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Performance of Newly Listed Firms: Evidence from Japanese firm and venture capital data

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Performance of Newly Listed Firms: Evidence from Japanese firm and venture capital data*

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Abstract

This paper investigates the effect of Initial Public Offerings (IPOs) on firm performance. To single out the economic effects on firm performance brought about by issuing IPOs, we employ propensity-score matching difference-in-differences estimation. Using a unique firm-level panel dataset that allows us to identify newly listed firms and those keeping unlisted status, we find that the former showed better performance than their never-listed counterparts prior to their IPO while the difference in performance partly diminished after the IPO. This implies that firms' distorted behavior originating from, for example, empire building motives prevents newly listed firms from performing. This result is mainly driven by the sample firms going public during a "hot market". Using the information on venture capital (VC) investment, we also find that the participation of VC in investments exacerbates such negative impacts of IPOs on firm performance. The adverse impact on firm performance is more sizable among IPO firms which are invested in by VC syndicates consisting of a smaller number of less heterogeneous VC, or not including foreign VC. These results suggest that the timing of going public and the composition of VC syndicates are related to the post-IPO performance of newly listed firms.

Keywords: IPO; Firm performance; Venture capital; Distorted firm behavior

JEL classification: G24, G32, D24, L25

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1. Introduction

Firms go public with various prospective motivations. To illustrate, expanding financial channels to stock market through Initial Public Offering (IPO), firms alleviate financial friction. Being recognized by broader business entities and consumers, newly listed firms also enjoy benefit in the context of marketing and public relations. Listed firms, however, could also suffer from obstacles, which distort their optimal behaviors. Such distortion includes short-termism originating from the pressures in stock market (Stein 1989), manager's empire building motives (Stulz 1990), or inactive behavior of firm managers (Bertrand and Mullainathan 2003). In response to such theoretical discussion, a few extant studies have tried to identify the impact of being listed on firms' behavior and performance (Asker et al. 2012). More precisely, it has been an important empirical issue whether the economic causal impact running from being listed is positive or negative.

Although the horserace between the two competing empirical implications obtained from theoretical discussions is conceptually straightforward, researchers find it difficult to examine the relationship due to identification problems: while going public generates various impacts on firms' performance, the performance of firms also affects the likelihood of IPO. Such a concern about the simultaneous determination of firm performance and the decision of going public makes it difficult to establish causality running from being listed to firms' performance. This paper tackles this problem by taking advantage of the rich panel dataset consisting of newly listed firms and a number of unlisted firms which have not yet established IPO. This dataset allows us to match a newly listed firm (i.e., *treatment*) with a firm which (i) has similar characteristics to the treated firm in terms of the likelihood of IPO but (ii) not yet established IPO (i.e., *control*).

As another key theme of this paper, we also study the role of Venture Capital (VC) in the context of the economic impact of being listed. VC is a class of financial intermediaries that finances venture firms mainly through equity investment (Gompers and Lerner 2001) prior to IPO. It provides

funds, screens investment targets, and gives various advices aiming at adding value to the firms. The object of VC is successful exits from investments with higher return through, for example, IPO. Although VCs are supposed to employ their strategic, management, marketing, and administrative expertise to achieve the successful exits (Cumming et al. 2005), it is still not self-evident whether their participation in investments and the provision of their expertise lead to long-term improvement in firm performance or not. Specifically, during the hot market right after the introduction of Japanese emerging stock markets (e.g., TSE-MOTHERS), it had been said some of VCs induced unpromising venture firms to go public for making profits from selling their shares at the timing of IPO. If this sort of VCs' motivation is dominating, VC participation might not lead to better performance of client firms. Thus, our interest is in how and to what extent VC contributes to firms' post-IPO performance through their presumed roles.

This paper focuses on the IPO of Japanese firms after 2001. We examine whether IPOs of firms with or without being invested by VCs had a positive or negative impact on the performance of newly listed firms in the comparison with unlisted firms which show similar characteristics to listed firms but not establish IPO. To do so, we construct and use a unique firm-level dataset compiled from various sources. The dataset includes the information that allows us to identify firms' IPO timing, and the information of VC investment to each sample firm. Thus, our sample consists of four groups of firms: IPO firms not invested by VCs, IPO firms invested by VCs, non-IPO firms not invested by VCs, and non-IPO firms invested by VCs.[1] By comparing the change in the performance of IPO firms with/without being invested by VCs and non-IPO firms without invested by VCs, we can single out the effect of going public on the performance of firms.

Our main findings can be summarized as follows. First, newly listed firms showed better performance than never-listed control firms prior to IPO while the difference in the performance

[1] Precisely speaking, we will exclude the last group from our analysis, and focus on two separate comparisons between A) IPO firms not invested by VCs and non-IPO firms not invested by VCs, and B) IPO firms invested by VCs and non-IPO firms not invested by VCs.

partly diminished after establishing IPO. This implies that firms' distorted behavior originating from being listed possibly prevents newly listed firms from performing. Namely, in the case of IPO firms without being invested by VCs prior to IPO, the return on asset of these treated firms is 5-6% higher than control firms (i.e., counterpart non-IPO firms without being invested by VCs) before going to public. Such a margin of performance, however, partly diminishes after IPO. Since we chose the control firms so that the likelihood of IPO for not IPO firm in a counter-factual environment is same as that for the treated firm, such a change in the performance difference between treated and control is not a consequence of selection bias. Note that the result does not either reflect unobservable time-invariant firm-specific effect since we focus on the change in performance. We confirm, thus, the result implies that the change of firms' listed status had a significant causal adverse effect on firm performance. Second, we find that this result is mainly driven by the firms going public during the hot market from 2001 to 2005. On the other hand, there is no adverse impact found in the case of firms going public after 2005. Third, using the information on Venture Capitals (VCs) investment, we also find that the participation of VCs in investments exacerbates such negative impact of IPO on firms' performance. More precisely, in the case of IPO firms being invested by VCs prior to IPO, the return on asset (ROA) of these treated firms is 3-4% higher than control firms (i.e., counterpart non-IPO firms without being invested by VCs) before going to public. Surprisingly, the adverse effect (around -4 to -5%) on firm performance originating from going public not only offsets the performance advantage prior to IPO but also dominates it. Given another finding that the asset size of IPO firms is confirmed to become larger than their counterpart non-IPO firms, we conjecture that the overinvestment of VC-backed newly listed firms after going public is the main source of their deteriorated post-IPO performance. Lastly, we find that this adverse impact originating from IPO with VCs are more apparent in the case of VC syndicates with a small number of less heterogeneous VCs. It is also found that VC syndicates including foreign VCs do not exhibit this mechanism.

The contributions of this paper to the literature are at least twofold. First, by using a rich panel dataset containing not only newly listed firms but a number of unlisted firms, we can implement propensity-score matching difference-in-differences estimation, which allows us to circumvent the identification problem faced by many existing studies. More specifically, the present paper establishes a causal mechanism that going public prevents firms performing. Asker et al. (2012) examines the capital investment behavior of listed and unlisted firms using a firm level dataset including both the listed and unlisted U.S. enterprises, but our uniqueness rests on the fact that we investigate the negative impact of going public to firms not only on firms' behavior but also on their long-run performance as well. Second, we are able to provide evidence for the long-run impact of the participation of venture capitals in a clearer manner than many of the previous studies did in the past. Namely, many of the studies that investigate the effects of VC investments use stock price or short-run performance change after IPO and thus are unable to clarify the long-run effects of IPO on individual firms.

The rest of the paper is structured as follows. Section 2 reviews the related literature and our contribution in greater detail. Section 3 describes our data. Sections 4 and 5 report our methodology and results for the impact of going public on firm performance, respectively. Section 6 extends the analysis to several sub-sample analyses. Section 7 summarizes the results and concludes.

2. Literature Review

2.1 Economic Implication of Going Public

A vast literature has been documenting the empirical facts about the impact of going public. For example, reflecting the conjecture that going public alleviates financial constraints faced by firms, a number of studies confirm that private firms suffer from higher external finance costs (e.g.,

Brav 2009; Saunders and Steffen 2011). One important research strand in this context concentrates on friction faced by listed firms. The idea is that firms going public encounter managerial myopia discussed in Stein (1989), which is a pressure for company executives to show higher performance measure by, for example, the level of profit. Such distorted motivation leads to insufficient investment, which could result in poor long-run performance. Empire-building motives originating from manager's entrenchment behavior (Stulz 1990) and inactive attitudes aiming at "quiet-life" (Bertrand & Mullainathan 2003) would also generate suboptimal choice from the standpoint of firms' value-maximization.

Due to the increasing availability of unlisted firm data, for example, by Sageworks, a growing number of studies have been examining the implication of firms' listed status in the context of firm behavior.[2] Asker et al. (2013) examine capital investment of listed and unlisted firms and find that the former invests much less than the latter. This result is consistent with the empirical finding already established by using smaller size of datasets, for example, in Sheen (2009).

The paper is most closely related to a group of literature that examines the impact of listed status onto firm performance. In this context (e.g., accounting profit), a number of extant studies have pointed out that managers of listed firms tend to avoid negative earnings surprise (Baber et al. 1991; Skinner and Sloan 2002; Bhojraj et al. 2009). Compared to these studies, our uniqueness rests on identifying a clear causal relation running from IPO to firm performance by using a rich panel dataset containing a number of listed and unlisted firms.

2.2 Contribution of Venture Capitals

From border perspective apart from direct impact of going public, there is a vast literature that examines empirically the roles of VC investment in the context of firm performance. Most of the extant studies in this line focus on the stock prices before and after IPO (e.g., Megginson and

[2] https://www.sageworksinc.com/default.aspx

Weiss 1991; Jain and Kini 1995; Brav and Gompers 1997; Kutsuna et al. 2002; Da Silva Rosa et al. 2003; Wang et al. 2003; Tykvová and Walz 2003; Tykvová 2004; Lee and Wahal 2004; Florin 2005; Arthurs and Busenitz 2006).

One important theme in this field is the implication of the characteristics of each VC and syndication of VCs. Many papers find that the experience and reputation of VCs affect the performance of their investment (e.g., Megginson and Weiss 1991; Lerner 1994; Jain and Kini 1995; Gompers 1996; Brander et al. 2002; Wang et al. 2003; Rindermann 2003; Chang 2004; Lee and Wahal 2004; Arthurs and Busenitz 2005; Giot and Schwienbacher 2006; Hochberg et al. 2007; Miyakawa and Takizawa 2012). As another strand of research, there is growing group of studies examining the relationship between the performance of investment and the types of VCs. For example, Tykvová and Walz (2007) find that the involvement of independent or foreign-owned VCs contributes to better performance of investments. Hamao et al. (2000) and Tykvová (2004) also emphasize the role of including independent VC in syndication.

Among limited examples studying Japanese firms, Kutsuna et al. (2000) find a positive correlation between the share of VC investments and the performance of firms after IPO. Kutsuna et al. (2002) also compares the change in difference in firm performance before and after IPO but the result is not supporting significant effect originating from VC participation. Okamuro and Hisa (2005) implement the similar analysis and confirm positive contribution of VC syndicate.

3. Data

3.1 Data sources

We rely primarily on two groups of firm-level data sources. First, information on unlisted and listed firms' financial characteristics is obtained from the *Basic Survey of Business Structure and*

Activities (BSBSA; *Kigyo Katsudou Kihon Chosa* in Japanese) compiled by the Ministry of Economy, Trade and Industry, and *Development Bank of Japan (DBJ) Financial Databank System*. The main purpose of the former survey is to gauge quantitatively the activities of Japanese enterprises, including capital investment, exports, foreign direct investment, and investment in research and development. To this end, the survey covers the universe of enterprises in Japan with more than 50 employees and with paid-up capital of over 30 million yen. From this data source, we obtain the major financial characteristics of unlisted firms. The latter dataset contains all the information about listed firms.

Second, we use the firm and investment round-level dataset provided by Japan Venture Research Co., LTD (JVR), a growing business data bureau focusing on start-up firms in Japan. The data covers all the IPOs dated from 2001 to 2011. The data consist of, for example, firm identification, IPO date, and the market where the firms are initially listed. An important feature of this data is that it stores the list of all VCs investing to each firm and the investment amount from each VC to the firm in each investment round. The data also store a part of the characteristics of each VC and entrepreneurial firms such as industry classification and location.

These datasets allows us to construct a unique firm-level dataset, which consists of four groups of firms: A) IPO firms invested by VCs, B) IPO firms not invested by VCs, C) non-IPO firms not invested by VCs, and D) non-IPO firms invested by VCs. The first group is identified by the list of firms in JVR data. Since DBJ data contains the list of all the newly listed firms, we can also identify the second group. A separate dataset provided by JVR contains the list of unlisted firms which have been invested by VCs, which leads to the last group. The residual firms are treated as the third group. Figure 1 illustrates the sample sizes of each group.

Using the financial characteristics stored in the datasets, we can match a newly listed firm (i.e., *treatment*) with a firm which has similar characteristics to the treated firm in terms of the

likelihood of IPO but not establishing IPO (i.e., *control*). As we detail later, by using the propensity of IPO conditional on firm characteristics, we match IPO firms with/without being invested by VCs with non-IPO firms not invested by VCs. In this sense, we ensure the exogeneity of IPO without being invested by VCs as well as the exogeneity of IPO with being invested by VCs.[3] By comparing the change in the performance of IPO firms with/without being invested by VCs and non-IPO firms without invested by VCs, we attempt to single out the effect of going public with/without VCs on the performance of firms.

4. Empirical Strategy

4.1 Two Competing Stories on the Impact of Going Public

A vast literature has been discussing the existence of financial friction faced by firms. For example, Brav (2009) finds that compared to listed firms, unlisted firms face more expensive equity cost due to, for example, severer information asymmetry. In this sense, it is conjecture that firms alleviate financial friction by being listed. Listed firms, however, could also suffer from different type of obstacles, which distort their optimal behaviors. As discussed and confirmed in Asker et al. (2012) in the context of capital investment, short-termism originating from the pressure of stock market (Stein 1989), manager's empire building motives (Stulz 1990), or inactive behavior of firm managers (Bertrand and Mullainathan 2003) could a source of such distortion. This motivates to test whether newly listed firms show better or worse performance compared to their counterpart firms.

4.2 Propensity-Score Matching Difference-in-Differences Estimation (PSM-DID)

In order to run the horserace of the above-mentioned two stories, first, we compute the

[3] If we are mainly interested in the role of VCs without considering IPO, we should match non-IPO firms invested by VCs with non-IPO firms not invested by VCs, and implement the difference-in-differences estimation, which is out of scope of the presenting paper.

propensity score defined in Rosenbaum and Rubin (1983), which is the conditional probability of assignment to a particular treatment (i.e., IPO without VCs and IPO with VCs) given the pre-treatment characteristics:

$$(1)\quad P(x) \equiv \Pr\{z = 1|x\} = E\{z|x\}$$

In this formulation, $z = \{0,1\}$ is the indicator of receiving the treatment and x is a vector of observed pretreatment characteristics. Rosenbaum and Rubin (1983) show that if the recipient of the treatment is randomly chosen within cells defined by x, it is also random within cells defined by the values of the single-index variable $P(x)$. Therefore, for each treatment case i, if the propensity score $P(x_i)$ is known, the Average effect of Treatment on the Treated (ATT) can be estimated as follows:

$$\begin{aligned}(2)\quad \hat{\alpha}_{ATT} &= E\{y_{1i} - y_{0i}|z_i = 1\} \\ &= E\{E\{y_{1i} - y_{0i}|z_i = 1, p(x_i)\}\} \\ &= E\{E\{y_{1i}|z_i = 1, p(x_i)\} - E\{y_{0i}|z_i = 0, p(x_i)\}|z_i = 1\}\end{aligned}$$

In this formulation, y_1 and y_0 denote the potential outcomes in the two counterfactual situations of treatment and no treatment, respectively. Therefore, according to the last line of equation (2), the ATT can be estimated as the average difference between the outcome of recipients and non-recipients of the treatment whose propensity scores $P(x_i)$ are identical.

In the case of the presenting study, we consider two types of treatment: IPO without being invested by VCs and IPO with being invested by VCs. Therefore, we focus on the difference in *ex post* performance between firms going public without being invested by VCs and firms that remain

private (non-IPO firms) as well as between firms going public with being invested by VCs and private firms. x is a vector of various characteristics of a firm such as firm size, liquidity, leverage, *ex ante* performance, etc.

By separately estimating two logit models (i.e., IPO without VCs and IPO with VCs) at the first stage, we investigate important determinants of going public and compute the propensity score (i.e., the probabilities of a firm going public) for each firm. Making use of this result, we conduct propensity score matching and compare the change in the performance of firms within the pairs of observations matched on the propensity score. In our matching process, firms are matched separately for each year using one-to-one nearest neighbor matching.[4]

In the second stage, we estimate a difference-in-differences (DID) estimator to evaluate the causal effect of IPO on a set of performance variables of interest. Once we match treated and control firms, the only difference between public and private firms is their listed status. Therefore, we focus on the Average effect of Treatment on the Treated (ATT). The ATT can be estimated as equation (2) above, which, in the case of this study, is equivalent to the following equation:

$$(3)\quad \hat{\alpha}_{\mathrm{ATT}} = \frac{1}{n}\sum\nolimits_{1}^{n}\left(y_{\text{IPO yeat+s}}^{\text{treated}} - y_{\text{IPO yeat+s}}^{\text{control}}\right) - \frac{1}{n}\sum\nolimits_{1}^{n}\left(y_{\text{Pre IPO yeat}}^{\text{treated}} - y_{\text{Pre IPO yeat}}^{\text{control}}\right) \quad s = \{1,2,3\}$$

In this formulation, n denotes the number of observations and y denotes outcome variables

4.3 Performance Measure

The first performance variable we employ is firms' Total Factor Productivity (TFP), which is calculated using the multilateral TFP index method developed by Good et al. (1997). Details on the TFP measure are provided in the Appendix. The second performance measure used in this presenting

[4] Our matching procedure is implemented in Stata 11 using a modified version of the procedure provided by Leuven and Sianesi (2001). As we match firms separately for each year and industry (52 manufacturing industries and 56 non-manufacturing industries), we had to modify the program.

paper is return on asset, defined as a ratio of firms' current profit to total asset. The last variable we use is the level of sale per employees. We also interested in the size of firms' assets since it reflects the difference in investment behaviors of newly-listed and never-listed firms, which we could use to discuss the source of performance differences between such two groups.

4.4 Explanatory variables for Propensity Score

Let us now describe the explanatory variables for our estimation in detail. Basic statistics of all variables are provided in Table 1. Following the extant studies examining the decision of going public, to estimate the propensity of going public $P(x)$ in (1), we employ firm size measured by the natural logarithm of firms' total asset (*LN_ASSET*), liquidity measured by the ratio of cash to total asset (*CASH_RATIO*), debt dependence measured by the ratio of debt to total asset (*DEBT_RATIO*), and pre-IPO TFP (*TFP*) as the determinants. For all these explanatory variables, we use a one-year lag to eliminate possible endogeneity problems originating from the reverse causality running from the dependent variable to the independent variables. In order to control for year-specific effect capturing, for example, the state of stock markets (Ritter 1984, 1991; Baker and Wurgler 2000), we also include the year dummy variable in the list of our explanatory variables. To control for industry-level shocks that affect the firm's IPO decision (Giot and Schwienbacher 2007), we classify the firms into 21 industries and add four industry dummies accordingly.

Since we will compare IPO firms without being invested by VCs and non-IPO firms as well as IPO firms with being invested by VCs and non-IPO firms separately, we estimate the propensity scores associated with going public without being invested by VCs and with invested by VCs, separately. In both estimations, we use non-IPO firms without being invested by VCs as control group.

5. Empirical Results

In the following subsections, we (1) show the result of the logit estimation on the determinants of IPO (Section 5.1); and (2) examine the *ex post* performance differences between A) IPO firms without being invested by VCs and private firms (Section 5.2) as well as between B) IPO firms with being invested by VCs and private firms, using matched samples (Section 5.3).

5.1 Propensity Score

The estimated results for the probability of going public are shown in Table 2 (a) and (b), the former and latter of which account for the case of going public without and that with being invested by VCs, respectively.

In the case of going public without being invested by VCs, first, we find that *LN_SIZE* and *CASH_RATIO* have positive and significant coefficients. On the other hand, *DEBT_RATIO* takes positive and significant coefficient. These results imply that the probability of going public for larger and liquid firms that were not depending too much on debt is higher. One puzzling result is that TFP of IPO firms tend be lower than the counterpart unlisted firms. All the first two results are obtained for the case of going public without being invested by VCs with almost identical coefficients associated with the variables. One difference is in the coefficient associated with firm size. Namely, the coefficient in the case of IPO with VCs is much smaller than the case of IPO without VCs. This implies that the size of firms going public with VCs tend to be much more diverse than the firms going public without VCs. We use this result in our matching process where firms are matched separately for each year using one-to-one nearest neighbor matching.

5.2 Difference-in-Differences Estimation

The results for the difference-in-differences estimation associated with IPO firms not invested by VCs are shown in Table 3. First, from the upper panel of the table showing the difference-in-differences coefficients in our estimation, we find a negative and significant negative impact running from IPO to firms' ROA in the case of the comparison between $t-1$ to $t+3$ while there is no impact on TFP and sales-to-employee ratio. This is somewhat consistent with the results in Kutsuna et al. (2000). The magnitude of this negative impact in our estimation is around -4%, which is economically sizable since the average level of ROA in our sample is 9.7 % in the case of IPO firms with VCs. Second, the lower panel of the table, which tabulates the treatment effect of IPO, shows that firms going public tend to show higher ROA prior to IPO. The advantage in ROA is estimated around 5 to 6%. These two results imply that a large part of the performance difference prior to IPO diminished after IPO in our sample.

According to the discussion in, for example, Asker et al. (2012), corporate managers exposed to the pressure in stock market could take suboptimal decisions. It is one interpretation of this result that the drop in firm performance is due to this distorted firm behavior. Note that although not shown in the table, the difference-in-differences coefficient in the case of the comparison between $t-1$ to $t-4$ and $t-1$ to $t-5$ are -0.043 and not significantly different from zero, respectively. To search for the sources of the above-mentioned result in greater detail, we split the sample into two groups by using the information of the timing of IPO. Table 4 and 5 show the difference-in-differences coefficients in the case of firms going public until 2005 and after 2005, respectively. We split the sample in this way since the famous scandal issue in the emerging market (i.e., "Livedoor shock") occurred during the hot market periods in the first half of 2000s. It is claimed that it became much difficult for unlisted firms to go public after 2005. We conjecture that such a structural change certainly affected the post-IPO performance of newly listed firms. Notably, the coefficients in Table 4 exhibit the similar patter as in Table 2 while there is virtually no negative

DID effect found in Table 5. Considering the fact that the treatment effect in Table 4 and 5 are almost identical, the results imply that not only the firms showing better performance prior to IPO but also having a certain prospect after going public were allowed to be listed after 2005.

We should note that similar to Table 3, the difference-in-differences coefficients in the case of the comparison between $t-1$ to $t-4$ and $t-1$ to $t-5$ in the case of Table 4 are -0.043 and not significantly different from zero, respectively. This necessitates us to be cautious about the interpretation of the negative impact found in Table 4.

5.3 Impact of Venture Capital Investments

How the participation of VCs in pre-IPO investment is interacted with the result obtained above? The results for the difference-in-differences estimation associated with IPO firms invested by VCs are shown in Table 6. First, from the upper panel of the table, we find a negative and significant impact from IPO on firms' ROA in the case of the comparison between $t-1$ to $t+2$ and $t-1$ to $t+3$ while there is no impact on TFP. We also confirm that IPO has a significant and positive impact on sales-to-employee ratio in the case of the comparison between $t-1$ to $t+3$. Note that the result associated with the sales-to-employee ratio is found to be positive only in this period and not significant in the case of the comparison between $t-1$ to $t+4$ and $t-1$ to $t+5$ while the negative impact on ROA keeps being significant in such long-run comparison (i.e., -0.044 and -0.032). This means that the participation of VCs in investments exacerbates the negative impact of IPO on firms' performance (i.e., ROA). More specifically, the negative impact is found not only to be short-term but also long-term. As discussed in the extant literature, VCs might have different motivation from firms' long-run growth. This result implies that such negative impact overwhelms the positive impact potentially coming from VCs' strategic, management, marketing, and administrative expertise. Such an analysis on firms' long-term performance dynamics also gives us a

conjecture that the drop of performance reflects the large size of capital investment which becomes feasible thanks to IPO. For testing this conjecture, we implement the same DID estimation for firms' asset size (*LN_ASSET*). Evidently, we confirm a positive and significant impact from IPO on firms' size in the case of all the comparisons in Table 6. This implies that VC-backed IPO firms tended to invest more than their counterpart non-IPO firms. As the most important result, however, this overinvestment could not lead to the improvement in ROA as mentioned above. This is consistent with the Empire-building motives discussed in Stulz (1990).

Second, from the lower panel of Table 6, we find that IPO firms with being invested by VCs tend to perform well compared to their counterpart unlisted firms. It is important to note that the performance advantage prior to IPO (i.e., 3 to 4%) is completely offset by the adverse impact of IPO under the investment by VCs (i.e., 4 to 5%). This fact becomes more apparent in the case of firms going public until 2005 (see Table 7 and 8). This confirms the validity of the claim that some of VCs induce unpromising venture firms to go public based on other motivations.

6. Subsample Analyses

One important feature of VC investment is syndication. Brander et al. (2002) reports that 60% of VC investments in Canada were syndicated in 1993. According to Wright and Lockett (2003), the shares of syndicated VCs are 30% in Europe and 60% in the U.S. (in 2000s). In our data, 89% of Japanese venture firms accomplishing IPO were financed by syndicated VCs in the last decade.

First, the average number of VCs included at the first stage of investment is 2.4 while that at the timing IPO is 4.1, which means VC syndication tends to be exposed to certain dynamics in terms of its size. From a difference perspective, second, we find that VC syndication contains various types

of VC. The type of VC consists of, for example, bank-dependent, security firm-dependent, insurance company-dependent, trade company-dependent ("Shosha" in Japanese), corporate (i.e., non-financial firm-dependent), mixed origination, foreign-owned, foreign-located, independent, university, government, and others. The average number of VC types included at the first stage of investment is 1.8 while that at the timing IPO is 2.5, which means the member VCs in a syndicate tends to be dynamic and heterogeneous.

In this section, first, we test how the composition of VC syndication (i.e., the number of VCs and the number of VC types) are interacted with the negative impact of IPO established in the previous section. Second, we also examine whether inclusion of a specific type of VC alleviates the negative impact. Namely, following the discussion of Tykvová and Walz (2007), we conjecture that the involvement of independent and/or foreign-owned VCs contributes to better performance of IPO firms after going public.

6.1 Size of Syndication and Heterogeneity of VCs

Table 9 shows the similar difference-in-differences estimation for the case of IPO firms with being invested by many VCs or a small number of VCs at the first investment round. We split the sample at the median level of VC number as of first round (i.e., one). The result clearly shows that the adverse impact from going public is found in the case of being invested by a small number of VCs. Interestingly, IPO firms with being invested by a small number of VCs tend to show higher performance prior to IPO, which is to large extent offset by the adverse impact of IPO. Table 10 repeats the same exercise by splitting the sample at the median level of the number VC types included at the first round investment. The obtained implication is almost identical to the ones mentioned above.

As discussed in a number of extant literature (e.g., Giot and Schwienbacher 2006; Cumming

2006; Miyakawa and Talizawa 2012), the characteristics and the composition of VC syndicate are crucial for the investment performance done by VCs. The presenting result is consistent with these empirical discussions.

6.2 Inclusion of Specific Types of VCs

Table 11 and 12 shows the similar difference-in-differences estimation for the case of IPO firms with being invested by independent VCs or not, and foreign VCs or not. The result shows that the inclusion of foreign VCs alleviates the adverse impact from going public while the impact originating from the inclusion of independent VCs is sustained for relatively short-term.

As Tykvová and Walz (2007) discusses, among various types of VCs, foreign-based VCs are keen to the prospect of firms' future performance. The current results confirm their views.

7. Conclusion

This paper examined the effect of Initial Public Offering (IPO) on firms' performance by utilizing a unique firm-level panel dataset that allows us to identify newly listed firms and firms keeping unlisted status. We find newly listed firms showed better performance than their counterpart of never-listed firms prior to IPO while the difference in the performance partly diminished after IPO. This implies that firms' distorted behavior originating from prevents newly listed firms from performing. As one important finding, this result is mainly driven by the sample firms going public right after the introduction of the emerging market in the early 2000s. We also find that the participation of VCs in investments exacerbates such negative impact of IPO on firms' performance. The adverse impact on the firm performance is more sizable among IPO firms which are invested by VC syndicate consisting of smaller number of less heterogeneous VCs, or not including foreign VCs.

These results suggest that the timing of going public, and the composition of VC syndicates are related to the post-IPO performance of newly listed firms.

The research presented in this paper could be expanded in a number of directions. One such direction would be to examine other financial characteristics of newly listed firms. It is one promising direction to apply the same methodology employed in this paper to, for example, firms' leverage, bank-dependence, and/or cash holding behavior. Second, another interesting analysis would be to focus on bank-dependent VCs. As studied in a few extant studies (Hamao et al. 2000; Hellmann et al. 2008), bank-dependent VCs could have different motives for the participation to investment (e.g., post-IPO bank lending by affiliated banks). It is an important research issue to examine the motivation of these VCs more extensively.

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Appendix: The multilateral TFP index

As detailed in Fukao et al. (2011), the TFP level of firm *i* in industry *j* in year *t*, $TFP_{i,j,t}$ is defined in comparison with the TFP level of a hypothetical representative firm in the benchmark year t_0 in industry *j*. In the presenting paper, the benchmark year t_0 is set to the year 1995 and the firm-level TFP level is calculated as follows, using the multilateral TFP index method developed by Good et al. (1997):.

$$\mathrm{LN}(\mathrm{TFP}_{\mathrm{i,j,t}}) = \left\{\mathrm{LN}(\mathrm{Q}_{\mathrm{i,j,t}}) - \overline{\mathrm{LN}(\mathrm{Q}_{\mathrm{J,t}})}\right\} - \sum_{\mathrm{k=1}}^{\mathrm{n}} (\mathrm{S}_{\mathrm{i,k,j,t}} + \overline{\mathrm{S}_{\mathrm{k,J,t}}}) \left\{\mathrm{LN}(\mathrm{X}_{\mathrm{i,k,j,t}}) - \overline{\mathrm{LN}(\mathrm{X}_{\mathrm{k,J,t}})}\right\}$$

$$\text{for } \mathrm{t} = \mathrm{t}_0$$

$$\mathrm{LN}(\mathrm{TFP}_{\mathrm{i,j,t}}) = \left\{\mathrm{LN}(\mathrm{Q}_{\mathrm{i,j,t}}) - \overline{\mathrm{LN}(\mathrm{Q}_{\mathrm{J,t}})}\right\} - \frac{1}{2}\sum_{\mathrm{k=1}}^{\mathrm{n}} (\mathrm{S}_{\mathrm{i,k,j,t}} + \overline{\mathrm{S}_{\mathrm{k,J,t}}}) \left\{\mathrm{LN}(\mathrm{X}_{\mathrm{i,k,j,t}}) - \overline{\mathrm{LN}(\mathrm{X}_{\mathrm{k,J,t}})}\right\}$$
$$+ \sum_{\mathrm{s=t_0+1}}^{\mathrm{t}} \left\{\overline{\mathrm{LN}(\mathrm{Q}_{\mathrm{J,s}})} - \overline{\mathrm{LN}(\mathrm{Q}_{\mathrm{J,s-1}})}\right\} - \sum_{\mathrm{s=t_0+1}}^{\mathrm{t}} \sum_{\mathrm{k=1}}^{\mathrm{n}} \frac{1}{2} (\overline{\mathrm{S}_{\mathrm{k,J,s}}} + \overline{\mathrm{S}_{\mathrm{k,J,s-1}}}) \left\{\overline{\mathrm{LN}(\mathrm{X}_{\mathrm{k,J,s}})} - \overline{\mathrm{LN}(\mathrm{X}_{\mathrm{k,J,s-1}})}\right\}$$

$$\text{for } \mathrm{t} > \mathrm{t}_0$$

$$\mathrm{LN}(\mathrm{TFP}_{\mathrm{i,j,t}}) = \left\{\mathrm{LN}(\mathrm{Q}_{\mathrm{i,j,t}}) - \overline{\mathrm{LN}(\mathrm{Q}_{\mathrm{J,t}})}\right\} - \frac{1}{2}\sum_{\mathrm{k=1}}^{\mathrm{n}} (\mathrm{S}_{\mathrm{i,k,j,t}} + \overline{\mathrm{S}_{\mathrm{k,J,t}}}) \left\{\mathrm{LN}(\mathrm{X}_{\mathrm{i,k,j,t}}) - \overline{\mathrm{LN}(\mathrm{X}_{\mathrm{k,J,t}})}\right\}$$
$$- \sum_{\mathrm{s=t+1}}^{\mathrm{t_0}} \left\{\overline{\mathrm{LN}(\mathrm{Q}_{\mathrm{J,s}})} - \overline{\mathrm{LN}(\mathrm{Q}_{\mathrm{J,s-1}})}\right\} + \sum_{\mathrm{s=t+1}}^{\mathrm{t_0}} \sum_{\mathrm{k=1}}^{\mathrm{n}} \frac{1}{2} (\overline{\mathrm{S}_{\mathrm{k,J,s}}} + \overline{\mathrm{S}_{\mathrm{k,J,s-1}}}) \left\{\overline{\mathrm{LN}(\mathrm{X}_{\mathrm{k,J,s}})} - \overline{\mathrm{LN}(\mathrm{X}_{\mathrm{k,J,s-1}})}\right\}$$

$$\text{for } \mathrm{t} < \mathrm{t}_0$$

where $Q_{i,j,t}$ stands for the real output (real sales) of firm *i* (in industry *j*) in year *t*, $X_{i,k,j,t}$ represents the real input of production factor *k* of firm *i* (in industry *j*) in year *t*, and $S_{i,j,k,t}$ is the cost share of production factor *k* at firm *i* (in industry *j*) in year *t*.[5] $\overline{LN(Q_{J,t})}$ denotes the arithmetic average of the log value of the output, in year *t*, of all firms in industry *j* to which firm *i* belongs, while $\overline{LN(X_{k,J,t})}$ stands for the arithmetic average of the log value of the input of production factor *k*, in year *t*, of all firms in industry *j* to which firm *i* belongs. Finally, $\overline{S_{k,J,t}}$ is the arithmetic average of the cost share of the input of production factor *k*, in year *t*, of all firms in industry *j* to which firm *i* belongs.

[5] Since our dataset does not contain the labor input prior to IPO, we use the labor input as of the timing of establishing IPO instead of this.

Figures and Tables

Figure 1. Number of firms in each group

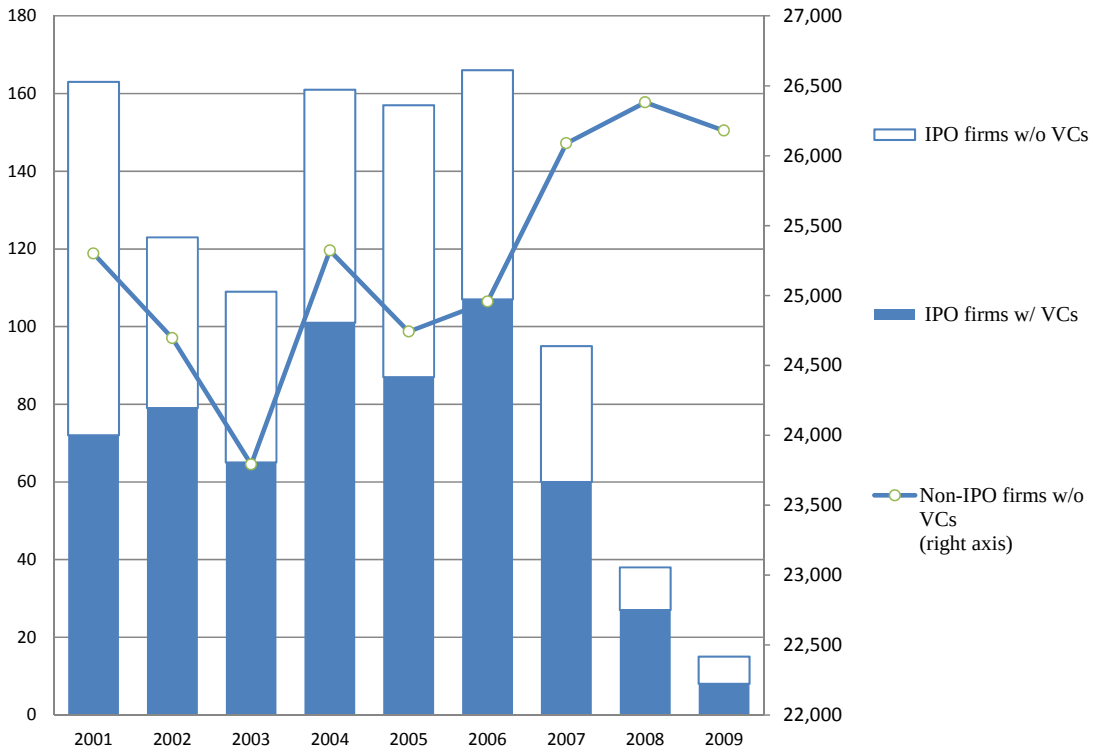

Table 1: Summary statistics

IPO firms w/ VCs	Mean	Median	Maximum	Minimum	Standard Deviation	Number of Sample Firms
CASH_RATIO	0.110	0.108	0.533	-1.115	0.112	606
DEBT_RATIO	0.122	0.072	0.704	0.000	0.133	606
LN_ASSET	8.376	8.290	12.103	5.601	0.987	606
TFP	0.023	0.026	1.777	-2.450	0.321	605
ROA	0.097	0.092	0.533	-1.142	0.113	606
SALES-to-EMPLOYEE RATIO	73.946	38.147	1168.540	0.000	119.196	606

IPO firms w/o VCs	Mean	Median	Maximum	Minimum	Standard Deviation	Number of Sample Firms
CASH_RATIO	0.117	0.106	0.472	-0.333	0.077	421
DEBT_RATIO	0.131	0.094	0.667	0.000	0.129	421
LN_ASSET	9.258	9.069	14.562	5.885	1.392	421
TFP	0.043	0.027	1.299	-2.144	0.282	419
ROA	0.104	0.092	0.472	-0.343	0.076	421
SALES-to-EMPLOYEE RATIO	93.973	52.557	1248.300	1.582	124.171	421

Non-IPO firms	Mean	Median	Maximum	Minimum	Standard Deviation	Number of Sample Firms
CASH_RATIO	0.071	0.059	174.767	-7.980	0.384	227,332
DEBT_RATIO	0.709	0.727	360.000	-1.175	1.052	227,332
LN_ASSET	8.083	8.008	14.903	1.099	1.214	227,332
TFP	-0.015	-0.009	3.086	-7.546	0.537	213,900
ROA	0.036	0.027	174.767	-36.167	0.387	227,332
SALES-to-EMPLOYEE RATIO	48.556	27.093	13440.510	0.000	116.709	227,456

Table 2: Logit estimation (IPO w/o and w/ VCs)

Panel (a) IPO without VCs

Dependent variable	IPO w/o VC dummy	
	Coef.	Std. Err
CASH_RATIO (t-1)	1.307	0.277 ***
DEBT_RATIO (t-1)	-12.324	0.501 ***
LN_ASSET (t-1)	0.641	0.051 ***
TFP(t-1)	-0.278	0.132 **
Const.	-16.132	666.489
Year dummy	Yes	
Industry dummy	Yes	
Number of obs	133529	
LR chi2(55)	2289.49	
Prob > chi2	0	
Pseudo R2	0.5184	

Panel (b) IPO with VCs

Dependent variable	IPO w/ VC dummy	
	Coef.	Std. Err
CASH_RATIO (t-1)	1.251	0.250 ***
DEBT_RATIO (t-1)	-12.782	0.399 ***
LN_ASSET (t-1)	0.074	0.045 *
TFP(t-1)	-0.453	0.103 ***
Const.	-10.260	466.945
Year dummy	Yes	
Industry dummy	Yes	
Number of obs	138830	
LR chi2(55)	3730.63	
Prob > chi2	0	
Pseudo R2	0.5386	

Note: ***, ** and * show statistical significance at the 1%, 5% and 10% level.

Table 3: DID effect (i.e., IPO w/o VC vs. non-IPO) & Treatment effect

DID effect (w/o VCs)

		Coef.	Std. Err	t-value	Obs.
2 windows((t-1)-(t+1))	*TFP*	-0.013	0.072	-0.180	606
	ROA	-0.019	0.013	-1.410	608
	SALES-to-EMPLOYEE RATIO	21.126	24.824	0.850	608
	LN_ASSET	0.290	0.2181	1.33	608
3 windows((t-1)-(t+2))	*TFP*	-0.016	0.081	-0.190	522
	ROA	-0.024	0.015	-1.610	524
	SALES-to-EMPLOYEE RATIO	14.120	27.170	0.520	524
	LN_ASSET	0.369	0.2334	1.58	524
4 windows((t-1)-(t+3))	*TFP*	0.025	0.105	0.240	406
	ROA	-0.037 **	0.017	-2.130	408
	SALES-to-EMPLOYEE RATIO	65.411	55.304	1.180	408
	LN_ASSET	0.336	0.2857	1.17	408

Treatment effect

		Coef.	Std. Err	t-value	Obs.
2 windows((t-1)-(t+1))	*TFP*	-0.014	0.051	-0.270	606
	ROA	0.052 ***	0.009	5.530	608
	SALES-to-EMPLOYEE RATIO	14.633	17.496	0.840	608
	LN_ASSET	0.307 **	0.1537	2	608
3 windows((t-1)-(t+2))	*TFP*	0.003	0.057	0.050	522
	ROA	0.057 ***	0.011	5.390	524
	SALES-to-EMPLOYEE RATIO	18.146	19.175	0.950	524
	LN_ASSET	0.307 *	0.1647	1.75	524
4 windows((t-1)-(t+3))	*TFP*	0.057	0.074	0.770	406
	ROA	0.063 ***	0.012	5.200	408
	SALES-to-EMPLOYEE RATIO	23.417	39.010	0.600	408
	LN_ASSET	0.351 *	0.2016	1.74	408

Table 4: 2001-2005 DID effect (i.e., IPO w/o VC vs. non-IPO) & Treatment effect

DID effect (2001-2005)

		Coef.	Std. Err	t-value	Obs.
2 windows((t-1)-(t+1))	*TFP*	-0.014	0.081	-0.180	386
	ROA	-0.023	0.017	-1.320	388
	SALES-to-EMPLOYEE RATIO	7.370	15.843	0.470	388
	LN_ASSET	0.302	0.2568	1.17	388
3 windows((t-1)-(t+2))	*TFP*	-0.024	0.083	-0.290	338
	ROA	-0.025	0.018	-1.400	340
	SALES-to-EMPLOYEE RATIO	1.852	18.830	0.100	340
	LN_ASSET	0.365	0.2778	1.31	340
4 windows((t-1)-(t+3))	*TFP*	-0.017	0.105	-0.160	302
	ROA	-0.041 **	0.019	-2.100	304
	SALES-to-EMPLOYEE RATIO	1.250	18.185	0.070	304
	LN_ASSET	0.314	0.3018	1.04	304

Treatment effect

		Coef.	Std. Err	t-value	Obs.
2 windows((t-1)-(t+1))	*TFP*	-0.006	0.057	-0.110	386
	ROA	0.058 ***	0.012	4.850	388
	SALES-to-EMPLOYEE RATIO	32.197 ***	11.145	2.890	388
	LN_ASSET	0.445 **	0.1807	2.46	388
3 windows((t-1)-(t+2))	*TFP*	-0.020	0.058	-0.350	338
	ROA	0.057 ***	0.013	4.500	340
	SALES-to-EMPLOYEE RATIO	28.400 **	13.275	2.140	340
	LN_ASSET	0.452 **	0.1958	2.31	340
4 windows((t-1)-(t+3))	*TFP*	0.024	0.074	0.320	302
	ROA	0.064 ***	0.014	4.650	304
	SALES-to-EMPLOYEE RATIO	37.278 ***	12.858	2.900	304
	LN_ASSET	0.496 **	0.2134	2.32	304

Table 5: 2006- DID effect (i.e., IPO w/o VC vs. non-IPO) & Treatment effect

DID effect (2006-)

		Coef.	Std. Err	t-value	Obs.
2 windows((t-1)-(t+1))	*TFP*	-0.011	0.141	-0.080	218
	ROA	-0.012	0.021	-0.560	220
	SALES-to-EMPLOYEE RATIO	46.191	62.587	0.740	220
	LN_ASSET	0.276	0.3987	0.69	220
3 windows((t-1)-(t+2))	*TFP*	-0.002	0.175	-0.010	182
	ROA	-0.021	0.026	-0.810	184
	SALES-to-EMPLOYEE RATIO	36.520	69.407	0.530	184
	LN_ASSET	0.385	0.4192	0.92	184
4 windows((t-1)-(t+3))	*TFP*	0.153	0.278	0.550	102
	ROA	-0.023	0.037	-0.630	104
	SALES-to-EMPLOYEE RATIO	246.315	208.638	1.180	104
	LN_ASSET	0.401	0.6949	0.58	104

Treatment effect

		Coef.	Std. Err	t-value	Obs.
2 windows((t-1)-(t+1))	*TFP*	-0.026	0.099	-0.260	218
	ROA	0.041 ***	0.015	2.700	220
	SALES-to-EMPLOYEE RATIO	-17.079	44.256	-0.390	220
	LN_ASSET	0.061	0.2819	0.22	220
3 windows((t-1)-(t+2))	*TFP*	0.046	0.123	0.380	182
	ROA	0.055 ***	0.019	2.990	184
	SALES-to-EMPLOYEE RATIO	-1.066	49.078	-0.020	184
	LN_ASSET	-0.016	0.2964	-0.05	184
4 windows((t-1)-(t+3))	*TFP*	0.151	0.192	0.780	102
	ROA	0.063 **	0.026	2.410	104
	SALES-to-EMPLOYEE RATIO	-14.947	146.103	-0.100	104
	LN_ASSET	-0.070	0.4866	-0.14	104

Table 6: DID effect (i.e., IPO w/ VC vs. non-IPO) & Treatment effect

DID effect (w/ VCs)

		Coef.	Std. Err	t-value	Obs.
2 windows((t-1)-(t+1))	*TFP*	-0.048	0.063	-0.760	888
	ROA	-0.003	0.023	-0.140	896
	SALES-to-EMPLOYEE RATIO	17.145	11.248	1.520	896
	LN_ASSET	0.368 **	0.1523	2.42	896
3 windows((t-1)-(t+2))	*TFP*	-0.059	0.068	-0.870	786
	ROA	-0.048 ***	0.014	-3.360	792
	SALES-to-EMPLOYEE RATIO	13.583	9.762	1.390	792
	LN_ASSET	0.479 ***	0.1672	2.86	792
4 windows((t-1)-(t+3))	*TFP*	-0.083	0.074	-1.110	650
	ROA	-0.043 ***	0.014	-3.050	656
	SALES-to-EMPLOYEE RATIO	20.120 **	9.652	2.080	656
	LN_ASSET	0.544 ***	0.1846	2.95	656

Treatment effect

		Coef.	Std. Err	t-value	Obs.
2 windows((t-1)-(t+1))	*TFP*	-0.056	0.044	-1.260	888
	ROA	0.016	0.016	1.010	896
	SALES-to-EMPLOYEE RATIO	36.675 ***	7.927	4.630	896
	LN_ASSET	0.315 ***	0.1074	2.94	896
3 windows((t-1)-(t+2))	*TFP*	-0.059	0.048	-1.240	786
	ROA	0.035 ***	0.010	3.500	792
	SALES-to-EMPLOYEE RATIO	30.952 ***	6.885	4.500	792
	LN_ASSET	0.291 **	0.1179	2.47	792
4 windows((t-1)-(t+3))	*TFP*	-0.012	0.052	-0.220	650
	ROA	0.033 ***	0.010	3.340	656
	SALES-to-EMPLOYEE RATIO	26.174 ***	6.773	3.860	656
	LN_ASSET	0.315 **	0.1296	2.43	656

Table 7: 2001-2005 DID effect (i.e., IPO w/ VC vs. non-IPO) & Treatment effect

DID effect (2001-2005)

		Coef.	Std. Err	t-value	Obs.
2 windows((t-1)-(t+1))	*TFP*	-0.088	0.071	-1.230	570
	ROA	-0.017	0.014	-1.220	572
	SALES-to-EMPLOYEE RATIO	20.140	12.260	1.640	572
	LN_ASSET	0.432 **	0.1900	2.27	572
3 windows((t-1)-(t+2))	*TFP*	-0.091	0.070	-1.300	554
	ROA	-0.036 **	0.017	-2.180	556
	SALES-to-EMPLOYEE RATIO	18.118	11.160	1.620	556
	LN_ASSET	0.570 ***	0.1968	2.9	556
4 windows((t-1)-(t+3))	*TFP*	-0.084	0.076	-1.100	552
	ROA	-0.042 ***	0.016	-2.640	556
	SALES-to-EMPLOYEE RATIO	23.199 **	11.120	2.090	556
	LN_ASSET	0.599 ***	0.2004	2.99	556

Treatment effect

		Coef.	Std. Err	t-value	Obs.
2 windows((t-1)-(t+1))	*TFP*	0.035	0.050	0.700	570
	ROA	0.040 ***	0.010	4.150	572
	SALES-to-EMPLOYEE RATIO	34.403 ***	8.639	3.980	572
	LN_ASSET	0.387 ***	0.1339	2.89	572
3 windows((t-1)-(t+2))	*TFP*	0.031	0.049	0.620	554
	ROA	0.039 ***	0.012	3.350	556
	SALES-to-EMPLOYEE RATIO	32.984 ***	7.877	4.190	556
	LN_ASSET	0.353 **	0.1389	2.54	556
4 windows((t-1)-(t+3))	*TFP*	0.044	0.053	0.830	552
	ROA	0.035 ***	0.011	3.100	556
	SALES-to-EMPLOYEE RATIO	30.417 ***	7.806	3.900	556
	LN_ASSET	0.345 **	0.1407	2.45	556

Table 8: 2006- DID effect (i.e., IPO w/ VC vs. non-IPO) & Treatment effect

DID effect (2006-)

		Coef.		Std. Err	t-value	Obs.
2 windows((t-1)-(t+1))	*TFP*	0.019		0.122	0.160	318
	ROA	0.021		0.058	0.360	324
	SALES-to-EMPLOYEE RATIO	11.861		22.447	0.530	324
	LN_ASSET	0.256		0.2549	1	324
3 windows((t-1)-(t+2))	*TFP*	0.014		0.155	0.090	234
	ROA	-0.077	***	0.028	-2.770	236
	SALES-to-EMPLOYEE RATIO	2.847		19.570	0.150	236
	LN_ASSET	0.261		0.3154	0.83	236
4 windows((t-1)-(t+3))	*TFP*	-0.080		0.238	-0.340	98
	ROA	-0.049	*	0.026	-1.850	100
	SALES-to-EMPLOYEE RATIO	1.811		8.564	0.210	100
	LN_ASSET	0.224		0.4708	0.48	100

Treatment effect

		Coef.		Std. Err	t-value	Obs.
2 windows((t-1)-(t+1))	*TFP*	-0.217	**	0.085	-2.550	318
	ROA	-0.026		0.041	-0.630	324
	SALES-to-EMPLOYEE RATIO	40.686	**	15.823	2.570	324
	LN_ASSET	0.190		0.1797	1.06	324
3 windows((t-1)-(t+2))	*TFP*	-0.269	**	0.109	-2.480	234
	ROA	0.026		0.019	1.360	236
	SALES-to-EMPLOYEE RATIO	26.170	*	13.779	1.900	236
	LN_ASSET	0.148		0.2220	0.67	236
4 windows((t-1)-(t+3))	*TFP*	-0.319	*	0.165	-1.930	98
	ROA	0.024		0.019	1.280	100
	SALES-to-EMPLOYEE RATIO	2.571		5.995	0.430	100
	LN_ASSET	0.145		0.3295	0.44	100

Table 9: #(VCs) DID effect (i.e., IPO w/ VC vs. non-IPO) & Treatment effect

#(VCs) at first investment round High

DID effect

		Coef.	Std. Err	t-value	Obs.
2 windows((t-1)-(t+1))	*TFP*	-0.002	0.098	-0.020	330
	ROA	0.023	0.058	0.410	332
	SALES-to-EMPLOYEE RATIO	20.874	21.385	0.980	332
	LN_ASSET	0.365	0.2512	1.45	332
3 windows((t-1)-(t+2))	*TFP*	0.007	0.104	0.070	302
	ROA	-0.037	0.028	-1.320	304
	SALES-to-EMPLOYEE RATIO	16.461	20.713	0.790	304
	LN_ASSET	0.373	0.2712	1.37	304
4 windows((t-1)-(t+3))	*TFP*	-0.058	0.112	-0.520	234
	ROA	-0.030	0.028	-1.090	236
	SALES-to-EMPLOYEE RATIO	27.116	17.715	1.530	236
	LN_ASSET	0.478	0.3224	1.48	236

Treatment effect

		Coef.	Std. Err	t-value	Obs.
2 windows((t-1)-(t+1))	*TFP*	-0.067	0.069	-0.980	330
	ROA	-0.017	0.041	-0.430	332
	SALES-to-EMPLOYEE RATIO	31.681 **	15.076	2.100	332
	LN_ASSET	0.230	0.1771	1.3	332
3 windows((t-1)-(t+2))	*TFP*	-0.065	0.073	-0.890	302
	ROA	0.026	0.020	1.290	304
	SALES-to-EMPLOYEE RATIO	37.615 **	14.645	2.570	304
	LN_ASSET	0.361 *	0.1918	1.88	304
4 windows((t-1)-(t+3))	*TFP*	-0.036	0.079	-0.460	234
	ROA	0.027	0.020	1.390	236
	SALES-to-EMPLOYEE RATIO	18.387	12.473	1.470	236
	LN_ASSET	0.235	0.2270	1.03	236

#(VCs) at first investment round Low

DID effect

		Coef.	Std. Err	t-value	Obs.
2 windows((t-1)-(t+1))	*TFP*	-0.096	0.094	-1.020	464
	ROA	-0.027 **	0.013	-2.060	468
	SALES-to-EMPLOYEE RATIO	17.704	15.044	1.180	468
	LN_ASSET	0.433 **	0.2061	2.1	468
3 windows((t-1)-(t+2))	*TFP*	-0.119	0.101	-1.190	400
	ROA	-0.068 ***	0.018	-3.870	404
	SALES-to-EMPLOYEE RATIO	14.684	10.587	1.390	404
	LN_ASSET	0.647 ***	0.2301	2.81	404
4 windows((t-1)-(t+3))	*TFP*	-0.108	0.111	-0.970	342
	ROA	-0.059 ***	0.018	-3.330	344
	SALES-to-EMPLOYEE RATIO	19.815	13.437	1.470	344
	LN_ASSET	0.697 ***	0.2459	2.83	344

Treatment effect

		Coef.	Std. Err	t-value	Obs.
2 windows((t-1)-(t+1))	*TFP*	-0.062	0.066	-0.940	464
	ROA	0.037 ***	0.009	3.990	468
	SALES-to-EMPLOYEE RATIO	44.715 ***	10.591	4.220	468
	LN_ASSET	0.299 ***	0.1451	2.06	468
3 windows((t-1)-(t+2))	*TFP*	-0.068	0.071	-0.960	400
	ROA	0.044 ***	0.012	3.600	404
	SALES-to-EMPLOYEE RATIO	29.999 ***	7.449	4.030	404
	LN_ASSET	0.204	0.1619	1.26	404
4 windows((t-1)-(t+3))	*TFP*	0.007	0.077	0.090	342
	ROA	0.039 ***	0.012	3.170	344
	SALES-to-EMPLOYEE RATIO	33.305 ***	9.392	3.550	344
	LN_ASSET	0.243	0.1719	1.42	344

Table 10: #(VC TYPES) DID effect (i.e., IPO w/ VC vs. non-IPO) & Treatment effect

#(VC TYPES) at first investment round High

DID effect

		Coef.	Std. Err	t-value	Obs.
2 windows((t-1)-(t+1))	*TFP*	-0.001	0.108	-0.010	286
	ROA	0.032	0.066	0.480	288
	SALES-to-EMPLOYEE RATIO	13.305	21.428	0.620	288
	LN_ASSET	0.356	0.2682	1.33	288
3 windows((t-1)-(t+2))	*TFP*	0.002	0.114	0.020	262
	ROA	-0.046	0.032	-1.430	264
	SALES-to-EMPLOYEE RATIO	14.659	23.058	0.640	264
	LN_ASSET	0.417	0.2908	1.44	264
4 windows((t-1)-(t+3))	*TFP*	-0.097	0.132	-0.740	190
	ROA	-0.045	0.033	-1.350	192
	SALES-to-EMPLOYEE RATIO	26.164 *	13.880	1.890	192
	LN_ASSET	0.499	0.3575	1.4	192

Treatment effect

		Coef.	Std. Err	t-value	Obs.
2 windows((t-1)-(t+1))	*TFP*	-0.079	0.076	-1.040	286
	ROA	-0.021	0.047	-0.440	288
	SALES-to-EMPLOYEE RATIO	31.260 **	15.099	2.070	288
	LN_ASSET	0.144	0.1890	0.76	288
3 windows((t-1)-(t+2))	*TFP*	-0.065	0.080	-0.810	262
	ROA	0.031	0.023	1.380	264
	SALES-to-EMPLOYEE RATIO	37.631 **	16.304	2.310	264
	LN_ASSET	0.283	0.2056	1.38	264
4 windows((t-1)-(t+3))	*TFP*	-0.032	0.093	-0.340	190
	ROA	0.034	0.023	1.440	192
	SALES-to-EMPLOYEE RATIO	9.399	9.763	0.960	192
	LN_ASSET	0.050	0.2515	0.2	192

#(VC TYPES) at first investment round Low

DID effect

		Coef.	Std. Err	t-value	Obs.
2 windows((t-1)-(t+1))	*TFP*	-0.088	0.088	-1.010	508
	ROA	-0.028 **	0.013	-2.180	512
	SALES-to-EMPLOYEE RATIO	22.300	15.350	1.450	512
	LN_ASSET	0.432 **	0.1978	2.19	512
3 windows((t-1)-(t+2))	*TFP*	-0.105	0.094	-1.110	440
	ROA	-0.060 ***	0.016	-3.670	444
	SALES-to-EMPLOYEE RATIO	15.966	10.310	1.550	444
	LN_ASSET	0.596 ***	0.2201	2.71	444
4 windows((t-1)-(t+3))	*TFP*	-0.083	0.100	-0.830	386
	ROA	-0.049 ***	0.016	-2.990	388
	SALES-to-EMPLOYEE RATIO	21.100	14.429	1.460	388
	LN_ASSET	0.663 ***	0.2331	2.84	388

Treatment effect

		Coef.	Std. Err	t-value	Obs.
2 windows((t-1)-(t+1))	*TFP*	-0.055	0.062	-0.900	508
	ROA	0.034 ***	0.009	3.850	512
	SALES-to-EMPLOYEE RATIO	43.840 ***	10.811	4.060	512
	LN_ASSET	0.342 **	0.1393	2.45	512
3 windows((t-1)-(t+2))	*TFP*	-0.068	0.066	-1.030	440
	ROA	0.040 ***	0.012	3.440	444
	SALES-to-EMPLOYEE RATIO	30.673 ***	7.258	4.230	444
	LN_ASSET	0.264 *	0.1549	1.7	444
4 windows((t-1)-(t+3))	*TFP*	0.000	0.070	0.000	386
	ROA	0.035 ***	0.011	3.050	388
	SALES-to-EMPLOYEE RATIO	36.066 ***	10.098	3.570	388
	LN_ASSET	0.333 **	0.1631	2.04	388

Table 11: Independent VC or not DID effect (i.e., IPO w/ VC vs. non-IPO) & Treatment effect

Independent VC in syndicate

DID effect

		Coef.	Std. Err	t-value	Obs.
2 windows((t-1)-(t+1))	*TFP*	-0.195	0.182	-1.070	178
	ROA	0.048	0.102	0.470	180
	SALES-to-EMPLOYEE RATIO	21.566	18.259	1.180	180
	LN_ASSET	0.408	0.3221	1.27	180
3 windows((t-1)-(t+2))	*TFP*	-0.111	0.200	-0.550	158
	ROA	-0.050 **	0.024	-2.110	160
	SALES-to-EMPLOYEE RATIO	9.315	12.689	0.730	160
	LN_ASSET	0.664	0.3401	1.95	160
4 windows((t-1)-(t+3))	*TFP*	-0.149	0.260	-0.570	116
	ROA	-0.034	0.022	-1.500	116
	SALES-to-EMPLOYEE RATIO	8.981	17.224	0.520	116
	LN_ASSET	0.408	0.4341	0.94	116

Treatment effect

		Coef.	Std. Err	t-value	Obs.
2 windows((t-1)-(t+1))	*TFP*	-0.096	0.127	-0.760	178
	ROA	-0.060	0.072	-0.840	180
	SALES-to-EMPLOYEE RATIO	19.818	12.839	1.540	180
	LN_ASSET	0.043	0.2265	0.19	180
3 windows((t-1)-(t+2))	*TFP*	-0.158	0.140	-1.130	158
	ROA	0.036 **	0.017	2.180	160
	SALES-to-EMPLOYEE RATIO	23.441 ***	8.916	2.630	160
	LN_ASSET	0.109	0.2390	0.45	160
4 windows((t-1)-(t+3))	*TFP*	-0.074	0.182	-0.410	116
	ROA	0.034 **	0.016	2.190	116
	SALES-to-EMPLOYEE RATIO	28.083 **	12.074	2.330	116
	LN_ASSET	0.483	0.3043	1.59	116

Not Independent VC in syndicate

DID effect

		Coef.	Std. Err	t-value	Obs.
2 windows((t-1)-(t+1))	*TFP*	-0.019	0.071	-0.270	616
	ROA	-0.022 *	0.014	-1.660	620
	SALES-to-EMPLOYEE RATIO	18.272	15.179	1.200	620
	LN_ASSET	0.405 **	0.1829	2.21	620
3 windows((t-1)-(t+2))	*TFP*	-0.052	0.073	-0.710	544
	ROA	-0.056 ***	0.019	-2.950	548
	SALES-to-EMPLOYEE RATIO	17.152	13.374	1.280	548
	LN_ASSET	0.488 **	0.2041	2.39	548
4 windows((t-1)-(t+3))	*TFP*	-0.072	0.076	-0.950	460
	ROA	-0.051 ***	0.018	-2.750	464
	SALES-to-EMPLOYEE RATIO	26.156 **	12.709	2.060	464
	LN_ASSET	0.655 ***	0.2197	2.98	464

Treatment effect

		Coef.	Std. Err	t-value	Obs.
2 windows((t-1)-(t+1))	*TFP*	-0.054	0.050	-1.100	616
	ROA	0.037 ***	0.010	3.840	620
	SALES-to-EMPLOYEE RATIO	44.983 ***	10.699	4.200	620
	LN_ASSET	0.337 ***	0.1289	2.61	620
3 windows((t-1)-(t+2))	*TFP*	-0.039	0.052	-0.760	544
	ROA	0.037 ***	0.013	2.720	548
	SALES-to-EMPLOYEE RATIO	36.171 ***	9.439	3.830	548
	LN_ASSET	0.319 **	0.1440	2.22	548
4 windows((t-1)-(t+3))	*TFP*	0.006	0.053	0.100	460
	ROA	0.034 ***	0.013	2.670	464
	SALES-to-EMPLOYEE RATIO	27.052 ***	8.909	3.040	464
	LN_ASSET	0.180	0.1541	1.17	464

Table 12: Foreign VC or not DID effect (i.e., IPO w/ VC vs. non-IPO) & Treatment effect

Foreign VC in syndicate

DID effect

		Coef.	Std. Err	t-value	Obs.
2 windows((t-1)-(t+1))	*TFP*	0.292	0.397	0.740	36
	ROA	0.049	0.036	1.350	36
	SALES-to-EMPLOYEE RATIO	16.804	41.751	0.400	36
	LN_ASSET	0.558	1.1256	0.5	36
3 windows((t-1)-(t+2))	*TFP*	0.308	0.386	0.800	36
	ROA	-0.015	0.032	-0.460	36
	SALES-to-EMPLOYEE RATIO	17.908	38.416	0.470	36
	LN_ASSET	0.826	0.9880	0.84	36
4 windows((t-1)-(t+3))	*TFP*	0.339	0.429	0.790	10
	ROA	-0.086	0.264	-0.330	12
	SALES-to-EMPLOYEE RATIO	54.848	43.784	1.250	12
	LN_ASSET	0.653	1.3761	0.47	12

Treatment effect

		Coef.	Std. Err	t-value	Obs.
2 windows((t-1)-(t+1))	*TFP*	-0.365	0.281	-1.300	36
	ROA	0.003	0.026	0.130	36
	SALES-to-EMPLOYEE RATIO	31.551	29.522	1.070	36
	LN_ASSET	0.513	0.7959	0.64	36
3 windows((t-1)-(t+2))	*TFP*	-0.455	0.273	-1.670	36
	ROA	0.005	0.023	0.240	36
	SALES-to-EMPLOYEE RATIO	31.482	27.164	1.160	36
	LN_ASSET	0.656	0.6986	0.94	26
3 windows((t-1)-(t+3))	*TFP*	-0.331	0.286	-1.160	10
	ROA	-0.061	0.186	-0.330	12
	SALES-to-EMPLOYEE RATIO	34.758	30.960	1.120	12
	LN_ASSET	1.327	0.9730	1.36	12

Not Foreign VC in syndicate

DID effect

		Coef.	Std. Err	t-value	Obs.
2 windows((t-1)-(t+1))	*TFP*	-0.073	0.069	-1.060	758
	ROA	-0.009	0.026	-0.340	764
	SALES-to-EMPLOYEE RATIO	19.168	12.927	1.480	764
	LN_ASSET	0.399 **	0.1588	2.51	764
3 windows((t-1)-(t+2))	*TFP*	-0.085	0.074	-1.150	666
	ROA	-0.057 ***	0.016	-3.470	672
	SALES-to-EMPLOYEE RATIO	15.295	11.168	1.370	672
	LN_ASSET	0.511 ***	0.1768	2.89	672
4 windows((t-1)-(t+3))	*TFP*	-0.095	0.081	-1.180	566
	ROA	-0.047 ***	0.015	-3.140	568
	SALES-to-EMPLOYEE RATIO	22.038 **	10.914	2.020	568
	LN_ASSET	0.605 ***	0.1973	3.07	568

Treatment effect

		Coef.	Std. Err	t-value	Obs.
2 windows((t-1)-(t+1))	*TFP*	-0.050	0.048	-1.030	758
	ROA	0.015	0.019	0.820	764
	SALES-to-EMPLOYEE RATIO	39.682 ***	9.105	4.360	764
	LN_ASSET	0.259 **	0.1118	2.32	764
3 windows((t-1)-(t+2))	*TFP*	-0.046	0.052	-0.880	666
	ROA	0.038 ***	0.012	3.300	672
	SALES-to-EMPLOYEE RATIO	33.384 ***	7.873	4.240	672
	LN_ASSET	0.251 **	0.1247	2.01	672
4 windows((t-1)-(t+3))	*TFP*	-0.004	0.057	-0.070	566
	ROA	0.036 ***	0.010	3.510	568
	SALES-to-EMPLOYEE RATIO	27.105 ***	7.649	3.540	568
	LN_ASSET	0.217	0.1383	1.57	568