1.51
Cash/Assets	1,142	0.165	0.097	0.144	27,330	0.148	0.081	0.135	0.017	13.29 ***	12,546	0.157	0.108	0.139	0.007	2.26 **
Loan/Assets	1,142	0.169	0.131	0.154	27,330	0.196	0.156	0.177	-0.027	-4.88 ***	12,546	0.187	0.168	0.156	-0.018	-3.56 ***

Panel B: 2000 to 2011

	IPO firms				Public firms						Private firms					
	No. of obs.	Mean [d]		Median	No. of obs.	Mean [e]	Standard Deviation	Median	Diff. [d] − [e]	*t*-statistics	No. of obs.	Mean [f]	Standard Deviation	Median	Diff. [d] − [f]	*t*-statistics
ln(Total Assets)	432	7.516	1.042	7.414	31,481	10.646	1.495	10.469	-3.129	-43.35 ***	6,241	9.297	1.772	9.289	-1.781	-20.64 ***
ROA	432	0.244	0.144	0.246	31,481	0.075	0.060	0.067	0.169	56.31 ***	6,241	0.060	0.066	0.051	0.184	50.26 ***
Tangible Assets	432	0.952	0.082	0.985	31,481	0.983	0.035	0.993	-0.031	-17.99 ***	6,241	0.984	0.047	0.997	-0.033	-13.11 ***
Cash/Assets	432	0.355	0.208	0.319	31,481	0.137	0.106	0.110	0.218	41.53 ***	6,241	0.135	0.134	0.097	0.220	31.54 ***
Loan/Assets	432	0.152	0.168	0.097	31,481	0.166	0.234	0.125	-0.014	-1.23	6,241	0.189	0.299	0.119	-0.038	-2.58 ***

Table 4 Comparing the measurements between pre-IPO firms and private firms

This table reports the compare the distributions of IPO firms with private firms for four measurements, TFP, earnings, sales, and employees. We report those measurements of IPO firms those three years prior to the IPOs and private firms. IPO firms in post subsample are those listed on new markets (Mothers, Heracules, Centrex, Jasdaq NEO, Q-Board, and Ambitious). ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. Column "t-statistics (vs. all private) reports" the t-test between the IPO firms at t-3 and private firms, those do not go public within ten years. Column "z-statistics (vs. all private) reports" the z-statistics by Willcoxon test between the IPO firms at t-3 and private firms, those do not go public within ten years. Column "mean (matched)" report the mean value of the matched firms.

			No. of obs.	Mean	Standard Deviation	Median	t-statistics (vs. all private)	z-statistics (vs. all private)	Mean (matched)	t-statistics (vs. matched)
TFP	pre	IPO firms ($t-3$)	1,005	15.291	14.727	11.173	2.48 **	4.20 ***	14.99	1.54
		Private firms	10,017	14.511	15.892	9.494				
	post	IPO firms ($t-3$)	300	21.693	18.831	17.033	3.56 ***	6.12 ***	18.72	2.44 **
		Private firms	4,357	17.493	19.854	12.373				
Profitability	pre	IPO firms ($t-3$)	1,005	0.151	0.091	0.130	20.20 ***	18.34 ***	0.15	-0.37
		Private firms	10,053	0.099	0.075	0.087				
	post	IPO firms ($t-3$)	311	0.128	0.173	0.117	15.56 ***	8.42 ***	0.06	5.80 ***
		Private firms	4,515	0.055	0.069	0.047				
ln(Sales)	pre	IPO firms ($t-3$)	1,005	9.660	1.040	9.613	8.16 ***	6.99 ***	9.76	-2.60 ***
		Private firms	10,053	9.209	1.720	9.393				
	post	IPO firms ($t-3$)	311	6.852	1.398	6.950	-13.45 ***	-13.42 ***	6.59	3.28 ***
		Private firms	4,511	8.570	2.224	8.595				
ln(Emp)	pre	IPO firms ($t-3$)	1,005	5.872	0.977	5.886	8.18 ***	7.01 ***	5.97	-2.64 ***
		Private firms	10,053	5.494	1.428	5.700				
	post	IPO firms ($t-3$)	311	3.563	1.122	3.584	-11.52 ***	-12.94 ***	3.26	4.08 ***
		Private firms	4,515	4.852	1.951	4.883				

Table 5 Determination for going public

This table reports the determination for the going public decision. Dependent variable takes the value of one if the firm goes public three years later, and zero if the firm is privately held and does not go public within three years. A probit model is used. *Post Deregulation* takes the value of one if the observation is 2000 or later, and zero otherwise. TFP is estimated by semi-parametric approach proposed by Olley and Pakes (1996). *Profitability* is operating income divided by total assets at the end of the previous fiscal year. ln(*Sales*) is defined as the natural logarithm of sales. ln(*Emp*) is natural logarithm of number of employment. *Cash/Assets* is defined as (cash and deposit plus cash and cash equivalents) divided by current total assets. *Loan/Assets* is defined as (short-term loans payable and corporate bonds plus long-term loans payable plus bonds and convertible bonds) divided by current total assets. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	[1]	[2]
TFP $_{t-1}$	-0.361	-0.207
	(0.439)	(0.32)
… x Post Deregulation	0.560	0.366
	(0.438)	(0.33)
Profitability $_{t-1}$	2.892***	2.863***
	(0.159)	(0.16)
… x Post Deregulation	-1.682***	-1.746***
	(0.237)	(0.24)
ln(Sales) $_{t-1}$	0.0236**	
	(0.0102)	
… x Post Deregulation	-0.0941***	
	(0.0151)	
ln(Emp.) $_{t-1}$		0.021*
		(0.01)
… x Post Deregulation		-0.099***
		(0.02)
Tangibility $_{t-1}$	1.877***	1.902***
	(0.726)	(0.73)
… x Post Deregulation	-2.553***	-2.628***
	(0.802)	(0.80)
Cash/Assets $_{t-1}$	0.471***	0.458***
	(0.119)	(0.12)
… x Post Deregulation	0.296*	0.359**
	(0.172)	(0.17)
Loan/Assets $_{t-1}$	0.618***	0.618***
	(0.0730)	(0.07)
… x Post Deregulation	-0.555***	-0.561***
	(0.0846)	(0.08)
Post Deregulation	2.975***	2.722***
	(0.809)	(0.81)
Year Fixed Effects	*yes*	*yes*
Industry Fixed Effects	*yes*	*yes*
No. of obs.	29,134	29,134
Pseudo R^2	0.123	0.117

31

Table 6 Growth of IPO firms: productivity

This table reports the comparison of the TFP growth rate between IPO firms and public (private) firms for each accounting period. IPO firms in the pre-deregulation period consist of firms that went public before 1995 and in the post-deregulation period are firms that went public after 2000 on new markets (Mothers, Heracules, Centrex, Jasdaq NEO, Q-Board, and Ambitious). The propensity score matching procedure is used to identify the matching firms of each IPO firm in each period between $t = -3$ and $t = 5$. In panel A, matched firms are chosen from a subsample of those that have been listed for at least five years. In panel B, matched firms are chosen from a subsample of firms that are unlisted and will not go public within the next five years. First, by estimating $p_{i,t} = \Phi(\alpha + X\beta)$ using a logit model, we identify the five firms with the nearest scores from the *Public* (*Private*) subsample and then compare the growth measurement for each period. Columns [a] and [d] report the IPO firms' growth for each period, and columns [b] and [e] report the matched firms' growth. The difference between the two subsamples, the excess growth, and the *t*-statistics are reported in columns [c] and [f]. Column [g] shows the difference in excess growth between the pre- and post-deregulation periods, in other words the difference between columns [f] and [c]. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Panel A: IPO firms vs. public firms

| | | Pre-deregulations | | | | Post-deregulations | | | | | Post − Pre | |
| | No. of obs. | IPO firms | Matched-public firms | Diff. | *t*-statistics | No. of obs. | IPO firms | Matched-public firms | Diff. | *t*-statistics | Diff.-Diff. | *t*-statistics |
Period (*t*)		[a]	[b]	[c] (= [a] − [b])			[d]	[e]	[f] (= [d] − [e])		[g] (= [f] − [c])	
−3	1,003	0.052	0.172	-0.120	-11.06 ***	273	0.212	0.147	0.065	1.94 *	0.184	6.81 ***
−2	977	0.057	0.143	-0.086	-8.38 ***	338	0.263	0.058	0.205	6.57 ***	0.291	11.51 ***
−1	986	0.054	0.125	-0.071	-7.37 ***	432	0.259	0.075	0.184	8.00 ***	0.255	12.10 ***
0	1,008	0.019	0.102	-0.083	-10.74 ***	471	0.117	0.097	0.021	0.99	0.103	5.67 ***
1	897	-0.040	0.066	-0.106	-14.13 ***	543	-0.023	0.076	-0.100	-5.48 ***	0.006	0.37
2	804	-0.036	0.041	-0.077	-9.16 ***	514	0.056	0.062	-0.006	-0.29	0.071	3.78 ***
3	759	-0.008	0.032	-0.040	-4.44 ***	465	0.080	0.074	0.006	0.29	0.045	2.37 **
4	675	0.015	0.026	-0.010	-1.04	402	0.052	0.058	-0.005	-0.24	0.005	0.25
5	541	0.005	0.027	-0.022	-2.24 **	326	0.067	0.039	0.028	1.12	0.050	2.16 **

Panel B: IPO firms vs. private firms

| | | Pre-deregulations | | | | Post-deregulations | | | | | Post − Pre | |
| | No. of obs. | IPO firms | Matched-private firms | Diff. | *t*-statistics | No. of obs. | IPO firms | Matched-private firms | Diff. | *t*-statistics | Diff.-Diff. | *t*-statistics |
Period (*t*)		[a]	[b]	[c] (= [a] − [b])			[d]	[e]	[f] (= [d] − [e])		[g] (= [f] − [c])	
−3	1,003	0.052	0.073	-0.021	-2.34 **	273	0.212	0.150	0.061	1.85 *	0.082	3.37 ***
−2	977	0.057	0.072	-0.015	-1.66 *	338	0.263	0.196	0.068	2.19 **	0.082	3.49 ***
−1	986	0.054	0.063	-0.008	-1.04	432	0.259	0.294	-0.035	-1.50	-0.026	-1.34
0	1,008	0.019	0.067	-0.048	-7.22 ***	471	0.117	0.192	-0.075	-3.77 ***	-0.027	-1.63
1	897	-0.040	0.044	-0.085	-11.91 ***	454	-0.070	0.125	-0.195	-10.90 ***	-0.110	-6.81 ***
2	804	-0.036	0.023	-0.059	-7.29 ***	433	0.058	0.093	-0.035	-1.59	0.023	1.20
3	759	-0.008	0.015	-0.023	-2.67 ***	399	0.087	0.103	-0.016	-0.72	0.007	0.38
4	675	0.015	0.013	0.003	0.29	350	0.056	0.077	-0.021	-0.89	-0.024	-1.09
5	541	0.005	0.012	-0.007	-0.73	283	0.074	0.085	-0.011	-0.41	-0.004	-0.17

Table 7 Growth of IPO firms: profitability

This table reports the comparison of the operating growth rate between IPO firms and public (private) firms for each accounting period. IPO firms in the pre-deregulation period consist of firms that went public before 1995 and in the post-deregulation period are firms that went public after 2000 on new markets (Mothers, Heracules, Centrex, Jasdaq NEO, Q-Board, and Ambitious). The propensity score matching procedure is used to identify the matching firms of each IPO firm in each period between $t = -3$ and $t = 5$. In panel A, matched firms are chosen from the subsample of firms that have been listed for at least five years. In panel B, matched firms are chosen from the subsample of firms that are unlisted and will not go public within the next five years. First, by estimating $p_{i,t} = \Phi(\alpha + X\beta)$ using a logit model, we identify the five firms with the nearest scores from the *Public* (*Private*) subsample and then compare the growth measurement for each period. Columns [a] and [d] report the IPO firms' growth for each period, and columns [b] and [e] report the matched firms' growth. The difference between the two subsamples, in terms of excess growth, and the t-statistics are reported in columns [c] and [f]. Column g shows the difference in excess growth between the pre- and post-deregulation periods, in other words the difference between columns [f] and [c]. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Panel A: IPO firms vs. public firms

Period (t)	No. of obs.	IPO firms [a]	Matched-public firms [b]	Diff. [c] (= [a] − [b])	t-statistics	No. of obs.	IPO firms [d]	Matched-public firms [e]	Diff. [f] (= [d] − [e])	t-statistics	Diff.-Diff. [g] (= [f] − [c])	t-statistics
											Post − Pre	
−3	1,005	0.324	0.173	0.150	4.96 ***	308	0.132	-0.126	0.258	1.89 *	0.108	1.16
−2	981	0.294	0.149	0.144	4.56 ***	368	0.683	0.029	0.654	4.75 ***	0.510	5.16 ***
−1	1,003	0.268	0.172	0.096	3.52 ***	449	0.872	-0.030	0.901	8.21 ***	0.806	9.60 ***
0	1,047	0.139	0.175	-0.035	-1.89 *	480	0.595	0.036	0.559	7.22 ***	0.595	10.03 ***
1	919	-0.016	0.115	-0.131	-6.48 ***	559	-0.174	-0.050	-0.124	-1.85 *	0.007	0.12
2	819	-0.051	0.053	-0.103	-3.80 ***	536	-0.072	-0.039	-0.034	-0.45	0.070	1.01
3	776	-0.020	0.028	-0.048	-1.38	488	-0.083	-0.031	-0.052	-0.77	-0.005	-0.07
4	691	0.033	0.028	0.004	0.11	425	-0.097	-0.037	-0.060	-0.70	-0.065	-0.78
5	551	-0.017	0.054	-0.071	-1.80 *	340	-0.056	-0.043	-0.013	-0.14	0.058	0.68

Panel B: IPO firms vs. private firms

Period (t)	No. of obs.	IPO firms [a]	Matched-private firms [b]	Diff. [c] (= [a] − [b])	t-statistics	No. of obs.	IPO firms [d]	Matched-private firms [e]	Diff. [f] (= [d] − [e])	t-statistics	Diff.-Diff. [g] (= [f] − [c])	t-statistics
											Post − Pre	
−3	1,005	0.324	0.262	0.062	2.26 **	308	0.132	-0.180	0.312	2.16 **	0.251	2.67 ***
−2	981	0.294	0.283	0.011	0.41	368	0.683	-0.326	1.009	7.22 ***	0.999	10.44 ***
−1	1,003	0.268	0.243	0.024	1.06	449	0.872	-0.447	1.319	10.97 ***	1.295	14.81 ***
0	1,047	0.139	0.290	-0.150	-7.91 ***	480	0.595	-0.152	0.747	9.64 ***	0.897	15.08 ***
1	919	-0.016	0.154	-0.170	-8.46 ***	469	-0.223	-0.010	-0.213	-2.90 ***	-0.043	-0.72
2	819	-0.051	0.057	-0.107	-3.69 ***	455	-0.068	-0.046	-0.023	-0.28	0.084	1.16
3	776	-0.020	0.068	-0.088	-2.55 **	421	-0.109	0.015	-0.124	-1.61	-0.035	-0.48
4	691	0.033	0.059	-0.026	-0.67	371	-0.127	0.055	-0.183	-1.94 *	-0.157	-1.81 *
5	551	-0.017	0.066	-0.082	-2.08 **	297	-0.048	0.058	-0.106	-1.05	-0.023	-0.25

Table 8 Growth of IPO firms: size (sales)

This table reports the comparison of the sales growth rate between IPO firms and public (private) firms for each accounting period. IPO firms in the pre-deregulation period consist of firms that went public before 1995 and in the post-deregulation period are firms that went public after 2000 on new markets (Mothers, Heracules, Centrex, Jasdaq NEO, Q-Board, and Ambitious). The propensity score matching procedure is used to identify the matching firms of each IPO firm in each period between $t = -3$ and $t = 5$. In panel A, matched firms are chosen from the subsample of firms that have been listed for at least five years. In panel B, the matched firms are chosen from the subsample of firms that are unlisted and will not go public within the next five years. First, by estimating $p_{i,t} = \Phi(\alpha + X\beta)$ using a logit model, we identify the firm with the nearest score from the *Public* (*Private*) subsample, and then we compare the growth measurement for each period. Columns [a] and [d] report the IPO firms' growth for each period, and columns [b] and [e] report the matched firms' growth. The difference between the two subsamples, in excess growth, and the *t*-statistics are reported in columns [c] and [f]. Column [g] reports the difference in excess g

Panel A: IPO firms vs. public firms

Period (t)	No. of obs.	IPO firms [a]	Matched-public firms [b]	Diff. [c] (= [a] − [b])	t-statistics	No. of obs.	IPO firms [d]	Matched-public firms [e]	Diff. [f] (= [d] − [e])	t-statistics	Diff.-Diff. [g] (= [f] − [c])	t-statistics
−3	1,005	0.160	0.121	0.038	5.45 ***	304	0.516	0.015	0.501	18.75 ***	0.462	23.73 ***
−2	981	0.153	0.128	0.025	3.27 ***	369	0.562	0.081	0.481	19.51 ***	0.456	23.38 ***
−1	1,003	0.143	0.118	0.026	3.60 ***	450	0.526	0.111	0.414	19.31 ***	0.388	21.72 ***
0	1,047	0.100	0.106	-0.006	-1.09	481	0.431	0.109	0.322	15.91 ***	0.329	20.42 ***
1	919	0.066	0.059	0.007	1.25	558	0.225	0.078	0.147	8.67 ***	0.140	9.19 ***
2	819	0.048	0.043	0.006	0.98	535	0.177	0.054	0.123	7.60 ***	0.117	7.85 ***
3	776	0.043	0.033	0.010	1.78 *	488	0.126	0.043	0.084	5.39 ***	0.074	5.22 ***
4	691	0.053	0.034	0.019	2.97 ***	425	0.100	0.046	0.054	3.26 ***	0.034	2.25 **
5	551	0.048	0.036	0.012	1.84 *	341	0.112	0.031	0.081	4.13 ***	0.069	3.95 ***

Panel B: IPO firms vs. private firms

Period (t)	No. of obs.	IPO firms [a]	Matched-private firms [b]	Diff. [c] (= [a] − [b])	t-statistics	No. of obs.	IPO firms [d]	Matched-private firms [e]	Diff. [f] (= [d] − [e])	t-statistics	Diff.-Diff. [g] (= [f] − [c])	t-statistics
−3	1,005	0.160	0.131	0.029	3.88 ***	304	0.516	0.083	0.433	15.05 ***	0.404	19.33 ***
−2	981	0.153	0.122	0.030	4.00 ***	369	0.562	0.089	0.474	17.85 ***	0.443	21.65 ***
−1	1,003	0.143	0.102	0.041	5.96 ***	450	0.526	0.181	0.345	16.79 ***	0.304	17.71 ***
0	1,047	0.100	0.119	-0.020	-3.43 ***	481	0.431	0.176	0.255	13.05 ***	0.275	17.48 ***
1	919	0.066	0.072	-0.006	-0.94	468	0.221	0.096	0.126	7.05 ***	0.131	8.66 ***
2	819	0.048	0.052	-0.004	-0.63	454	0.202	0.096	0.105	5.75 ***	0.109	6.86 ***
3	776	0.043	0.035	0.008	1.37	421	0.139	0.099	0.040	2.26 **	0.032	2.10 **
4	691	0.053	0.028	0.025	3.76 ***	371	0.116	0.093	0.023	1.21	-0.002	-0.10
5	551	0.048	0.032	0.016	2.35 **	298	0.130	0.116	0.014	0.59	-0.002	-0.09

34

Table 9 Growth of IPO firms: size (employment)

This table reports the comparison of the employment growth rate between IPO firms and public (private) firms for each accounting period. IPO firms in the pre-deregulation period consist of firms went public before 1995 and in the post-deregulation period are firms went public after 2000 on new markets (Mothers, Heracules, Centrex, Jasdaq NEO, Q-Board, and Ambitious). The propensity score matching procedure is used to identify the matching firms of each IPO firm in each period between $t = -3$ and $t = 5$. In Panel A, matched firms are chosen from the subsample of firms that have been listed for at least five years. In panel B, matched firms are chosen from the subsample of firms that are unlisted and will not go public within the next five years. First, by estimating $p_{i,t} = \Phi(\alpha + X\beta)$ using a logit model, we identify the firm with the nearest score from the *Public* (*Private*) subsample and then compare the growth measurement for each period. Columns [a] and [d] report the IPO firms' growth for each period, and columns [b] and [e] report the matched firms' growth. The difference between the two subsamples, in excess growth, and the t-statistics, are reported in columns [c] and [f]. Column [g] shows the difference in excess growth between the pre- and post-deregulation periods, in other words the difference between columns f and [c]. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Panel A: IPO firms vs. public firms

Period (t)	No. of obs.	IPO firms [a]	Matched-public firms [b]	Diff. [c] (= [a] − [b])	t-statistics	No. of obs.	IPO firms [d]	Matched-public firms [e]	Diff. [f] (= [d] − [e])	t-statistics	Diff.-Diff. [g] (= [f] − [c])	t-statistics
											Post − Pre	
−3	1,003	0.128	0.036	0.092	11.25 ***	304	0.423	0.026	0.396	16.48 ***	0.304	15.27 ***
−2	978	0.139	0.040	0.099	13.23 ***	364	0.465	0.056	0.409	17.93 ***	0.309	16.69 ***
−1	986	0.125	0.039	0.086	12.78 ***	447	0.391	0.045	0.346	17.94 ***	0.260	15.91 ***
0	1,008	0.084	0.055	0.029	5.11 ***	479	0.355	0.066	0.290	18.31 ***	0.261	19.18 ***
1	898	0.077	0.034	0.043	8.78 ***	560	0.244	0.066	0.178	12.15 ***	0.135	10.32 ***
2	807	0.066	0.022	0.044	8.05 ***	536	0.161	0.057	0.104	7.42 ***	0.060	4.57 ***
3	765	0.049	0.024	0.026	4.83 ***	489	0.112	0.051	0.061	4.42 ***	0.036	2.76 ***
4	683	0.045	0.026	0.019	2.99 ***	424	0.097	0.043	0.054	3.73 ***	0.035	2.54 **
5	546	0.047	0.039	0.008	1.29	341	0.116	0.045	0.071	3.81 ***	0.063	3.72 ***

Panel B: IPO firms vs. private firms

Period (t)	No. of obs.	IPO firms [a]	Matched-private firms [b]	Diff. [c] (= [a] − [b])	t-statistics	No. of obs.	IPO firms [d]	Matched-private firms [e]	Diff. [f] (= [d] − [e])	t-statistics	Diff.-Diff. [g] (= [f] − [c])	t-statistics
											Post − Pre	
−3	1,003	0.128	0.074	0.055	7.46 ***	304	0.423	0.000	0.422	16.25 ***	0.368	18.82 ***
−2	978	0.139	0.067	0.072	9.83 ***	364	0.465	0.020	0.445	19.04 ***	0.373	20.07 ***
−1	986	0.125	0.061	0.064	9.67 ***	447	0.391	0.109	0.282	15.62 ***	0.218	13.93 ***
0	1,008	0.084	0.073	0.011	1.81 *	479	0.355	0.096	0.259	16.62 ***	0.248	18.11 ***
1	898	0.077	0.050	0.027	5.45 ***	470	0.280	0.048	0.232	14.56 ***	0.205	15.24 ***
2	807	0.066	0.043	0.023	3.89 ***	455	0.183	0.064	0.119	7.49 ***	0.096	6.76 ***
3	765	0.049	0.035	0.014	2.67 ***	422	0.121	0.075	0.046	2.90 ***	0.032	2.30 **
4	683	0.045	0.039	0.006	0.94	370	0.111	0.065	0.046	2.74 ***	0.040	2.61 ***
5	546	0.047	0.035	0.012	1.84 *	298	0.135	0.088	0.047	2.22 **	0.035	1.95 *

Table Appendix A Listing requirements for the TSE and the Other Exchanges for Emerging Companies

This table reports the listing requirements of the major stock markets for which modified requirements were established after 1999. The second section of the Tokyo Stock Exchange (TSE) was established in 1961 and the listing requirements were modified in 2000. Mothers is the stock market created by the TSE. NASDAQ is the stock market jointly created by the Osaka Stock Exchanges (OSE) and Softbank. JASDAQ was an over the counter (OTC) market and was reorganized into a stock market that was renamed JASDAQ. Centrex is the stock market created by the Nagoya Stock Exchange.

|	TSE second section	Mothers	NASDAQ Japan (growth standard)	JASDAQ (second standard)	Centrex
Established	in 2000	11/1999	05/2000	in 2000	10/1999
Net assets	At least 1 billion yen on a consolidated basis and a positive figure on a unconsolidated basis in latest fiscal year end	No requirement	More than 400 million yen	No requirement	No requirement
Profits	a. Two fiscal years age At least 400 million yen in latest fiscal year and 100 million yen, or b. Three fiscal years ago At least 400 million yen in latest fiscal year, 100 million yen and a total of 600 million yen over latest three years	No requirement	More than 75 million yen	No requirement	No requirement
Market value	More than 2 billion yen	More than 500 million yen at IPO	More than 5 billion yen	More than 500 million yen at IPO	More than 500 million yen at IPO
Firm age	At least three years old	No requirement	At least one year old	Less than ten years old	At least one year old
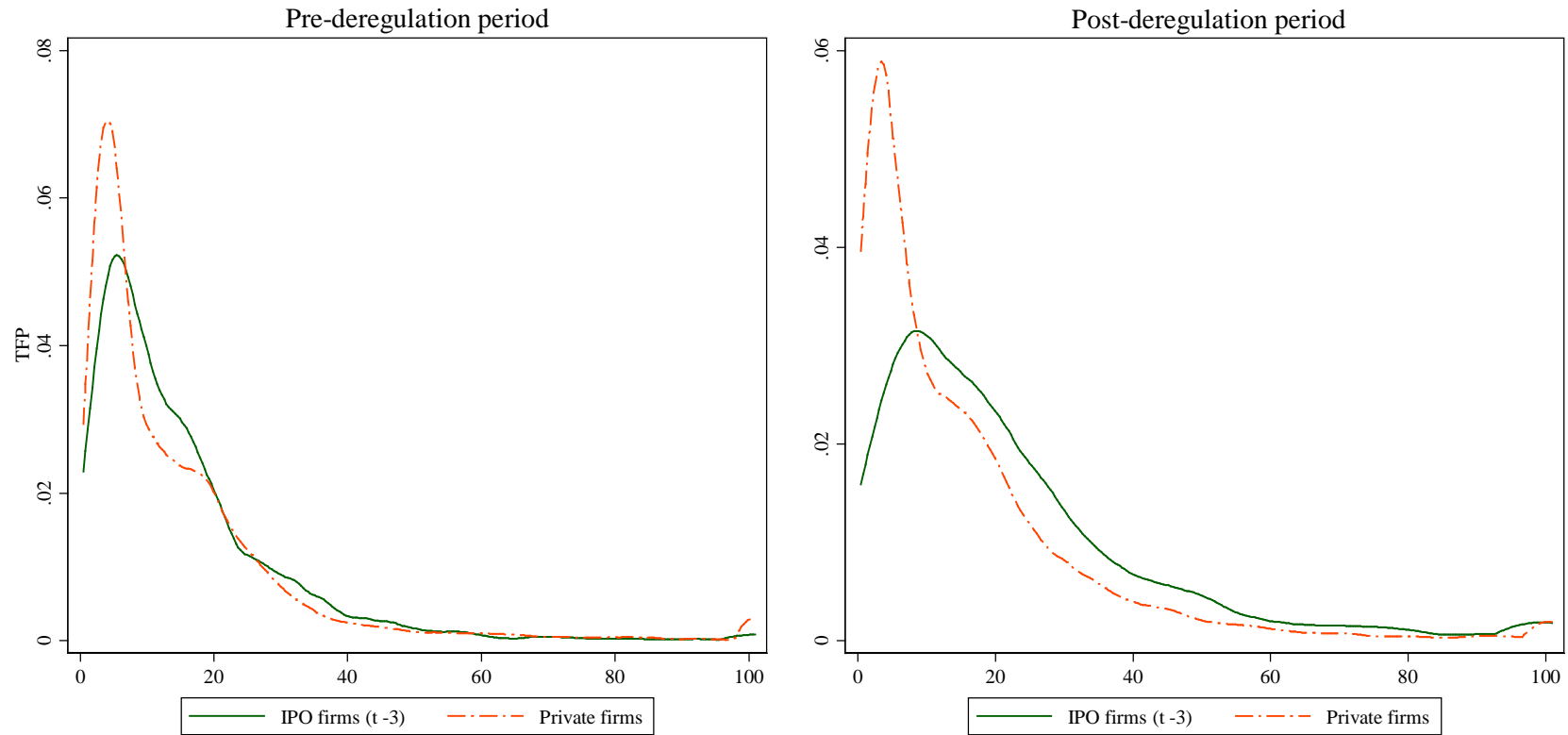
Fig. 1 Comparing of productivity between IPO firms and private firms at pre and post deregulation period

The figures plot the distributions of the level of TFP of IPO firms at three years prior to their IPOs (the solid line) and that of private firms (the broken line). The left graph plots the levels of TFP in the pre-deregulation period and the right graph plots those in the post-deregulation period.
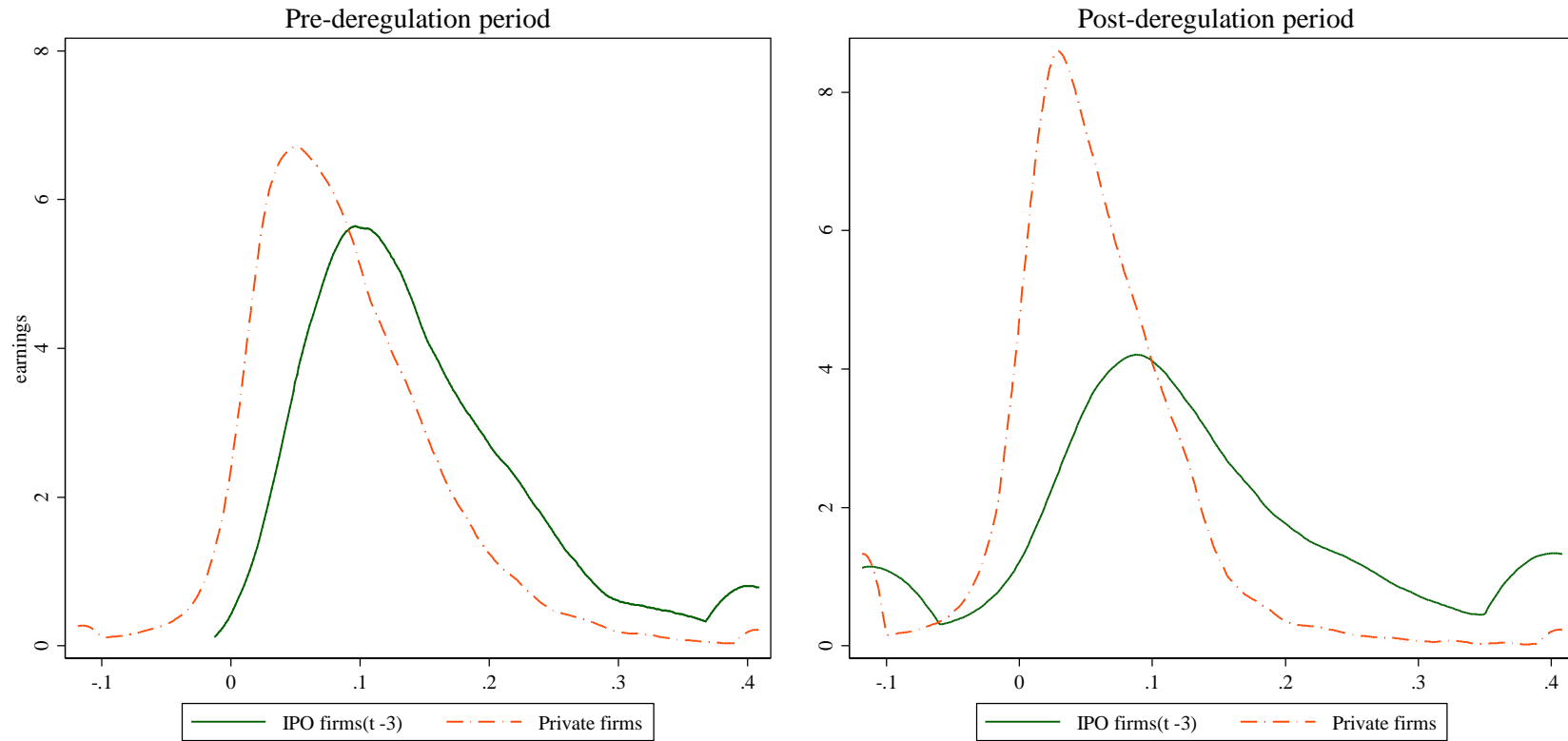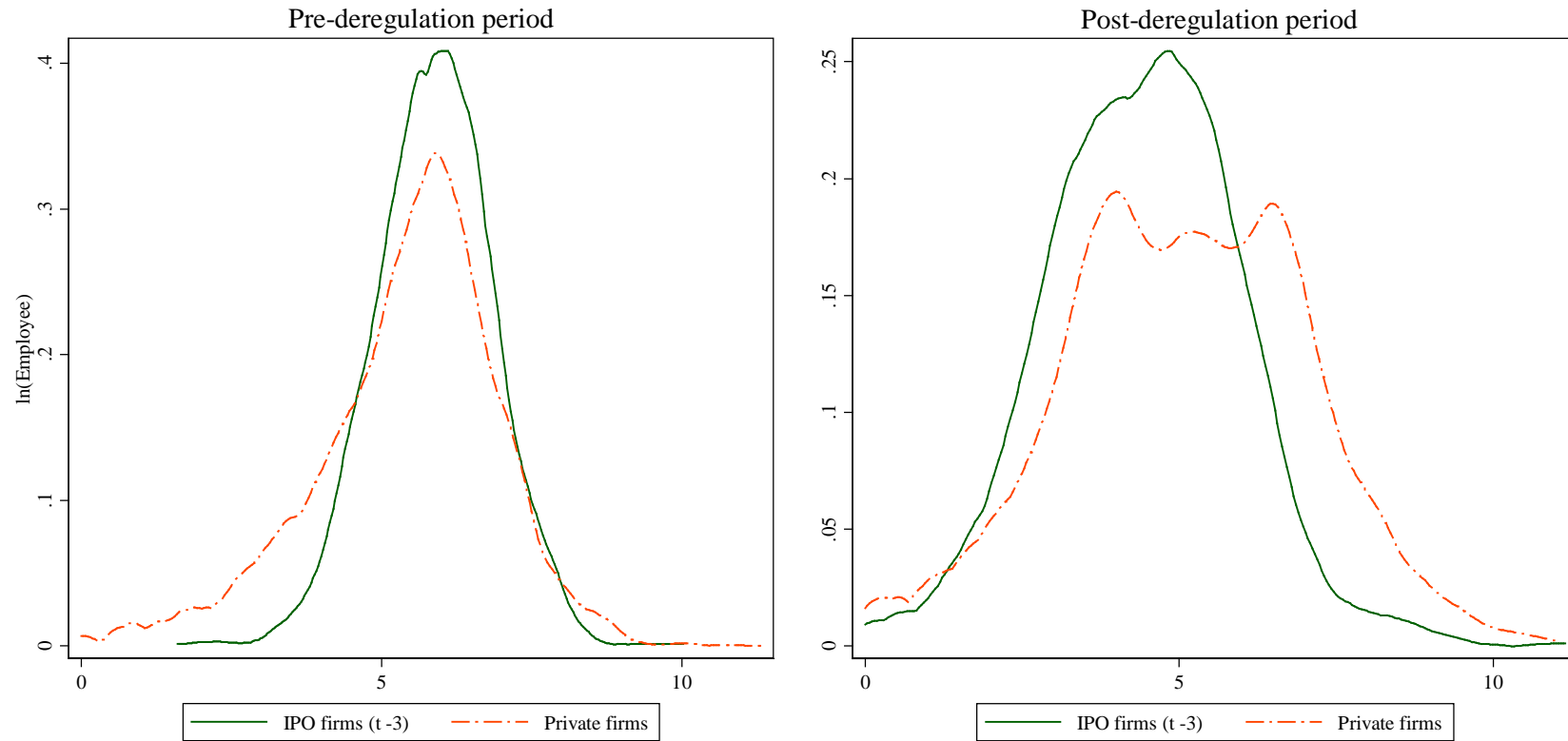
Fig. 2 Comparing of profitability between IPO firms and private firms in the pre- and post-deregulation periods
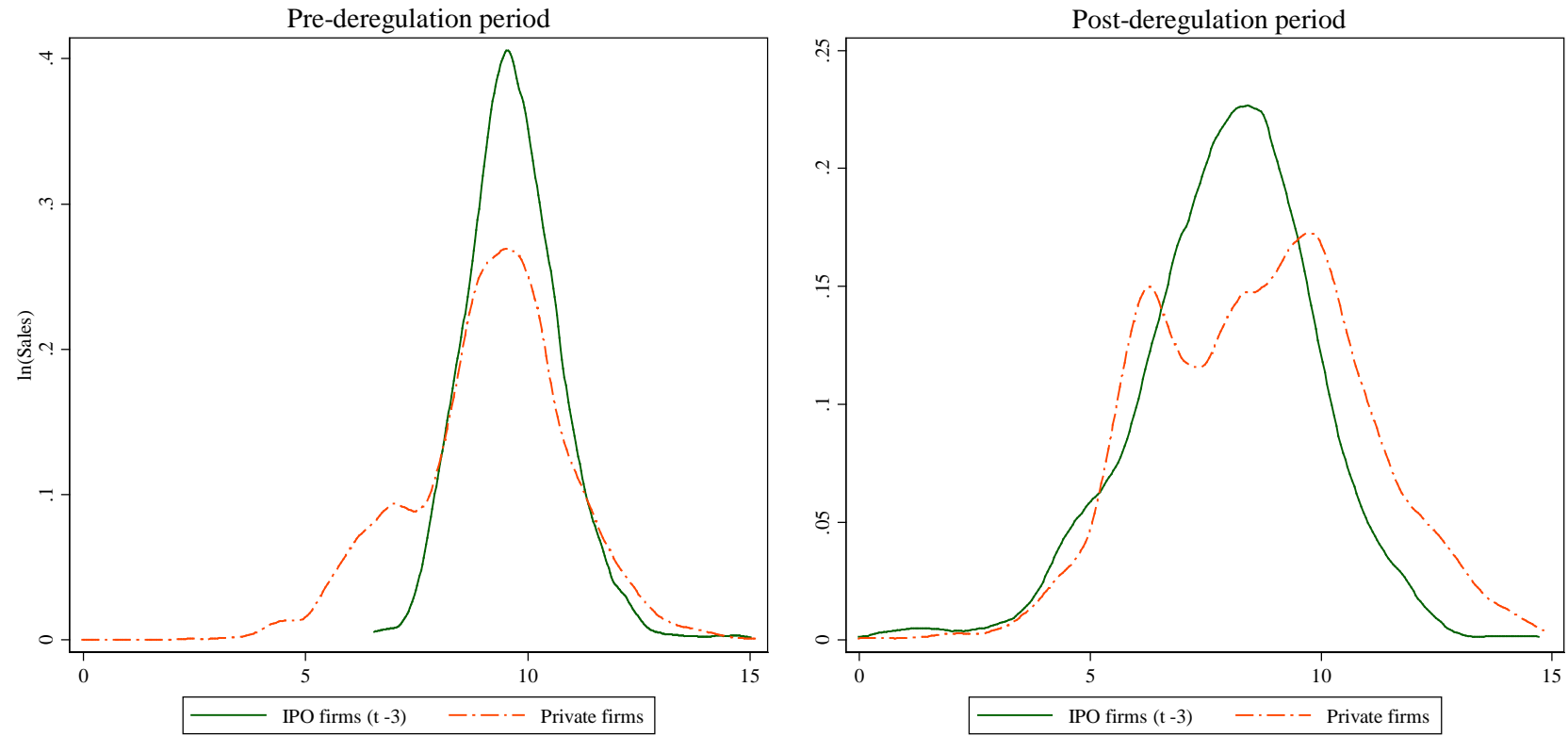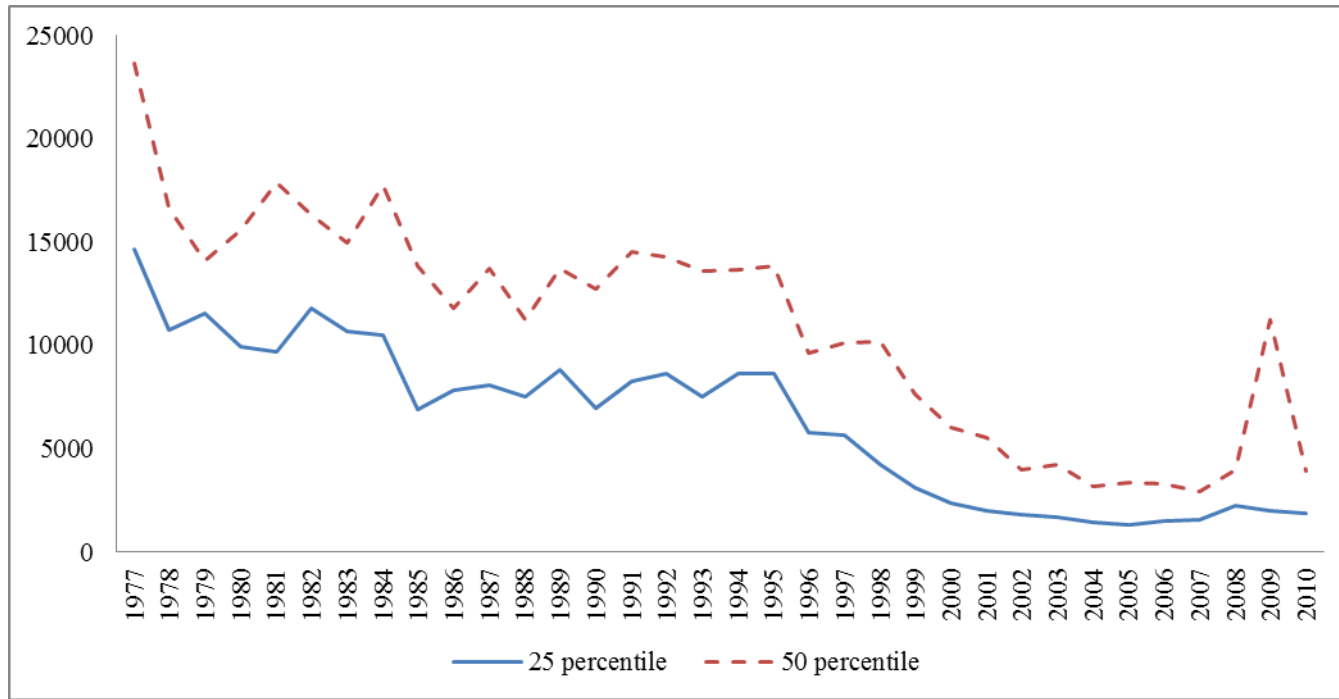
Fig. 3 Comparing sales between IPO firms and private firms in the pre- and post-deregulation periods

Fig. 4 Comparing asset size between IPO firms and private firms in the pre- and post-deregulation periods

Fig. 5 IPO firm size by year