The Relationship between Venture Capital Backing and the Top Management Team Quality of Firms Going Public and Implications for Initial Public Offerings

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Abstract

We make use of hand-collected data on a large sample of entrepreneurial firms going public to analyze the association between venture capital (VC) backing and the top management team (TMT) quality of firms at the time of their initial public offerings (IPOs), and the effect of both VC-backing and TMT quality on the growth in their post-IPO operating performance and IPO firm valuations. We first show that VC-backing is associated with higher TMT quality. We then show that both higher TMT quality and VC-backing lead to higher growth in post-IPO operating performance and higher IPO valuations. We find that the above two variables affect the growth in post-IPO operating performance through an "ability channel," whereby the TMTs of such firms choose projects with higher equilibrium scale and implement them more ably. Further, TMT quality and VC-backing affect IPO firm valuations not only through the above ability channel, but also through a "certification channel," whereby higher TMT quality and VC-backing credibly certify intrinsic firm value to the IPO market, thus reducing the extent of asymmetric information facing such firms in the IPO market and yielding these firms higher IPO valuations. Finally, we show that TMT quality and VC-backing act as complements in their effect on IPO firms' growth in post-IPO operating performance.

Keywords: Top Management Human Capital; Venture Capital Backing; Initial Public Offerings
JEL Codes: G32; G24; M13

Executive Summary

The existing literature has argued that VCs actively shape start-up firms' top management teams (TMTs) by playing two important roles: the "scout" or "selection" role where VCs select firms with better TMTs and the "monitoring" or "coach" role where VCs help to build better TMTs. However, there has been little empirical evidence documenting how backing by VCs affects the quality and reputation of their investee firms' TMTs at the time of their initial public offerings (IPOs). Since the quality of a firm's TMT (i.e., the human capital of managers constituting its TMT) is likely to change from initial VC investment to IPO, and VC-backing and TMT quality may affect the success of its IPO as well as its IPO valuation and post-IPO operating performance, it is important to study the association between VC-backing and TMT quality at the time when VC-backed firms go public. The first objective of this paper is therefore to analyze, for the first time in the literature, how VC-backing is related to the TMT quality of the firms they back at the time of their IPOs.

The second objective of this paper is to study how the TMT quality of a firm and VC-backing itself affect the growth in post-IPO operating performance and the IPO valuation of firms going public. The TMT quality of a firm may affect the growth in its post-IPO operating performance and IPO valuation through two channels: an "ability" channel and a "certification" channel. Through the ability channel, higher quality TMTs may be able to select better projects and implement them more ably, resulting in higher growth in post-IPO operating performance and higher IPO valuation for their firms. Through the certification channel, higher quality TMTs may be able to convey the intrinsic value of their firm more credibly to outsiders, thus reducing the information asymmetry facing their firm in the equity market, thereby increasing this firm's market valuations at IPO. Similarly, VC-backing may itself affect a firm's growth in post-IPO operating performance and IPO valuation through the above ability and certification channels.

Given that TMT quality and VC-backing are likely to interact in affecting firms' growth in post-IPO operating performance, it is important to analyze whether TMT quality and VC-backing act as complements or as substitutes in this effect. On the one hand, the resource-based view predicts that firms with more valuable resources, such as higher TMT quality and VC-backing, will perform better since higher quality TMTs and VCs may enhance the positive effect of each other on the growth in post-IPO operating performance by combining their two separate effects. On the other hand, the presence of both higher quality top managers and VCs in a firm may generate "horizontal" agency costs that are likely to diminish the separate effects of each variable (VC-backing and TMT quality) on a firm's growth in post-IPO operating performance. If this horizontal agency cost effect dominates, VC-backing and TMT quality may be substitutes in affecting the growth in post-IPO operating performance. Thus, the third objective of our paper is to empirically analyze whether VC-backing and TMT quality are complements or substitutes in affecting firms' growth in post-IPO operating performance.

We test the above-hypothesized relationships by making use of a unique hand-collected dataset on the TMT quality and reputation of a large sample of 3,903 entrepreneurial firms representing all industries (except financial firms) going public in 1993-2012. We measure TMT quality by conducting a common factor analysis using eight individual proxies of TMT quality and reputation and produce a single measure of TMT quality that captures the variation common to the above individual proxies.

In the first part of our analysis, we find that VC-backing is positively associated with TMT quality, so that VC-backed firms have higher TMT quality at IPO than non-VC-backed firms. In the second part of our analysis, we find the following. First, firms with higher TMT quality and those backed by VCs realize higher growth in post-IPO operating performance and receive higher equity market valuations both at IPO and in the immediate post-IPO secondary

market. Second, our channel or "mechanism" test shows that TMT quality and VC-backing together significantly reduce the extent of information asymmetry faced by IPO firms in the equity market, thus confirming that certification is a channel (independent of the ability channel) through which VC-backing and TMT quality affect IPO firm valuations. Third, TMT quality and VC-backing act as complements in their effect on IPO firms' growth in post-IPO operating performance. In other words, the effect of TMT quality on the growth in post-IPO operating performance is stronger for VC-backed firms compared to that for non-VC-backed firms.

This paper contributes to the literature in three ways. First, this is the first study analyzing how VC-backing is related to a firm's TMT quality at IPO. We show that the positive association between VC-backing and TMT quality applies to the entire population of firms going public across all industries. Second, using a sample consisting of both VC- and non-VC-backed firms, we are able to establish that both TMT quality and VC-backing positively affect firm valuations at IPO and post-IPO operating performance. Finally, we show, for the first time in the literature, that VC-backing and TMT quality are complements in affecting IPO firms' growth in post-IPO operating performance, thus shedding new light on the IPO process. In particular, it highlights the importance of even VC-backed firms building up high quality TMTs by the time they go public.

Our findings have several important implications for entrepreneurs, board members of private firms, and policymakers. First, we show that the positive association between VC-backing and TMT quality of entrepreneurial firms persists till the IPOs of these firms, in turn yielding these firms higher IPO valuations. This documents a new mechanism through which VCs generate value for entrepreneurial firms, beyond what has already been documented in the literature (which mainly focuses on how VCs help to add product market value to the firms they invest in). Second, we show that TMT quality and VC-backing together yield additional long-

term benefits to firms after their IPOs through higher growth in post-IPO operating performance, which is likely to yield them higher long-run equity market valuations long past their IPOs. Third, the above findings allow us to quantify the benefits to entrepreneurial firms of building high quality TMTs, which can then be compared to the well-known costs of building up such teams: for example, as measured by the size of the compensation packages (consisting of salary, bonus, and stock options) to be offered to reputable and experienced top firm managers at the time they are hired by the firm. Finally, our findings indicate that policymakers in various U.S. states need to initiate and implement policies that promote the local VC industry and invest significantly in professional education to create a robust managerial workforce available for hire by local firms, since this will yield rich dividends for entrepreneurial firms and the local economy when these firms go public.

1. Introduction

A number of theoretical and practitioner studies have argued that venture capitalists (VCs), besides providing financing, may boost the value of the firms they back (Repullo and Suarez, 2004; Chemmanur and Chen, 2014) by improving various dimensions of firm performance such as efficiency (Chemmanur et al., 2011), growth (Davila et al., 2003; Bertoni et al., 2011), productivity (Croce et al., 2013), innovation (Kortum and Lerner, 2000; Dutta and Folta, 2016), or operating performance (Nahata, 2008; Krishnan et al., 2011; Rosenbusch et al., 2013; Chemmanur et al., 2016). One important factor affecting a firm's performance along various dimensions is the quality of its top management team (TMT). It has been shown that TMT quality improves firms' performance by affecting their organizational practices (Bertrand and Schoar, 2003), ability to acquire resources (Arthurs et al., 2009), capital structure (Bhagat et al., 2012), innovativeness (Liu et al., 2012), or exit decisions (He and Li, 2016).

The extant literature has argued that VCs may play two roles in affecting private firms' TMTs. The first role is the "selection" or "scout" role where VCs select firms with better TMTs (Beckman et al., 2007; Beckman and Burton, 2008). The second role is the "monitoring" or "coach" role where VCs help to build better TMTs (Baum and Silverman, 2004; Arthurs and Busenitz, 2006; Colombo and Grilli, 2010). VCs may perform the second role by helping to recruit higher quality TMT members and by replacing or dismissing underperforming TMT members (Gorman and Sahlman, 1989; Fiet et al., 1997; Boeker and Wiltbank, 2005; Jain and Tabak, 2008). Using a sample of 170 early-stage high-tech firms in Silicon Valley, Hellmann and Puri (2002) show that VCs foster the professionalization of start-ups measured by the hiring of a marketing vice president, human resource policies, and the adoption of stock option plans.

While, on the one hand, the academic literature agrees that VCs actively shape start-up firms' TMTs, and, on the other hand, practitioners argue that VCs have a positive effect on the

TMT quality of firms they back, the empirical evidence documenting how backing by VCs affects the quality and reputation of a firm's TMT at the time of IPO has been limited. The composition of entrepreneurial firms' TMTs is likely to change substantially as early-stage start-ups grow and prepare to go public (Kaplan et al., 2009). Chen et al. (2008) show that, in the year before their IPO, firms aggressively hire prestigious executives and directors in order to signal their worthiness to the market. Therefore, the effect of VC-backing on TMT quality in IPO-stage firms may be quite different than that in the early-stage start-ups analyzed by, for example, Hellmann and Puri (2002). Given that the quality of a firm's TMT at IPO is likely to affect the success of its IPO, its IPO valuation, as well as its post-IPO operating performance, it is important to understand the association between VC-backing and the quality of firms' TMTs at the time of IPO. The first objective of this paper is to fill this gap in the literature and study how VC-backing is associated with TMT human capital or "TMT quality" of IPO firms: we expect VC-backed firms to have higher quality TMTs at IPO compared to non-VC-backed firms.[1]

The second objective of this paper is to study how TMT quality and VC-backing create value for IPO firms' shareholders by affecting the growth in post-IPO operating performance and the IPO valuation of such firms. The operating performance (the ability to generate cash flows) of a firm is a crucial determinant of firm value since in the absence of information asymmetry firm value is the present value of future cash flows. However, a better operating performance may not necessarily result in higher stock market valuation if a firm faces a high degree of information asymmetry in the equity market. This is because stock market investors may not

[1] As discussed earlier, the relationship between VC-backing and TMT quality at IPO may be driven either by selection or monitoring. However, since we collect information on TMT quality from IPO prospectuses, we do not have data on TMT quality in the years before IPO. This means that we do not observe the hiring of new managers between the initial VC investment in the firm and its IPO, so that we cannot distinguish between the selection and monitoring roles of VCs with respect to TMTs. Due to this data limitation, we do not attempt to show a causal relationship between either of the above mechanisms arising from VC-backing of the firm and its TMT quality at IPO. It is likely that selection and monitoring are jointly at work in generating the association between VC-backing and TMT quality that we document empirically in this paper.

incorporate all the relevant information about the firm's future operating performance into the firm's stock price if the degree of information asymmetry between firm insiders and stock market investors is high. Therefore, while it is important to determine the effect of TMT quality and VC-backing on the ability of IPO firms to generate high cash flows post-IPO (by generating a higher growth in post-IPO operating performance), it is also important to determine how TMT quality and VC-backing affect the IPO and immediate post-IPO market valuations of such firms.

The TMT quality of a firm may affect the growth in its post-IPO operating performance and its stock valuation at IPO in two ways. First, higher quality managers may be able to select better projects characterized by a larger net present value (NPV) for any given scale and implement them more ably. Thus firms with higher quality TMTs may be expected to have higher growth in post-IPO operating performance, which is likely to also increase their IPO and immediate post-IPO stock market valuation (since in the absence of information asymmetry firm value is simply the present value of future cash flows). We refer to this as the "ability channel" from now on. Second, TMT quality may have a certifying effect on firm value: higher quality managers may be able to convey the intrinsic value of their firm more credibly to outsiders (Chemmanur and Paeglis, 2005; Cohen and Dean, 2005; Higgins and Gulati, 2006), thus reducing the information asymmetry facing their firm in the equity market. We refer to this as the "certification channel" from now on. This reduction in information asymmetry, in turn, is likely to increase a firm's IPO and immediate post-IPO market valuation, since stock market investors will be better able to incorporate the relevant (positive) information about the firm's future cash flows into its stock price. Further, VC-backing may itself directly affect the growth in a firm's post-IPO operating performance and its IPO valuation through the above ability (Jain and Kini, 1995; Rosenbusch et al., 2013) and certification channels (Megginson and Weiss, 1991), similar to the effect of TMT quality on these two variables.

The third objective of this paper is to empirically analyze whether TMT quality and VC-backing are complements or substitutes in affecting a firm's growth in post-IPO operating performance. Given the importance of the ability channel in affecting the growth in post-IPO operating performance, and given that TMT quality and VC-backing are expected to have similar effects through this channel, it is important to discern whether TMT quality and VC-backing act as complements or as substitutes in generating the above effect. On the one hand, according to the resource-based view (Barney, 1991; Barney et al., 2001), resources and capabilities of firms are important sources of their sustained competitive advantage. Thus, the firms with more resources, such as higher TMT quality (Castanias and Helfat, 1991; Michalisin et al., 2004) and VC-backing (Manigart et al., 2002), can be expected to perform better. Further, since both TMT quality and VC-backing are expected to have a positive effect on the growth in post-IPO operating performance, they are likely to enhance the positive effect of each other on IPO firm operating performance. Therefore, under this mechanism, we would expect TMT quality and VC-backing to be complements in their effect on the growth in post-IPO operating performance.

On the other hand, the presence of both higher quality TMTs and VCs together in a firm may generate agency costs that are likely to diminish the growth in firm's post-IPO operating performance due to conflicts between the VCs backing a firm and its top managers. The extant literature has shown that when principal-principal conflict exists, it creates inefficiencies in the form of "horizontal agency costs" (Young et al., 2008; Dalziel et al., 2011; Colombo et al., 2014). Similar horizontal agency costs are likely to arise when TMTs and VCs have different goals, preferences, and perception of risks and returns regarding different projects and strategies. Given these horizontal agency costs, the marginal benefit created by higher TMT quality may be reduced in the presence of VC-backing and, conversely, the marginal benefit created by VC-backing may be reduced in the presence of higher TMT quality. If the above horizontal agency

costs effect dominates the effect of the greater resources brought to the firm by higher TMT quality and VC-backing, we would expect VC-backing and TMT quality to be substitutes in affecting a firm's growth in post-IPO operating performance. In summary, whether VC-backing and TMT quality are complements or substitutes in affecting the growth in post-IPO operating performance is ultimately an empirical question, which we analyze in this paper.

We test the above-hypothesized relationships by making use of a unique hand-collected dataset on the TMT quality of a large sample of 3,903 firms representing all industries (except financial firms) going public in 1993-2012. We follow the methodology of Chemmanur et al. (2011) and Chemmanur and Paeglis (2005) to measure TMT quality by conducting a common factor analysis using eight individual proxies of TMT quality and reputation and produce a single measure of TMT quality (a "TMT quality factor") that captures the variation common to the above individual proxies. Using our TMT quality factor score from factor analysis, in the first part of our analysis we find that VC-backed firms are associated with higher TMT quality at IPO than non-VC-backed firms. In the second part of our analysis, we find that firms with higher TMT quality and those backed by VCs realize higher growth in post-IPO operating performance and receive higher equity market valuations both at IPO and immediately post-IPO. In the third part of our analysis, we find that TMT quality and VC-backing act as complements in their effect on the growth in post-IPO operating performance. In other words, the effect of TMT quality on the growth in post-IPO operating performance is stronger for VC-backed firms compared to that for non-VC-backed firms. Finally, we also find that TMT quality and VC-backing significantly reduce the extent of information asymmetry faced by IPO firms in the equity market (proxied by firms' post-IPO equity bid-ask spread, analyst coverage, and institutional equity holdings), thus confirming the operation of the certification channel (independent of the ability channel) through which VC-backing and TMT quality affect firm valuation at IPO.

This paper contributes to the existing literature in several ways. First, this is the first large-sample study of how VC-backing is related to a firm's TMT quality at IPO. Using a large hand-collected dataset on TMT quality variables spanning a 20-year period, we show that the positive association between VC-backing and TMT quality applies to the entire population of firms going public across all industries. Second, using a sample consisting of both VC- and non-VC-backed firms, we are able to study the effect of VC-backing and TMT quality at IPO on the growth in post-IPO operating performance and IPO valuation. Ours is the first paper to study the relationship between TMT quality at IPO and the above two variables for VC-backed firms.[2] Finally, we analyze whether VC-backing and TMT quality are complements or substitutes in affecting the growth in a firm's post-IPO operating performance, again for the first time in the literature, thus shedding new light on the IPO process for VC-backed firms.

2. Hypotheses Development and Related Literature

2.1. The Relationship between VC-Backing and TMT Quality at IPO

The extant literature has recognized two roles for VCs in affecting entrepreneurial firms' TMTs: the "scout" or "selection" role where VCs invest in firms with better TMTs, and the "coach" or "monitoring" role where VCs help build better TMTs. Consistent with the selection role, Beckman et al. (2007) show that firms with certain TMT characteristics such as diverse prior company affiliations, functional diversity, or prior senior management experience are more likely to attract VC financing. Similarly, Beckman and Burton (2008) find that the TMTs of VC-backed firms have broader experience and more complete structure. On the other hand, Baum

[2] While we make use of an approach similar to Chemmanur and Paeglis (2005) to measure TMT quality, this is the first paper to analyze the effect of TMT quality on the growth in post-IPO operating performance and IPO valuation in VC-backed firms, and whether TMT quality and VC-backing are complements or substitutes in affecting the growth in post-IPO operating performance. We are able to study the above novel effects since our sample includes both VC-backed and non-VC-backed firms, unlike the much smaller sample consisting of only non-VC-backed firms used by Chemmanur and Paeglis (2005).

and Silverman (2004) do not find a connection between start-up firms' TMT characteristics and their subsequent performance and conclude that VCs do not identify start-ups with inherently superior TMTs, thus refuting the selection role of VCs. Colombo and Grilli (2010) provide evidence for VCs' monitoring function and find no support for the selection function. Arthurs and Busenitz (2006) find that newly public VC-backed firms demonstrate greater dynamic capabilities related to management development suggesting that VCs are able to hire or develop the necessary managerial talent for such firms to succeed. In summary, the existing literature has provided mixed results on the selection versus monitoring roles for VCs in entrepreneurial firms.

One of the ways in which VCs can perform the monitoring role is by helping to recruit higher quality TMT members, replacing founding entrepreneurs, or dismissing other team members with weak managerial skills (Gorman and Sahlman, 1989; Bygrave and Timmons, 1992; Fiet et al., 1997). Boeker and Wiltbank (2005) show that VC ownership as well as VCs' presence on the boards of private firms is positively related to TMT changes. Jain and Tabak (2008) find that firms are less likely to have their founders as CEOs at the time of IPO if VCs have a stronger presence on their boards. Thus, the extant literature suggests that VCs may add value by helping private firms to build up their TMTs. While we expect VC-backing to have a positive effect on TMT quality at IPO, due to data limitations we will not attempt to show a *causal* effect of the above TMT building efforts by VCs. This is because we obtain data on TMT quality from IPO prospectuses, which allows us to measure TMT quality at the time of IPO; but does not allow us to observe TMT changes and therefore TMT quality in the years prior to IPO. This means that we are unable to distinguish whether it is the selection or the monitoring role of VCs that leads to higher quality TMTs at IPO. We therefore focus on establishing an association between VC-backing and TMT quality at IPO. Thus, our first hypothesis is as follows.

H1. *VC-backed firms will have higher quality TMTs at IPO than non-VC-backed firms.*

2.2. The Effect of TMT Quality and VC-Backing on the Growth in Post-IPO Operating Performance and IPO Valuation

TMT quality is an important factor affecting firms' post-IPO operating performance and equity market valuations at IPO. First, TMT quality may affect the growth in post-IPO operating performance through what we refer to as the "ability channel" from now on. Higher quality TMTs are likely to be better at selecting and implementing good projects characterized by larger NPVs for any given scale. This means that, assuming decreasing returns to scale, the equilibrium scale (level of investment) of their projects will be larger (see Figure A1 in our online Appendix A for an illustration). The larger the equilibrium scale of their projects, and the better the TMTs' ability to implement these projects, the better the post-IPO operating performance (Chemmanur and Paeglis, 2005). This leads to a positive relationship between TMT quality and the growth in post-IPO operating performance. Thus, we expect firms with higher quality TMTs to have higher growth in post-IPO operating performance due to the TMTs' ability to select better projects to undertake and to implement these projects more ably. This is our next testable hypothesis.

H2a: *TMT quality will have a positive effect on the growth in post-IPO operating performance of firms going public, acting through the ability channel.*

Second, TMT quality may affect a firm's IPO valuation in the following manner. Finance theory teaches us that, in the absence of information asymmetry, the IPO valuation of a firm will simply be the present value of its future cash flows (see, e.g., Ritter and Welch, 2002 and Lowry et al., 2017 for excellent reviews of the IPO literature and Brau and Fawcett, 2006 for a review of managerial practices in IPOs). Thus, acting through the ability channel, TMT quality will be associated with higher IPO valuations as well. Further, a higher TMT quality may also affect a firm's IPO valuation through what we refer to as the "certification channel" from now on. This is because TMT quality may certify firm value to the financial market as follows. Top managers

are concerned about protecting their reputation with the managerial labor market (Chemmanur and Paeglis, 2005; Bednar et al., 2015), since this will affect their future compensation if they have to seek new employment. Misleading investors about important aspects of their firm (by mispricing their firm's equity or exaggerating its future prospects) may damage the personal reputation of top managers in the labor market (and in the financial market), so that top managers with higher reputation at stake will be less likely to mislead the markets. Given that investors are likely to be aware of this, they will assign higher credibility to disclosures made by higher quality TMTs, thus reducing the information asymmetry faced by their firms in the market.[3]

The above reduction in information asymmetry, in turn, is likely to result in higher market valuations for IPO firms as follows. When the extent of information asymmetry between IPO firms and market investors is higher, investors may not be able to distinguish between high and low intrinsic value firms and thus value firms by averaging the valuations across high- and low-value firms (i.e., price the equity in a "pooling" equilibrium). In such a setting, high-value firms are likely to receive lower valuations (compared to their intrinsic value) and low-value firms are likely to receive higher valuations. The reduction in information asymmetry due to certification will therefore result in higher valuations for high-value firms (as investors will be able to value such firms closer to their intrinsic value) and lower valuations for low-value firms.[4]

[3] For TMT quality to be a credible signal of high firm quality, building high quality TMTs must be costly enough not to be imitated by low-quality firms. One reason why TMT quality may be a credible signal of firm quality is because of potential self-selection by higher quality top managers: higher quality top managers may prefer to work for higher quality firms. If a lower quality firm wishes to overcome this managerial preference and hire a higher quality top manager, the firm will have to grant a greater compensation package to the top manager than the compensation package that a higher quality firm may have to grant to such a manager. In other words, TMT quality is likely to satisfy the incentive compatibility (or "non-mimicking") condition required for all credible signals.

[4] Note that high-value firms may be willing to go public even at undervalued prices if the benefits they expect to realize from going public (in terms of raising the capital necessary to finance their available positive NPV projects, thereby expanding their business) is greater than the loss from potential undervaluation of their equity. The reduction in information asymmetry due to certification by higher TMT quality or VC-backing, or both, increases the valuations of high-quality firms and makes those valuations closer to their intrinsic value. However, even if a high-quality firm gets a relatively lower valuation at IPO, it may still decide to go public if the potential benefits of doing so outweigh the potential loss due to undervaluation.

Given the lower extent of information asymmetry, some low-value firms may consequently decide to withdraw from the IPO market, and, as a result, the proportion of high-value firms going public will increase and the proportion of low-value firms going public will decrease. Thus, given the above effects, we expect TMT quality to be associated with higher IPO firm valuations on average (acting through the certification channel).[5]

In order to better illustrate how TMT quality is likely to affect firms' growth in operating performance and IPO valuation, we introduce the following numerical example. Consider an IPO market with two types of firms: high and low intrinsic value firms. Let us assume that both types of firms generate $100 of earnings per share in IPO year (year 0). Further assume that the TMTs of high intrinsic value firms are of higher quality than those of low intrinsic value firms, but the two types of firms are otherwise identical. In the next three years, the earnings of high-value firms will grow at, say, 20% annually due to the better ability of their TMTs and the earnings of low-value firms will grow at 10% only. After three years the growth rate of both types of firms settles down to a constant rate of 5% annually in perpetuity. Given a risk-adjusted discount rate of, say, 15% for both types of firms, we can show that the present value of the high-value firms' earnings (intrinsic value) in year 0 will be $1,620 per share and it will be $1,294 per share for low-value firms. Thus, higher TMT quality will be associated through the ability channel with a higher growth in operating performance (earnings) and with higher intrinsic firm value.

However, a higher intrinsic value may not necessarily translate into higher IPO valuation if there is information asymmetry between firms and investors. If investors are not able to

[5] The IPO literature has extensively discussed "underwriter certification," where the reputation of the underwriter in an IPO conveys information to IPO market investors in an asymmetric information setting: see, e.g., Chemmanur and Fulghieri (1994) for a theoretical model and Carter and Manaster (1990) for empirical evidence. However, note that this does not preclude additional IPO firm variables such as TMT quality and VC-backing from conveying information about firm quality to IPO market investors. For theoretical models of signaling with many signals see, e.g., Engers (1987) and Chemmanur and Yan (2009). Given the possibility that underwriter certification is also present in our setting, we control for underwriter reputation in all our regressions.

distinguish between the two types of firms due to information asymmetry, they may assign a probability of 50% that any IPO firm is a high-value firm and a probability of 50% that it is a low-value firm, and thus assign the same (average) valuation of 0.5×$1,620 + 0.5×$1,294 = $1,457 per share to both types of firms. However, if higher TMT quality is able to certify firm value by reducing the information asymmetry facing the firm, then investors will be able to distinguish between the two types of firms with probability one (by observing their TMT quality) and price them at their intrinsic values: the high-value firms will receive higher IPO valuations equal to their intrinsic value of $1,620 per share and the low-value firms will receive lower IPO valuations equal to their intrinsic value of $1,294 per share.[6] Thus, higher TMT quality will be associated through the certification channel with higher IPO firm valuations for high-value firms.

In summary, we expect an IPO firm's TMT quality to positively affect its equity market valuation at IPO through both the ability channel (by increasing the growth in its post-IPO operating performance) and through the certification channel (by conveying better information to equity market investors about its intrinsic value). This is the next hypothesis that we test here.

H2b: *TMT quality will have a positive effect on a firm's IPO market valuation, acting through either the ability channel or the certification channel, or through both channels.*

VC-backing may also affect a firm's post-IPO operating performance and IPO valuation through the ability and certification channels in a manner similar to that of TMT quality discussed above. First, acting through the ability channel, VC-backing will also be associated with higher quality projects, leading VC-backed firms to have a larger equilibrium scale and better post-IPO operating performance compared to non-VC-backed firms. The prior literature has shown that VCs are able to create additional value and improve the operating performance of

[6] In this example, where outsiders believe the firms to be one of two possible types (high- or low-value), information asymmetry is completely eliminated by their observing TMT quality. However, in a real world setting (where firm value is continuous), it is likely that certification will reduce information asymmetry but will not eliminate it.

the firms they back by getting actively involved in the management of such firms, i.e., through monitoring. It has been shown that VCs serve on the boards of the firms they back, provide business consulting services, orchestrate mergers and acquisitions, perform strategic planning, monitor operating performance, and provide linkages to external parties (Tyebjee and Bruno, 1984; Rosenstein et al., 1993; Fried et al., 1998). Thus, similar to the arguments made above in the context of higher quality TMTs, we expect VC-backing to be associated with higher growth in post-IPO operating performance through the ability channel. This leads to the next hypothesis.

H3a: *VC-backing will have a positive effect on the growth in post-IPO operating performance of firms going public, acting through the ability channel.*

Second, VC-backing may affect a firm's IPO valuation as follows. As discussed above, in the absence of information asymmetry, the IPO valuation of a firm will be the present value of its future cash flows. Thus, acting through the ability channel, VC-backing will also be associated with higher IPO valuations (since the future cash flows of VC-backed firms will be greater than those of non-VC-backed firms). Further, the VC literature has also argued that, since VCs are long-term players in the financial market, they have the incentive to take public higher quality firms, thus certifying that these firms are of higher intrinsic value to investors in the financial market: see Megginson and Weiss (1991) for informal arguments and evidence, and Chemmanur and Fulghieri (1994) for a theoretical model of certification by financial intermediaries (see also Chemmanur, 1993; Carter et al., 1998; Stuart et al., 1999). This means that, when IPO market investors observe that a firm going public is VC-backed, they will infer that it is of higher intrinsic value on average than a non-VC-backed firm. In other words, we expect VC-backed firms to face a lower extent of information asymmetry in the equity market, resulting in higher IPO valuations for such firms (through a mechanism similar to the certification effect of TMT quality on IPO valuation, discussed earlier). This yields the following testable hypothesis.

H3b: *VC-backing will have a positive effect on a firm's IPO market valuation, acting through either the ability channel or the certification channel, or through both channels.*

2.3. Disentangling the Effects of the Ability and Certification Channels on IPO Variables

In this section, we develop testable hypotheses to determine whether the ability and certification channels are independently at work in affecting the growth in post-IPO operating performance and IPO firm valuation. First, if both TMT quality and VC-backing have a positive effect on the growth in post-IPO operating performance (providing support for our hypotheses **H2a** and **H3a**), this would suggest that the ability channel is at work in affecting these variables. This is because the certification channel operates only through reducing the information asymmetry facing IPO firms, and given that operating performance is measured using accounting numbers, certification is unlikely to be the channel through which VC-backing and TMT quality affect firms' growth in post-IPO operating performance. Second, if both TMT quality and VC-backing have a positive effect on IPO valuation (providing support for our hypotheses **H2b** and **H3b**), this would suggest that either the ability channel or the certification channel or both channels are likely at work. This is because TMT quality and VC-backing may affect IPO firm valuation through either the ability or the certification channel, or both, so that analyzing the effect of TMT quality and VC-backing on IPO valuation alone does not allow us to show that the certification channel is at work independent of the ability channel.

However, we can determine whether the certification channel is independently at work in affecting IPO valuations by studying the effect of TMT quality and VC-backing on the information asymmetry facing IPO firms. Since the certification channel affects IPO valuation only through reducing information asymmetry, we can establish the operation of the certification channel (independent of the ability channel) by directly testing whether TMT quality and VC-

backing reduce the extent of information asymmetry facing IPO firms. This is the next hypothesis that we test here.

H4a. *TMT quality will be negatively related to the extent of information asymmetry facing firms in the equity market.*

H4b. *VC-backing will be negatively related to the extent of information asymmetry facing firms in the equity market.*

2.4. The Effects of TMT Quality and VC-Backing on IPO Firms' Growth in Post-IPO Operating Performance: Complements or Substitutes?

We now turn to the question of whether TMT quality and VC-backing are complements or substitutes in affecting the growth in firms' post-IPO operating performance. On the one hand, according to the resource-based view (Barney, 1991; Barney et al., 2001), resources and capabilities of firms are important sources of their sustained competitive advantage. Thus, firms possessing more valuable resources can be expected to perform better. TMT quality (Castanias and Helfat, 1991; Michalisin et al., 2004) and VC-backing (Manigart et al., 2002) are likely to be among such valuable resources, and, as discussed above, both higher TMT quality and VC-backing are expected to be associated with higher growth in post-IPO operating performance through the ability channel. Therefore, TMT quality and VC-backing are likely to enhance each other's positive effect on a firm's post-IPO operating performance, so that TMT quality and VC-backing will be *complements* in this effect (if the above consideration dominates). If this is the case, we would expect the effect of TMT quality on a firm's growth in post-IPO operating performance to be stronger in VC-backed firms than in non-VC-backed firms.

On the other hand, the presence of both higher quality TMTs and VCs in a firm may generate "horizontal" agency costs that are likely to diminish its growth in post-IPO operating

performance. Such agency costs have been shown to exist in firms where principal-principal conflicts exist (Young et al., 2008; Dalziel et al., 2011). Colombo et al. (2014) show that, while a higher number of owner-managers improves firm performance, a higher number of non-manager individual shareholders does not significantly affect firm performance. They interpret the latter finding as evidence that the benefits associated with the resources non-manager shareholders provide to the firm are offset by an increase in horizontal agency costs associated with the limited ability of non-manager shareholders to effectively monitor the behavior of owner-managers. Similar horizontal agency costs are likely to arise when TMTs and VCs have different goals, preferences, and perception of risks and returns associated with different projects and corporate strategies.[7] Given such horizontal agency costs, the marginal benefit generated by higher TMT quality (VC-backing) is likely to diminish in the presence of VC-backing (higher TMT quality). Thus, we would expect TMT quality and VC-backing to be *substitutes* in their effect on post-IPO operating performance if this consideration dominates. If this is the case, we would expect the effect of TMT quality on a firm's growth in post-IPO operating performance to be weaker in VC-backed firms than in non-VC-backed firms. Given the above discussion, we propose the following two competing hypotheses.

H5a. *The effect of TMT quality on the growth in post-IPO operating performance will be stronger in VC-backed firms than in non-VC-backed firms.*

H5b. *The effect of TMT quality on the growth in post-IPO operating performance will be weaker in VC-backed firms than in non-VC-backed firms.*

[7] It can be argued that if VCs are mindful about potential horizontal agency costs, they may not promote or hire certain TMT members who are likely to cause such horizontal agency costs. However, *a priori* it is not clear whether the horizontal agency costs can be completely avoided in VC-backed firms. The existing literature points at the existence of conflicts between VCs and entrepreneurs (see, e.g., Higashide and Birley, 2002; Masulis and Nahata, 2011; Collewaert, 2013). Further, while VCs actively shape the TMTs of many entrepreneurial firms and may be able to minimize horizontal agency costs in some firms, in some other firms they may not be able to do this. Thus, one cannot completely rule out *ex ante* the existence of horizontal agency costs in entrepreneurial firms.

3. Data and Sample Selection

Our list of U.S. IPOs covering the twenty year period from 1993 to 2012 comes from the SDC/Platinum Global New Issues database. Following the IPO literature (e.g., Jain and Kini, 1994; Krishnan et al., 2011; Lowry et al., 2017) we excluded real estate investment trusts, unit IPOs (IPOs of common stock bundled with warrants), closed-end funds, spin-offs, equity carve-outs, foreign firms, financial firms with standard industrial classification (SIC) codes between 6000-6999, and former leveraged buy-outs. Our final sample consists of 3,903 IPO firms; 2,380 VC-backed and 1,523 non-VC-backed.

Information on various TMT quality proxies was hand-collected from the "Management" section of IPO prospectuses. The data on TMT's compensation came from the "Executive Compensation" section of the prospectuses. Information on internal governance mechanisms such as CEO/Chairman-of-the-board duality, proportion of outside directors, and insider stock ownership came from IPO prospectuses as well. IPO prospectuses were obtained from the Thomson Financial database. Information on institutional shareholdings was obtained from 13F and 13F-E filings, the financial analyst coverage data came from Institutional Brokers Estimate System (IBES) database, accounting data came from Compustat, and stock price data came from the Center for Research in Security Prices (CRSP).

4. Measures of TMT Quality and Reputation, and Control Variables

4.1. Measures of TMT Quality and Reputation

We follow Chemmanur et al. (2011) and Chemmanur and Paeglis (2005) in constructing our TMT quality measures (see also D'Aveni, 1990 and Hambrick and D'Aveni, 1992, who used similar measures in their analyses). TMT quality is affected by the amount of human and knowledge resources (including education and experience) available to the TMT. Our first proxy

of TMT quality, the TMT size, measures the amount of human resources available to the team. It is the number of executive officers with a title of a vice president or higher on the team (TSIZE). The next two proxies measure the education level of managers. Our second proxy of TMT quality is the percentage of TMT members with a master of business administration (MBA) degree (PMBA) and the third proxy is the percentage of TMT members with a certified public accountant (CPA) designation (PCPA). Given that educational attainment and certification implies knowledge, skills, and intellectual capacity (Cohen and Dean, 2005), we expect greater percentages of MBAs and CPAs on the TMT to be associated with greater TMT quality. See, for example, Colombo and Grilli (2005) who show that founders' years of university education in the economics and management fields affect firm growth, or Bantel and Jackson (1989) who show that educational attainment of the TMT relates to firm innovation.[8]

We measure prior managerial experience of TMT members by using the following two proxies. Our fourth proxy of TMT quality is the percentage of managers who have served as executive officers at other firms prior to joining the IPO firm (PFTEAM) and our fifth proxy of TMT quality is the percentage of managers who were partners at law or accounting firms prior to joining the IPO firm (PLAWACC). Clearly, the greater the percentage of TMT members with prior managerial experience the greater the TMT quality.

Our sixth proxy of TMT quality is the percentage of team members with core functional expertise (PCORE). Functional expertise captures skills, knowledge, or prior experience of a TMT member in certain areas of business management. In particular, we define PCORE as the percentage of TMT members holding positions in the key areas of operations and production,

[8] One could argue that a larger number of TMT members with similar educational backgrounds may also diminish TMT quality. However, the summary statistics of our sample presented in Table 2 show that the proportions of MBAs in the TMTs of VC-backed and non-VC-backed firms are 17% and 8.4%, respectively, and the proportions of CPAs in the TMTs of VC-backed and non-VC-backed firms are 6.9% and 10.4%, respectively. These relatively low percentages indicate that the TMTs of our sample firms are unlikely to suffer from the potential problem of having too many managers with similar educational backgrounds.

research and development (R&D), sales and marketing, and finance; "key areas" in the sense that having qualified managers in these areas is essential for efficient business management. Thus, while the previous four proxies measure the education level and prior managerial experience of TMT members, PCORE captures the diversity of the skills and backgrounds of TMT members necessary for efficient business management. Our definition of functional expertise is similar to that of Beckman and Burton (2008), who show that broadly experienced founding teams of entrepreneurial firms achieve important milestones faster than firms that start with neither experience nor structure. Given the above, we expect a greater percentage of TMT members with core functional expertise to be associated with greater TMT quality.

Our seventh proxy of TMT quality is the natural logarithm of the average compensation (salary plus bonus) of team members in the fiscal year before the IPO (PCOMP). Higher quality managers are expected to be valued higher in a competitive labor market and thus the higher the average compensation of TMT members the greater the TMT quality. Our eighth proxy of TMT quality measures the reputation of TMT members in the business community. It is the number of team members who sit on other firms' corporate boards (BOARDS). While the measures discussed above also partially capture TMT reputation, this proxy better captures the reputation and visibility of managers in the business community. The greater the value of BOARDS, the greater the quality and reputation of a firm's TMT.

Our last two proxies of TMT quality measure the degree of uniformity or heterogeneity in the tenures of TMT members. Our ninth proxy is the average tenure of team members (TENURE), which is the average number of years that TMT members have been with the firm. Greater average tenure may indicate shared experiences and cohesion, and thus lower interaction costs between TMT members. Liu and Arthurs (2019) find that IPO firms perform better when their executives have longer tenures with the firm, which indicates that the executives' human

capital has been well integrated into the knowledge base and routines of the firm. However, longer tenures may also result in complacency and rigidity in team interactions. An ideal TMT would have members from different cohorts, which would ensure an inflow of new ideas and perspectives (Wiersema and Bantel, 1992; Beckman et al., 2007). Thus, a higher TMT quality would be associated not only with longer average tenures but also with greater dispersion in such tenures. Therefore, we use the heterogeneity in TMT members' tenures (TENHET), defined as the coefficient of variation of TMT members' tenures, as our tenth proxy for TMT quality.

4.2. Control Variables

In order to make sure that our empirical tests capture the effect of TMT quality and not the effect of other firm characteristics, we control for these other firm characteristics by including the following controls in our regressions. The first two controls are firm size, defined as the natural logarithm of the book value of firm's assets immediately prior to IPO (LNBVA), and firm age, defined as the natural logarithm of one plus the firm's age (LNAGE): see, e.g., Ritter (1984) or Michaely and Shaw (1994), who used similar controls in their studies. Further, given that firm size and firm age may have non-linear effects on our dependent variables we also include the squared terms of firm size (LNBVA2) and firm age (LNAGE2) in our regressions.

Next, we control for the proportion of outside directors (directors who are not executive officers, founders, former employees, or anyone who is engaged in business dealings with the firm) in the firm's board of directors (ODIR). Outside directors can enhance firm quality by, first, providing linkages to external parties such as underwriters, financial institutions, and auditors, and, second, by providing additional expertise (inputs and perspectives) to the firm's management (Cotter et al., 1997; Borokhovich et al., 1996). We also control for insider stock ownership defined as the proportion of voting power held by firm insiders (executive officers

and directors) before the IPO (INSIDERB), and CEO/Chairman-of-the-board duality which is a dummy equal to one if a firm's CEO is also its Chairman of the board, and zero otherwise (BOSS). Separation of the roles of CEO and board Chairman creates greater management accountability and enhances internal governance (Yermack, 1997; Rechner and Dalton, 1991).

Finally, we also control for underwriter reputation, measured as the lead IPO underwriter's share of proceeds raised in the IPO market in the previous five years (UNDREP).[9] Underwriter reputation has been shown in the literature to be positively associated with firm quality and to be an important determinant of various IPO characteristics.

4.3. Common Factor Analysis of TMT Quality Variables

Although the individual TMT quality proxies discussed above are expected to measure TMT quality, they may each have unique limitations in capturing the underlying unobservable construct. Thus, we use common factor analysis to construct a single factor for TMT quality that will capture the variation common to the observable proxies of TMT quality: see, e.g., Gaver and Gaver (1993) and Guay (1999) for other settings where factor analysis was used in corporate finance. In order to ensure that this single factor captures only the effect of TMT quality and not that of other variables such as firm size, firm age, or industry characteristics, we use firm-size-, firm-age-, and industry-dummies-adjusted individual TMT quality proxies to extract the common factor. We adjust individual TMT quality proxies for firm size, firm age, and industry characteristics, by regressing these TMT quality proxies on firm size, firm age, and 2-digit SIC code industry dummies, and take the residuals of such regressions (in other words, the variation in individual TMT quality proxies not explained by firm size, firm age, or industry

[9] We also use another measure of underwriter reputation developed by Loughran and Ritter (2004) based on the work by Carter and Manaster (1990) as a control variable. This measure takes values from zero to nine (from least to most reputable underwriters). Our results using this alternative measure are similar to those reported in this paper.

characteristics) to be our firm-size-, firm-age-, and industry-dummies-adjusted individual TMT quality proxies. Thus, in the first part of our analysis where we study the association between VC-backing and TMT quality, our TMT quality factor score (MQF) is constructed using TSIZE, MBA, FTEAM, CORE, LAWACC, CPA, COMP, and BOARDS adjusted for firm size, firm age, and industry dummies. These variables refer, respectively, to the TMT size, the number of TMT members with MBA degrees, the number of TMT members with prior managerial experience, the number of TMT members with core functional expertise, the number of TMT members with prior experience as law or accounting partners, the number of TMT members who are CPAs, the natural logarithm of the TMT's total compensation (salary plus bonus) in the fiscal year before the IPO, and the number of TMT members who sit on other firms' boards.

We exclude TENURE and TENHET from the construction of the above common factor since they receive negative factor loadings and negative scoring coefficients if included in the common factor analysis. The interpretation of our TMT quality factor becomes problematic when some individual TMT quality proxies have positive scoring coefficients and others have negative scoring coefficients. Therefore, we restrict our common factor analysis to the first eight TMT quality proxies, since they have positive factor loadings and positive scoring coefficients in our common factor analysis. We then use TENURE and TENHET as controls in our tests.[10]

It can be argued that TMT quality is a "mediator" between VC-backing and firm performance. However, it is also possible that some non-VC-backed private firms are able to build high quality TMTs. Thus, our research design takes the view that, while VC-backing may

[10] Negative factor loadings and negative scoring coefficients of TENURE and TENHET are due to negative correlations of these two proxies with other TMT quality variables. For example, the correlation between TENURE (TENHET) and the proportion of TMT members with prior managerial experience at other firms (PFTEAM) is -0.47 (-0.19) and the correlation between TENURE (TENHET) and the proportion of TMT members with MBA degrees (PMBA) is -0.11 (-0.06). Indeed, firms that have TMTs with longer average tenures are more likely to develop their managers internally, rather than to hire them from outside, and consequently such managers are less likely to have prior managerial experience at other firms. Similarly, managers who have longer average tenures with their firms are more likely to acquire their managerial skills internally, rather than externally at an educational institution.

help private firms to build TMTs, it is not necessarily the only way for firms to build up higher quality TMTs. Given this, in the second part of our empirical analysis where we study how VC-backing interacts with TMT quality in affecting the growth in post-IPO operating performance and IPO valuation, we construct our TMT quality factor score by adjusting individual TMT quality proxies not only for firm size, firm age, and industry characteristics (as described above), but also for VC-backing. Thus, in the second part of our empirical analysis we use firm-size-, firm-age-, industry-dummies-, and VC dummy-adjusted individual TMT quality proxies to extract the common factor (MQFVC). In other words, in the second part of our empirical analysis we use TMT quality factor which captures the TMT quality not explained by firm size, firm age, industry characteristics, or VC-backing.

Table 1 presents the results of our common factor analysis. Panel A of Table 1 presents the starting communalities of eight TMT quality proxies (for each of the two TMT quality factors described above), estimated as the squared multiple correlations obtained from regressing each TMT quality proxy on the remaining TMT quality proxies used in common factor analysis. Panel B of Table 1 presents the eigenvalues of the reduced correlation matrices. As suggested by Harman (1976), the number of factors necessary to approximate the original correlations among individual measures is equal to the number of summed eigenvalues necessary to exceed the sum of communalities. The eigenvalue of the first factor in our common factor analysis of MQF is 1.73 and it is larger than the sum of communalities of 1.56. The eigenvalue of the first factor in our common factor analysis of MQFVC is 1.68 and it is larger than the sum of communalities of 1.51. This suggests that one factor (MQF or MQFVC) parsimoniously explains the intercorrelations between individual TMT quality proxies. Panel C of Table 1 presents the correlations between the common factors and the eight proxies of TMT quality, while Panel D provides summary statistics of these common factors.

5. Empirical Tests and Results

5.1. The Relationship between VC-Backing and the TMT Quality of Firms Going Public

5.1.1. Summary Statistics of TMT Quality Variables in VC-Backed and Non-VC-Backed Firms

Table 2 presents the summary statistics of TMT quality proxies of VC-backed and non-VC-backed firms, and univariate tests of differences in the means and medians of such proxies between the two groups. VC-backed firms have significantly larger TMT sizes (TSIZE) compared to non-VC-backed firms. The mean (median) team size of VC-backed firms is 6.86 (6) members compared to 5.64 (5) members of non-VC-backed firms. VC-backed firms have also significantly larger percentages of team members with MBA degrees (PMBA) and with prior managerial experience (PFTEAM). The mean (median) percentage of MBAs in the TMTs of VC-backed firms is 17% (12.5%) compared to 8.4% (0%) in non-VC-backed firms, and the mean (median) percentage of team members with prior managerial experience in VC-backed firms is 59.6% (60%) compared to 47% (50%) in non-VC-backed firms. VC-backed firms have also significantly larger percentages of TMT members in core functional areas (PCORE) with the mean (median) proportion of 58.2% (60%) compared to 52% (50%) in non-VC-backed firms. The average compensation of TMT members in VC-backed firms is significantly greater than that in non-VC-backed firms (PCOMP). All the differences discussed above are statistically significant at the 1% level. VC-backed firms also have a somewhat larger percentage of managers who previously served as law and accounting partners (PLAWACC). The mean PLAWACC of VC-backed firms is 3.1% and it is 2.9% for non-VC-backed firms. While the difference in means is not statistically significant, the difference in medians is significant at the 5% level. Thus, based on the above six management quality proxies, we find that VC-backed firms have higher quality TMTs than non-VC-backed firms.

Table 2 also shows that the TMTs of VC-backed firms have lower percentages of CPAs (PCPA). The mean PCPA of VC-backed firms is 6.9% compared to 10.4% of non-VC-backed firms. Further, the TMTs of VC-backed firms have significantly shorter average tenures (TENURE) and smaller tenure heterogeneity (TENHET). The mean (median) TENURE of VC-backed firms is 4.56 (3.5) years compared to 5.63 (4.25) years of non-VC-backed firms. The mean (median) TENHET of VC-backed firms is 0.69 (0.59) compared to 1.18 (0.63) of non-VC-backed firms.[11] All these differences are statistically significant at the 1% level. Thus, the TMT quality of VC-backed firms is relatively lower compared to non-VC-backed firms according to the above three proxies. Finally, there are no significant differences in the number of TMT members who sit on other firms' corporate boards across VC-backed and non-VC-backed firms.

The overall association between VC-backing and TMT quality is positive, as shown in Table 2 by the significantly larger mean and median TMT quality factor score (MQF) of VC-backed firms compared to non-VC-backed firms. Thus our univariate tests show that, although some individual TMT quality variables are smaller for VC-backed firms, the overall relationship between VC-backing and TMT quality is positive, consistent with our hypothesis **H1**.[12]

5.1.2. OLS Analysis of the Relationship between VC-Backing and TMT Quality

In this section we analyze the relationship between VC-backing and TMT quality by using OLS regressions of the TMT quality factor score (MQF) as well as individual TMT quality

[11] The smaller tenure heterogeneity of VC-backed firms' TMTs is due to the shorter average tenures of VC-backed firm managers. In general, the shorter the average tenure the smaller the dispersion in tenures. The shorter average tenures of VC-backed firms can be explained by the fact that VC-backed firms are on average younger firms; the mean (median) age of VC-backed firms is 11.58 (7) years compared to 14.62 (8) years of non-VC-backed firms.

[12] Table 2 also shows that even though VC-backed firms are significantly younger than non-VC-backed firms, their book value of assets is significantly larger, the proportion of outside directors in their boards of directors is significantly greater, their insider ownership before IPO is significantly lower, and they have significantly less incidences of CEOs serving as Chairmen of the board. These results provide some evidence that VC-backed firms have somewhat better internal governance mechanisms compared to non-VC-backed firms.

variables on a dummy equal to one for VC-backed firms and zero for non-VC-backed firms (VCDUM), and a set of controls including firm size (LNBVA), firm age (LNAGE), squared terms of firm size (LNBVA2) and firm age (LNAGE2), proportion of outside directors (ODIR), insider ownership before IPO (INSIDERB), a dummy equal to one if a firm's CEO is also its Chairman of the board and zero otherwise (BOSS), and underwriter reputation (UNDREP).

The results of our regressions are shown in Table 3. In regression 1, where TMT quality factor score (MQF) is the dependent variable, VCDUM is positive and highly significant, indicating that there is a significantly positive association between VC-backing and TMT quality even after controlling for firm size, age, internal governance, and underwriter reputation. The results of regressions 2 to 5 in Table 3 show also a significantly positive relationship between VC-backing and TMT size (TSIZE), the percentage of TMT with MBA degrees (PMBA), the percentage of TMT with prior managerial experience (PFTEAM), and the percentage of TMT with core functional expertise (PCORE). These findings are economically significant as well. For example, the TSIZE of VC-backed firms is larger than that of non-VC-backed firms by 0.51, which constitutes 8% of the mean TSIZE of 6.38 for the overall sample. The PMBA, PFTEAM, and PCORE of VC-backed firms are larger than those of non-VC-backed firms by 0.04, 0.05, and 0.05, respectively, which constitute 26.4%, 9.3%, and 8.6% of the overall sample's respective mean PMBA of 0.14, mean PFTEAM of 0.55, and mean PCORE of 0.56.

Regressions 7, 8, 10, and 11 in Table 3 indicate that VC-backing is associated with a smaller percentage of managers who previously served as law and accounting partners (PLAWACC), a smaller percentage of CPAs (PCPA), shorter average tenures (TENURE), and lower tenure heterogeneity (TENHET). The PLAWACC, PCPA, TENURE, and TENHET of VC-backed firms are smaller than those of non-VC-backed firms by 0.01, 0.03, 0.58, and 0.17, respectively, which equal to 23.0%, 30.2%, 11.7%, and 19.6% of the overall sample's respective

mean PLAWCC of 0.03, mean PCPA of 0.08, mean TENURE of 4.68, and mean TENHET of 0.88. Thus, consistent with our univariate tests, our multivariate regressions show that there is a positive association between VC-backing and TMT quality, consistent with our hypothesis **H1**.

5.2. The Effect of TMT Quality and VC-Backing on Firms' Growth in Post-IPO Operating Performance and IPO Valuation

In this section we study the effect of TMT quality and VC-backing on the growth in post-IPO operating performance of firms going public and their IPO and immediate post-IPO market valuations. We run multivariate regressions with the growth in post-IPO operating performance and IPO valuation proxies as dependent variables on a VC dummy (VCDUM), interaction of TMT quality factor score with VC dummy (MQFVC×VCDUM), interaction of TMT quality factor score with one minus VC dummy (MQFVC×(1 – VCDUM)), and a set of controls as in the previous section. We add TMT's average tenure (TENURE) and tenure heterogeneity (TENHET) to this set of controls. In other words, we estimate regressions of the following type:

$$\begin{aligned} Dependent\ var_i = {} & \beta_0 + \beta_1 VCDUM_i + \beta_2 MQFVC_i \times VCDUM_i + \beta_3 MQFVC_i \times (1 - VCDUM_i) \\ & + \beta_4 TENURE_i + \beta_5 TENHET_i + \beta_6 LNBVA_i + \beta_7 LNBVA2_i + \beta_8 LNAGE_i + \beta_9 LNAGE2_i \\ & + \beta_{10} ODIR_i + \beta_{11} INSIDERB_i + \beta_{12} BOSS_i + \beta_{13} UNDREP_i + \varepsilon_i, \end{aligned} \quad (1)$$

where β_2 estimates the effect of TMT quality on the growth in post-IPO operating performance and IPO valuation of VC-backed firms and β_3 estimates the effect of TMT quality on the growth in post-IPO operating performance and IPO valuation of non-VC-backed firms. In our regressions, if β_2 is significantly larger than β_3 then TMT quality and VC-backing are complements in affecting the dependent variable; alternatively, if β_2 is significantly smaller than β_3, then TMT quality and VC-backing are substitutes.

5.2.1. The Effect of TMT Quality and VC-Backing on the Growth in Post-IPO Operating Performance

In this section we study how TMT quality and VC-backing affect the growth in post-IPO operating performance, which is measured as the change in industry-adjusted post-IPO operating performance from the pre-IPO year to up to three years after IPO.[13] We measure operating performance (OIBDA) as the operating income before depreciation plus interest income (Compustat items OIBDP and IDIT, respectively) over the book value of assets (item AT). Next, we construct industry-adjusted OIBDA by subtracting the respective 2-digit SIC code industry medians. Finally, we construct the changes in OIBDA (ΔOIBDA) by subtracting the industry-adjusted OIBDA in the year prior to the IPO (year -1) from the industry-adjusted OIBDA in subsequent years (years 0 to 3). We have also conducted our analysis using ROA (net income over the book value of assets) as the dependent variable. Our results using ROA were qualitatively similar to those reported here for OIBDA.

We test our hypotheses regarding the relationship between VC-backing, TMT quality, and the growth in post-IPO operating performance by running multivariate regressions of the changes in industry-adjusted operating performance measures from year -1 to years 0 through 3 after IPO on the set of independent variables as in equation (1). The results of our regressions are presented in Table 4. We find that VC-backing has a significantly positive effect on ΔOIBDA in all years, which provides support for our hypothesis **H3a**. Next, the effect of TMT quality on ΔOIBDA is positive and highly significant in VC-backed firms, but it is mostly positive and

[13] The prior literature has used either the levels of (e.g., Loughran and Ritter, 1997) or growth in (e.g., Jain and Kini, 1994; Jain and Kini, 1995) operating income over assets (OIBDA) or return on assets (ROA) to measure post-issue operating performance. Since, in untabulated results, we find that TMT quality as well as VC-backing significantly reduce firm age at IPO (see also Megginson and Weiss, 1991 and Lee and Wahal, 2004 for VC-backed firms), and younger firms going public are likely to have lower levels of OIBDA or ROA, we choose to focus on the growth in the above variables in our empirical analysis as it is less likely to be affected by firm age at IPO.

statistically insignificant in non-VC-backed firms. This provides partial support for our hypothesis **H2a**. The support that we find for hypotheses **H2a** and **H3a** also indicates that the ability channel is at work in affecting firms' growth in post-IPO operating performance.

Further, the differences between the coefficient estimates of MQFVC×VCDUM and MQFVC×(1 – VCDUM) are positive and significantly different from zero in all regressions indicating that the effect of TMT quality on the growth in post-IPO operating performance is stronger in VC-backed firms compared to non-VC-backed firms. This implies that TMT quality and VC-backing act as complements in their positive effect on the growth in post-IPO operating performance providing support for our hypothesis **H5a**, and contradicting our hypothesis **H5b** (that TMT quality and VC-backing are substitutes). One possible reason we do not find support for our hypothesis **H5b** may be because VCs, who play a significant role in hiring and shaping TMTs of the firms they back, are likely to be aware of potential horizontal agency costs *ex ante*. Therefore, rational VCs may try not to hire or promote TMT members who might cause significant agency costs *ex post*.

Our findings are also economically significant. For example, a one standard deviation increase in MQF increases industry-adjusted change in OIBDA from year -1 prior to IPO to year +1 after IPO by 0.018 for VC-backed firms and by 0.002 for non-VC-backed firms, which constitute 13.3% and 1.3% increases, respectively, over the mean value of that measure for the overall sample of 0.137. This implies that TMT quality has a significant positive economic effect on the growth in post-IPO operating performance of VC-backed firms, but the economic impact of TMT quality on the growth in post-IPO operating performance in non-VC-backed firms is much smaller. This provides further support for the idea that TMT quality and VC-backing act as complements in their effect on firms' growth in post-IPO operating performance.

5.2.2. The Effect of TMT Quality and VC-Backing on IPO Firm Market Valuation

In this section, we study the effect of TMT quality and VC-backing on IPO firm valuation both in the IPO market and in the immediate post-IPO secondary market. We measure IPO firm valuation using Tobin's Q, which is the ratio of the market value of assets over the book value of assets, where the market value of assets is equal to the book value of assets minus the book value of equity plus the product of the number of shares outstanding and share price.[14] We measure firm valuation in the IPO market by using the IPO offer price as the share price in the above definition (QOP). We measure IPO firm valuation in the secondary market by using either the first trading day closing price as the share price in the above definition (QFTD) or the share price at the end of the issue quarter (QIQ). We also construct industry-adjusted Q ratios (QOPADJ, QFTDADJ, and QIQADJ) by subtracting contemporaneous 2-digit SIC code industry median Q ratios from the above proxies. The book value of assets and the book value of equity both for IPO firms and industry peers are taken from the first available post-IPO quarter on Compustat. The number of shares outstanding as well and the share price for industry peers is taken from the first available post-IPO quarter on Compustat. To construct QIQ and QIQADJ, we use the number of IPO firm outstanding shares and the share price from the first available post-IPO quarter on Compustat. To construct QOP, QOPADJ, QFTD, and QFTDADJ we use the number of IPO firm outstanding shares as of the end of the first trading day after the IPO.

Table 5 presents the results of our regressions as specified in equation (1) using various valuation proxies described above as dependent variables. The coefficient estimates of VCDUM are positive and highly significant in all six regressions indicating that VC backing significantly increases firm valuations both in the IPO and immediate post-IPO secondary markets supporting

[14] Even though Tobin's Q continues to be used extensively in the finance literature, see Bartlett and Partnoy (2020) for some criticism of Tobin's Q as a valuation measure used in empirical analyses. Given such criticism, particular care should be taken in interpreting our valuation results using Tobin's Q.

our hypothesis **H3b**. The coefficient estimates of MQFVC×VCDUM are positive and highly significant as well suggesting that TMT quality significantly increases VC-backed firms' valuation both in the IPO and secondary markets. The coefficient estimates of MQFVC×(1 – VCDUM) are also significantly positive in all regressions and smaller in regressions 3 to 6, but larger in regressions 1 and 2. These findings provide support for our hypothesis **H2b**.

Our findings are also economically significant. For example, a one standard deviation increase in MQFVC increases QFTDADJ (QFTD) of VC-backed firms by 0.36 (0.29), which is a 16.9% (7.0%) increase over the mean QFTDADJ (QFTD) of the overall sample of 2.15 (4.15). Further, a one standard deviation increase in MQFVC increases QFTDADJ (QFTD) of non-VC-backed firms by 0.12 (0.12), which is a 5.6% (2.9%) increase over the mean QFTDADJ (QFTD) of the overall sample of 2.15 (4.15). Clearly, TMT quality has an economically significant positive impact on IPO firm secondary market valuation.

We also address the possible endogeneity of TMT quality and VC-backing by conducting an instrumental variable (IV) analysis of the effect of TMT quality and VC-backing on the growth in post-IPO operating performance and on IPO and immediate post-IPO market valuations. In this IV analysis we make use of a plausible exogenous measure of the supply of high quality top managers as an instrument for TMT quality, and a plausibly exogenous measure of a shock in the supply of venture capital as an instrument for VC-backing. Our IV analyses show that the effects of TMT quality and VC backing on the growth in post-IPO operating performance and on IPO and immediate post-IPO market valuations shown above hold even after controlling for the potential endogeneity of TMT quality and VC-backing. Due to space limitation, we confine the results of these analyses to Tables A1 and A2 in online Appendix A.[15]

[15] We thank an anonymous referee for suggesting the methodology described in Grilli and Murtinu (2015), which we used to perform this IV analysis.

5.3. Disentangling the Ability and Certification Channels: the Effect of TMT Quality and VC-Backing on the Information Asymmetry Facing IPO Firms

We now attempt to disentangle the ability and certification channels by analyzing the effect of TMT quality and VC-backing on the extent of information asymmetry facing IPO firms. We employ three information asymmetry proxies widely used in the corporate finance literature: bid-ask spread, analyst coverage, and institutional investor participation in IPOs. The greater the bid-ask spread, the greater the extent of information asymmetry; the greater the analyst coverage and institutional investor participation in IPOs, the lower the extent of information asymmetry.[16] Our bid-ask spread variable, BIDASK, is the mean daily bid-ask spread as a percentage of the stock price, calculated over one year (252 trading days) after the IPO. Our analyst coverage variable, EST, is the number of analysts following the IPO firm at the end of the fiscal year of the IPO as reported by IBES, where the observations missing in IBES are set equal to zero (firms not covered by financial analysts do not have any data in IBES).[17] We use two variables to proxy for the institutional investor participation in IPOs: INSTP is the proportion of IPO firm shares held by institutional investors at the end of the first quarter post-IPO, and INSTN is the number of institutional investors holding IPO firms' shares at the end of the first quarter after the IPO.[18]

[16] These proxies of information asymmetry have been widely used in the existing literature. See, e.g., Leuz and Verrecchia (2000) who use bid-ask spread as a measure of information asymmetry. Brennan and Subrahmanyam (1995) and Chae (2005) use the number of analysts following a firm as a measure of information asymmetry. Huddart and Ke (2007) use institutional ownership and analyst following as measures of information asymmetry.

[17] IBES reports analyst coverage data for 2,547 firms in our sample at the end of the fiscal year of their IPOs. The remaining 1,356 firms in our sample do not have analyst coverage data in IBES at the end of the fiscal year of their IPOs; thus, we assume that such firms are not covered by financial analysts.

[18] Note that here we use post-IPO data to measure the extent of information asymmetry facing IPO firms prior to going public. Given that private firms do not have the data necessary to construct reliable asymmetric information measures pre-IPO, many researchers are forced to use such unreliable and error-prone proxies as firm size, firm age, or industry average numbers. Rather than using such unreliable proxies, we choose to follow other researchers who use immediate post-IPO measures to capture the information asymmetry facing private firms at the time of IPO. We therefore use the above-described variables, which are widely used in the corporate finance literature, constructed for the fiscal year after the IPO. Here we make a reasonable assumption that the extent of information asymmetry facing firms going public after IPO must be highly correlated with the extent of information asymmetry facing such firms prior to IPO.

We study how TMT quality and VC-backing affect the extent of information asymmetry facing IPO firms by running multivariate regressions of various asymmetric information proxies on VCDUM, MQFVC, and other controls as in equation (1). Table 6 reports the results of our regressions. In regressions 1 and 2, where BIDASK is the dependent variable, the coefficient estimates of VCDUM and MQFVC are significantly negative indicating that VC-backing as well as TMT quality significantly reduce the bid-ask spreads (thus lowering information asymmetry) of IPO firms. Regressions 3 and 4 are Poisson maximum-likelihood estimations using EST (number of analysts) as the dependent variable. The coefficient estimates of VCDUM and MQFVC are positive and highly significant, indicating that VC-backed firms as well as firms with higher TMT quality are followed by a significantly larger number of financial analysts and thus face less information asymmetry in the post-IPO equity market.

Regressions 5 and 6 in Table 6 are logistic regressions using the proportion of IPO firm shares held by institutional investors at the end of the first quarter after the IPO as the dependent variable.[19] Regressions 7 and 8 are negative binomial maximum-likelihood estimations using the number of institutional investors holding IPO firm shares at the end of the first quarter after the IPO as the dependent variable. We use the negative binomial maximum-likelihood estimation technique since the number of institutional investors is a count variable exhibiting a great degree of overdispersion (ranging between 0 and 455, with the mean of 24.97 and the median of 20). The coefficient estimates of VCDUM and MQFVC in all four regressions are positive and highly significant indicating that VC-backing and TMT quality are associated with a significant increase in the institutional investor participation in the IPO firm's equity, both in terms of the number of institutional investors and the proportion of IPO firm shares held by institutional investors (thus

[19] We make use of logistic regressions here since the dependent variable is a proportion bounded between 0 and 1. See, e.g., Hox (2002), who shows that logistic regressions are the appropriate estimation method when a dependent variable is a proportion bounded between 0 and 1.

decreasing the extent of information asymmetry faced by IPO firms). Our findings above provide support for our hypotheses **H4a** and **H4b**, and indicate that the certification channel is at work in affecting IPO valuations (independent of the ability channel).

Our findings are also economically significant. For example, using the coefficient estimates from regression 1 in Table 6, a one standard deviation increase in MQFVC decreases BIDASK by 0.003, which is equivalent to a 8.6% decrease over the mean BIDASK for the overall sample of 0.03. Further, the bid-ask spread of VC-backed firms is less than that of non-VC-backed firms by 0.008, which is equivalent to a 26.6% decrease over the mean BIDASK for the overall sample of 0.03. Additionally, using the coefficient estimates from regression 3 in Table 6, a one standard deviation increase in MQFVC increases EST by 0.076, which is equivalent to a 3.4% increase over the mean EST for the overall sample of 2.24. Finally, the number of analysts following VC-backed firms is larger than that of non-VC-backed firms by 0.308, which is equivalent to a 13.7% increase over the mean EST for the overall sample of 2.24. These findings indicate that VC-backing and TMT quality each economically significantly decrease the extent of information asymmetry faced by IPO firms.

6. Discussion

In this paper, we have used hand-collected data on the management quality of a large sample of 3,903 firms going public during 1993-2012 to conduct the first large-sample study of the relationship (association) between VC-backing and TMT quality, and the effect of these two variables on the growth in post-IPO operating performance, IPO and immediate post-IPO market valuations, and the asymmetric information facing firms post-IPO. We also analyzed whether TMT quality and VC-backing are complements or substitutes in their effect on IPO firms' growth in post-IPO operating performance. Our findings are as follows. First, VC-backing is

associated with higher TMT quality at IPO. Second, both TMT quality and VC-backing have a positive effect on firms' growth in post-IPO operating performance and they act as complements in this effect. Third, both TMT quality and VC-backing increase IPO and immediate post-IPO secondary market equity valuations. Fourth, both TMT quality and VC-backing have a negative effect on the extent of post-IPO information asymmetry facing firms going public.

6.1. Implications for Theory

Our paper generates several novel insights on how VCs and TMTs add value to firms and how such value addition affects the pricing of entrepreneurial firms' equity in IPOs and the post-IPO operating performance of these firms. These insights will help future researchers to formulate new theoretical models of entrepreneurial firm financing and performance. First, using a large hand-collected dataset on TMT quality variables spanning a 20-year period, we show that there is a positive association between VC-backing and TMT quality at the time of IPO; earlier studies have shown this positive association between VC-backing and more professional TMTs only for small samples of early-stage firms. Second, using a sample consisting of both VC- and non-VC-backed firms, we are able to show that VC-backing and TMT quality at IPO each have a positive effect on firms' IPO valuation and the growth in post-IPO operating performance. Ours is the first paper to demonstrate the above relationship for VC-backed firms. We show that the above effects occur through two independent channels: first, an "ability" channel, where VC-backed firms and firms with higher TMT quality select better projects and implement them more ably, yielding greater post-IPO operating performance; and second, through a "certification" channel, whereby higher quality TMTs and VCs each reduce the information asymmetry facing firms going public, yielding them higher IPO market equity valuations. Finally, we show that VC-backing and TMT quality are complements in affecting the

growth in a firm's post-IPO operating performance, again for the first time in the literature, thus shedding new light on the IPO process for VC-backed firms.

6.2. Implications for Practice

Our findings have several important implications for entrepreneurs and corporate board members of private firms, as well as for policymakers. First, we show that the positive association between VC-backing and TMT quality persists till IPO, in turn yielding the firm going public higher IPO equity valuations. Second, we show that TMT quality and VC-backing together yield additional long-term benefits to firms after IPO through better post-IPO operating performance and therefore higher long-term valuations even after IPO. Third, the above findings allow us to quantify the benefits to entrepreneurial firms of building a high quality TMT, which can then be compared to the well-known costs to firms of building up such teams (e.g., in terms of salary, equity, and stock options to be given to top firm managers at the time they are hired). Finally, our findings indicate that policymakers in various U.S. states need to initiate and implement policies that promote the local VC industry and invest significantly in professional education to create a robust managerial workforce available for hire by local firms, since this will yield rich dividends for entrepreneurial firms and the local economy when these firms go public.

6.3. Limitations and Future Research

Our study also has some limitations. First, data limitations do not allow us to establish a causal relationship between VC-backing and TMT quality. Thus, we are only able to demonstrate a positive association between the above two variables at the time of IPO. Future researchers having access to detailed data on the hiring of top managers in the years between the first round of VC investment in a private firm and its eventual IPO can perhaps distinguish

between selection and monitoring as the main driving factor behind the positive association between VC-backing and higher TMT quality at IPO that we document in this paper.

Second, while we have shown that having higher quality TMTs at IPO confers important benefits to IPO firms (higher growth in post-IPO operating performance and higher IPO valuations), some of these higher quality top managers may not stay with the firm in the long-run, and may instead leave the firm soon after IPO, taking their human capital with them. Coff (1997, 1999) argues that, given the above possibility of top managers leaving firms after a short period, firms need to have specific policies in place to cope with the above problem, such as retention strategies, rent-sharing strategies, organizational design strategies, and information strategies. Corporate boards and practitioners therefore need to be aware of the importance of putting in place human capital retention strategies to ensure that firms do not lose a substantial portion of their top management human capital. Thus, an important topic for future academic research suggested by our study is to analyze whether VC-backed firms (or firms with higher quality TMTs in general) are indeed able to put in place the necessary retention mechanisms and thereby are able to retain their top management human capital in the long run subsequent to IPO.

6.4. Conclusion

In this paper, we showed that TMT quality is an important variable affecting the success of private firms' IPOs. In particular, we demonstrated a positive association between VC-backing and TMT quality in a large sample of private firms going public. Further, we showed that TMT quality at IPO and VC-backing each have a positive effect on two important IPO variables: equity valuation at IPO and the growth in a firm's post-IPO operating performance. Finally, we showed that, on average, VC-backing and TMT quality act as complements in affecting the growth in private firms' post-IPO operating performance.

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Table 1. Selected statistics related to a common factor analysis of eight measures of TMT quality and reputation

The sample consists of 3,903 initial public offerings (IPO) conducted between 1993 and 2012. MQF is the TMT quality factor score obtained using common factor analysis on the firm-size-, firm-age-, and industry-dummies-adjusted TSIZE, MBA, FTEAM, LAWACC, CPA, CORE, COMP, and BOARDS. MQFVC is the TMT quality factor score obtained using common factor analysis on the firm-size-, firm-age-, industry-dummies-, and VC-dummy-adjusted TSIZE, MBA, FTEAM, LAWACC, CPA, CORE, COMP, and BOARDS. TSIZE is the size of a firm's TMT, defined as the number of executive officers with a rank of vice president or higher. MBA is the number of TMT members with MBA degrees. FTEAM is the number of TMT members who have served as executive officers and/or vice presidents prior to joining the IPO firm. CORE is the number of TMT members who have core functional expertise, namely, holding positions in operations and production, sales and marketing, research and development, and finance. LAWACC is the number of TMT members who have previously been partners in a law or accounting firm. CPA is the number of TMT members who are certified public accountants. COMP is the natural logarithm of the total compensation (salary plus bonus) of TMT members in the fiscal year preceding the IPO. BOARDS is the number of other companies' boards that TMT members sit on.

Panel A. Estimated communalities of eight TMT quality measures

Common factor	TSIZE	MBA	FTEAM	CORE	LAWACC	CPA	COMP	BOARDS	Total
MQF	0.5416	0.1124	0.3511	0.4238	0.0445	0.0333	0.0348	0.0152	1.5567
MQFVC	0.5409	0.0968	0.3359	0.4134	0.0445	0.0352	0.0296	0.0156	1.5119

Panel B. Eigenvalues of the reduced correlation matrices

Common factor	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8
MQF	1.73132	0.19276	0.08358	0.02637	0.01687	-0.12303	-0.14950	-0.22171
MQFVC	1.67901	0.19527	0.09098	0.03156	0.00745	-0.12169	-0.14664	-0.22409

Panel C. Correlations between the common factors and eight TMT quality measures

Common factor	TSIZE	MBA	FTEAM	CORE	LAWACC	CPA	COMP	BOARDS
MQF	0.8413	0.3990	0.6556	0.7481	0.1497	0.1072	0.1618	0.0581
MQFVC	0.8422	0.3662	0.6267	0.7226	0.1536	0.1331	0.1444	0.0654

Panel D. Descriptive statistics of the common factors extracted from eight TMT quality measures

Common factor	Maximum	Third quartile	Median	First quartile	Minimum	Mean
MQF	4.5886	0.4713	-0.0845	-0.5941	-2.5007	0
MQFVC	4.5351	0.4716	-0.0815	-0.5869	-2.5271	0

Table 2. Summary statistics and univariate tests

The sample consists of 3,903 IPOs conducted between 1993 and 2012. TSIZE is the size of a firm's TMT, defined as the number of executive officers with a rank of vice president or higher. PMBA is the percentage of a firm's TMT with MBA degrees. PFTEAM is the percentage of a firm's TMT who have served as executive officers and/or vice presidents prior to joining the firm. PCORE is the percentage of a firm's TMT who have core functional expertise, namely, holding positions in operations and production, sales and marketing, R&D, and finance. PLAWACC is the percentage of a firm's TMT who have previously been partners in a law or accounting firm. PCPA is the percentage of a firm's TMT who are certified public accountants. PCOMP is the natural logarithm of the average compensation (salary plus bonus) of TMT members in the fiscal year preceding the IPO. BOARDS is the number of other companies' boards that TMT members sit on. TENURE is the average number of years a firm's TMT members have been with the firm. TENHET is the coefficient of variation of the TMT members' tenures. MQF is the TMT quality factor score obtained using common factor analysis on the firm-size-, firm-age-, and industry-dummies-adjusted TSIZE, MBA, FTEAM, LAWACC, CPA, CORE, COMP, and BOARDS. BVA is the book value of the firm's assets immediately before the IPO (in $millions). LNBVA is the natural logarithm of the book value of the firm's assets immediately before the IPO. LNBVA2 is the squared term of LNBVA. AGE is the firm age in years. LNAGE is the natural logarithm of one plus the firm age. LNAGE2 is the squared term of LNAGE. ODIR is the percentage of outside directors in the board of directors. INSIDERB is the proportions of voting power owned by firm officers and directors immediately prior to the IPO. BOSS is an indicator variable equal to one if a CEO is also a Chairman of the board of directors, and zero otherwise. UNDREP is underwriter reputation measured as the lead IPO underwriter's share of total proceeds raised in the IPO market in the previous five years. The results of *t*-tests for the difference in means and non-parametric Wilcoxon rank-sum tests for the difference in medians are reported in parentheses. ***, **, and * indicate significance at the 1, 5, and 10 percent levels, respectively.

	VC-backed IPO firms						Non-VC-backed IPO firms						Diff. in		Diff. in	
	N	Min	Mean	Median	Max	SD	N	Min	Mean	Median	Max	SD	means	(*t*-stat.)	medians	(*z*-stat.)
TSIZE	2380	1	6.861	6	20	2.574	1523	1	5.642	5	20	2.575	1.219	(14.43)***	1	(15.66)***
PMBA	2380	0	0.170	0.125	1	0.193	1523	0	0.084	0	1	0.156	0.087	(14.73)***	0.125	(16.02)***
PFTEAM	2380	0	0.596	0.6	1	0.269	1523	0	0.470	0.5	1	0.303	0.125	(13.53)***	0.1	(13.00)***
PCORE	2380	0	0.582	0.6	1	0.199	1523	0	0.520	0.5	1	0.216	0.062	(9.18)***	0.1	(9.23)***
PLAWACC	2380	0	0.031	0	1	0.082	1523	0	0.029	0	0.75	0.084	0.002	(0.65)	0	(2.03)**
PCPA	2380	0	0.069	0	1	0.105	1523	0	0.104	0	0.833	0.139	-0.035	(-9.05)***	0	(-7.29)***
PCOMP	2380	9.434	12.287	12.214	15.660	0.587	1523	0	12.094	12.087	15.742	0.895	0.193	(8.15)***	0.126	(8.10)***
BOARDS	2380	0	0.554	0	10	1.096	1523	0	0.565	0	9	1.190	-0.011	(-0.30)	0	(1.34)
TENURE	2380	0.5	4.564	3.5	30	3.485	1523	0.25	5.627	4.25	30.125	4.592	-1.063	(-8.19)***	-0.75	(-5.06)***
TENHET	2380	0	0.685	0.590	16.408	0.777	1523	0	1.180	0.630	22.854	2.040	-0.495	(-10.68)***	-0.040	(-2.97)***
MQF	2380	-2.501	0.126	0.051	4.589	0.904	1523	-2.410	-0.196	-0.266	3.794	0.775	0.322	(11.45)***	0.317	(11.60)***
BVA	2380	0.322	240.390	29.873	28,866.1	1,220.86	1523	0.005	238.302	21.206	137,238	3,585.47	2.088	(0.03)	8.667	(10.26)***
LNBVA	2380	12.683	17.529	17.212	24.086	1.616	1523	8.553	16.873	16.870	25.645	1.924	0.656	(11.47)***	0.343	(10.26)***
LNBVA2	2380	160.852	309.871	296.269	580.132	58.559	1523	73.159	288.394	284.591	657.665	65.893	21.477	(10.64)***	11.678	(10.26)***
AGE	2380	0	11.584	7	157	16.554	1523	0	14.618	8	167	20.438	-3.033	(-5.09)***	-1	(-2.86)***
LNAGE	2380	0	2.137	2.079	5.063	0.804	1523	0	2.192	2.197	5.124	1.053	-0.056	(-1.87)*	-0.118	(-2.86)***
LNAGE2	2380	0	5.211	4.324	25.630	4.011	1523	0	5.913	4.828	26.255	4.925	-0.702	(-4.87)***	-0.504	(-2.86)***
ODIR	2380	0	0.721	0.75	1	0.171	1523	0	0.500	0.556	1	0.270	0.221	(31.36)***	0.194	(27.15)***
INSIDERB	2380	0	0.572	0.595	1	0.272	1523	0	0.662	0.744	1	0.314	-0.089	(-9.42)***	-0.149	(-11.36)***
BOSS	2380	0	0.524	1	1	0.500	1523	0	0.674	1	1	0.469	-0.150	(-9.37)***	0	(-9.27)***
UNDREP	2380	0	0.044	0.022	0.304	0.051	1523	0	0.019	0.002	0.208	0.036	0.025	(16.77)***	0.020	(22.88)***

Table 3. Relationship between VC-backing and TMT quality

The sample consists of 3,903 IPOs conducted between 1993 and 2012 (2,380 VC-backed and 1,523 non-VC-backed). This table presents multivariate ordinary least squares (OLS) regressions of TMT quality variables on VC dummy (VCDUM) and other control variables. MQF is the TMT quality factor score obtained using common factor analysis on the firm-size-, firm-age-, and industry-dummies-adjusted TSIZE, MBA, FTEAM, LAWACC, CPA, CORE, COMP, and BOARDS. TSIZE is the size of a firm's TMT, defined as the number of executive officers with a rank of vice president or higher. PMBA is the percentage of a firm's TMT with MBA degrees. PFTEAM is the percentage of a firm's TMT who have served as executive officers and/or vice presidents prior to joining the firm. PCORE is the percentage of a firm's TMT who have core functional expertise, namely, holding positions in operations and production, sales and marketing, R&D, and finance. PCOMP is the natural logarithm of the average compensation (salary plus bonus) of TMT members in the fiscal year preceding the IPO. PLAWACC is the percentage of a firm's TMT who have previously been partners in a law or accounting firm. PCPA is the percentage of a firm's TMT who are certified public accountants. BOARDS is the number of other companies' boards that TMT members sit on. TENURE is the average number of years a firm's TMT members have been with the firm. TENHET is the coefficient of variation of the team members' tenures. VCDUM is a dummy variable equal to one for VC-backed IPOs and zero for non-VC-backed IPOs. LNBVA is the natural logarithm of the book value of assets immediately prior to the IPO. LNBVA2 is the squared term of LNBVA. LNAGE is the firm age defined as the natural logarithm of one plus the firm age. LNAGE2 is the squared term of LNAGE. ODIR is the proportion of outside directors in the board of directors. INSIDERB is the proportion of voting power owned by firm officers and directors immediately prior to the IPO. BOSS is an indicator variable equal to one if a CEO is also a Chairman of the board of directors, and zero otherwise. UNDREP is underwriter reputation measured as the lead IPO underwriter's share of total proceeds raised in the IPO market in the previous five years. *t*-statistics are in parentheses. ***, **, and * indicate significance at the 1, 5, and 10 percent levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Dependent variable	MQF	TSIZE	PMBA	PFTEAM	PCORE	PCOMP	PLAWACC	PCPA	BOARDS	TENURE	TENHET
Intercept	-2.000	-6.864	-0.775	0.616	0.038	9.207	-0.039	-0.190	6.379	-12.204	-6.874
	(-1.92)*	(-2.40)**	(-4.25)***	(2.01)**	(0.14)	(9.76)***	(-0.37)	(-1.33)	(3.79)***	(-2.29)**	(-6.66)***
VCDUM	0.285	0.511	0.036	0.051	0.048	0.020	-0.007	-0.025	0.003	-0.584	-0.172
	(8.58)***	(5.39)***	(5.30)***	(4.84)***	(5.87)***	(0.82)	(-2.23)**	(-4.92)***	(0.08)	(-4.64)***	(-3.53)***
LNBVA	0.266	0.762	0.095	0.001	0.075	0.078	0.010	0.048	-0.745	1.349	0.753
	(2.15)**	(2.20)**	(4.82)***	(0.02)	(2.55)**	(0.76)	(1.04)	(3.29)***	(-3.89)***	(2.41)**	(6.57)***
LNBVA2	-0.010	-0.007	-0.003	-0.000	-0.003	0.004	-0.000	-0.001	0.023	-0.030	-0.021
	(-2.62)***	(-0.70)	(-5.03)***	(-0.30)	(-3.43)***	(1.29)	(-0.90)	(-3.47)***	(4.16)***	(-1.82)*	(-6.55)***
LNAGE	0.175	0.172	0.015	-0.122	0.043	0.344	0.005	-0.004	-0.323	1.638	0.569
	(3.06)***	(1.04)	(1.44)	(-6.25)***	(2.96)***	(4.55)***	(0.97)	(-0.40)	(-3.55)***	(6.46)***	(7.42)***
LNAGE2	-0.029	-0.035	-0.005	0.005	-0.009	-0.044	-0.002	-0.000	0.061	0.158	-0.024
	(-2.32)**	(-0.97)	(-2.24)**	(1.34)	(-3.01)***	(-3.00)***	(-1.57)	(-0.04)	(3.18)***	(2.58)***	(-1.19)
ODIR	0.024	-0.298	0.025	0.105	0.071	-0.196	-0.009	-0.024	0.060	-1.767	-0.984
	(0.37)	(-1.57)	(1.98)**	(5.05)***	(4.23)***	(-3.62)***	(-1.20)	(-2.32)**	(0.69)	(-6.71)***	(-7.03)***
INSIDERB	-0.177	-0.396	-0.007	-0.032	-0.047	0.048	-0.002	0.008	-0.199	0.660	0.470
	(-3.42)***	(-2.69)***	(-0.65)	(-2.09)**	(-3.88)***	(1.26)	(-0.35)	(1.16)	(-2.87)***	(3.53)***	(7.24)***
BOSS	0.060	0.188	-0.003	0.001	0.001	-0.012	-0.004	-0.010	0.156	0.288	0.091
	(2.06)**	(2.31)**	(-0.46)	(0.13)	(0.17)	(-0.64)	(-1.49)	(-2.63)***	(4.20)***	(2.97)***	(2.79)***
UNDREP	2.097	5.296	0.038	0.240	-0.091	1.161	0.067	-0.199	0.378	-3.743	0.486
	(5.55)***	(4.80)***	(0.53)	(2.54)**	(-1.30)	(5.24)***	(2.11)**	(-5.23)***	(0.89)	(-3.02)***	(1.02)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	3,903	3,903	3,903	3,903	3,903	3,903	3,903	3,903	3,903	3,903	3,903
R^2	0.0988	0.2198	0.1521	0.2833	0.1553	0.4122	0.0721	0.0815	0.0704	0.4876	0.2390

Table 4. Relationship between TMT quality, VC-backing, and the growth in post-IPO operating performance

The sample consists of 3,903 IPOs conducted between 1993 and 2012. OIBDA is the ratio of operating income before depreciation plus interest income (Compustat items OIBDP and IDIT, respectively) to the book value of total assets (item AT). OIBDA is adjusted for industry performance by subtracting contemporaneous industry (2-digit SIC code) medians. ΔOIBDA is the change in industry-adjusted OIBDA calculated as the difference in the industry-adjusted OIBDA in a given year after the IPO (up to three years including the year of IPO) and the industry-adjusted OIBDA in the fiscal year prior to the IPO (year -1). Year 0 is the year of IPO. VCDUM is a dummy variable equal to one for VC-backed IPOs and zero for non-VC-backed IPOs. MQFVC is the TMT quality factor score obtained using common factor analysis on the firm-size-, firm-age-, industry-dummies-, and VC-dummy-adjusted TSIZE, MBA, FTEAM, LAWACC, CPA, CORE, COMP, and BOARDS. TENURE is the average number of years TMT members have been with a firm. TENHET is the coefficient of variation of the team members' tenures. LNBVA is the natural logarithm of the book value of assets immediately prior to the IPO. LNBVA2 is the squared term of LNBVA. LNAGE is the firm age defined as the natural logarithm of one plus the firm age. LNAGE2 is the squared term of LNAGE. ODIR is the proportion of outside directors in the board of directors. INSIDERB is the proportion of voting power owned by firm officers and directors immediately prior to the IPO. BOSS is an indicator variable equal to one if a CEO is also a Chairman of the board of directors, and zero otherwise. UNDREP is underwriter reputation measured as the lead IPO underwriter's share of total proceeds raised in the IPO market in the previous five years. Dependent variables are winsorized at the 5th and 95th percentiles. *t*-statistics are in parentheses. ***, **, and * indicate significance at the 1, 5, and 10 percent levels, respectively.

	(1)	(2)	(3)	(4)
	ΔOIBDA -1 to 0	ΔOIBDA -1 to 1	ΔOIBDA -1 to 2	ΔOIBDA -1 to 3
Intercept	2.440	1.221	1.805	1.816
	(7.73)***	(3.41)***	(5.34)***	(4.46)***
VCDUM	0.078	0.070	0.068	0.065
	(9.61)***	(7.84)***	(6.85)***	(5.62)***
MQFVC×VCDUM	0.022	0.021	0.030	0.032
	(4.30)***	(3.64)***	(4.81)***	(4.61)***
MQFVC×(1 – VCDUM)	0.008	0.002	0.006	-0.004
	(1.22)	(0.28)	(0.72)	(-0.37)
TENURE	-0.002	-0.003	-0.002	-0.003
	(-2.64)***	(-2.63)***	(-1.75)*	(-2.30)**
TENHET	0.003	0.002	0.004	0.006
	(1.90)*	(1.19)	(2.29)**	(3.03)***
LNBVA	-0.227	-0.114	-0.173	-0.173
	(-6.65)***	(-2.94)***	(-4.73)***	(-3.98)***
LNBVA2	0.005	0.003	0.004	0.004
	(5.84)***	(2.57)**	(4.39)***	(3.64)***
LNAGE	-0.083	-0.080	-0.108	-0.110
	(-5.71)***	(-5.20)***	(-6.09)***	(-5.12)***
LNAGE2	0.011	0.011	0.015	0.015
	(4.16)***	(4.08)***	(4.66)***	(3.88)***
ODIR	0.107	0.121	0.111	0.132
	(6.35)***	(6.53)***	(5.50)***	(5.62)***
INSIDERB	-0.051	-0.023	-0.049	-0.036
	(-3.34)***	(-1.44)	(-2.68)***	(-1.70)*
BOSS	-0.007	-0.007	-0.003	0.002
	(-0.97)	(-0.81)	(-0.35)	(0.18)
UNDREP	0.217	0.265	0.256	0.408
	(2.78)***	(2.95)***	(2.57)**	(3.74)***
N	3,307	3,081	2,764	2,460
R^2	0.1687	0.1058	0.1134	0.1177
Difference between the coefficients of MQFVC×VCDUM and MQFVC×(1 – VCDUM) with *t*-statistics in parentheses				
MQFVC×VCDUM –	0.015	0.019	0.024	0.036
MQFVC×(1 – VCDUM)	(1.81)*	(2.02)**	(2.31)**	(2.95)***

Table 5. Relationship between TMT quality, VC-backing, and IPO firm equity market valuation

The sample consists of 3,903 IPOs conducted between 1993 and 2012. QOP, QFTD, and QIQ are three definitions of Tobin's Q, and QOPADJ, QFTDADJ, and QIQADJ are three definitions of industry-adjusted Tobin's Q. Tobin's Q is the ratio of the market value of assets to the book value of assets, where the market value of assets is equal to the book value of assets minus the book value of common equity plus the number of shares outstanding times the market price (either IPO offer price for QOP and QOPADJ, first trading day closing price for QFTD and QFTDADJ, or the closing price at the end of the issue quarter for QIQ and QIQADJ) or times the share price at the end of the issue quarter (for industry peers). Industry-adjusted Tobin's Q is the difference between the IPO firm's Tobin's Q and the median of its 2-digit SIC code industry peers. VCDUM is a dummy variable equal to one for VC-backed IPOs and zero for non-VC-backed IPOs. MQFVC is the TMT quality factor score obtained using common factor analysis on the firm-size-, firm-age-, industry-dummies-, and VC-dummy-adjusted TSIZE, MBA, FTEAM, LAWACC, CPA, CORE, COMP, and BOARDS. TENURE is the average number of years TMT members have been with a firm. TENHET is the coefficient of variation of the team members' tenures. LNBVA is the natural logarithm of the book value of assets immediately prior to the IPO. LNBVA2 is the squared term of LNBVA. LNAGE is the firm age defined as the natural logarithm of one plus the firm age. LNAGE2 is the squared term of LNAGE. ODIR is the proportion of outside directors in the board of directors. INSIDERB is the proportion of voting power owned by firm officers and directors immediately prior to the IPO. BOSS is an indicator variable equal to one if a CEO is also a Chairman of the board of directors, and zero otherwise. UNDREP is underwriter reputation measured as the lead IPO underwriter's share of total proceeds raised in the IPO market in the previous five years. Dependent variables are winsorized at the 99th percentile. *t*-statistics are in parentheses. ***, **, and * indicate significance at the 1, 5, and 10 percent levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	QOPADJ	QOP	QFTDADJ	QFTD	QIQADJ	QIQ
Intercept	3.593	6.122	-2.176	3.132	-1.238	4.334
	(1.75)*	(2.88)***	(-0.72)	(1.11)	(-0.28)	(1.09)
VCDUM	0.222	0.240	0.684	0.553	0.629	0.430
	(4.00)***	(4.23)***	(7.31)***	(5.81)***	(5.88)***	(3.95)***
MQFVC×VCDUM	0.131	0.117	0.419	0.334	0.311	0.222
	(3.58)***	(3.32)***	(5.53)***	(4.50)***	(3.86)***	(2.91)***
MQFVC×(1 –VCDUM)	0.133	0.151	0.140	0.139	0.165	0.135
	(2.94)***	(3.30)***	(2.16)**	(2.10)**	(1.96)**	(1.69)*
TENURE	-0.021	-0.014	-0.060	-0.026	-0.060	-0.023
	(-3.05)***	(-2.04)**	(-5.27)***	(-2.38)**	(-4.90)***	(-1.92)*
TENHET	-0.013	0.006	-0.029	0.009	-0.030	0.011
	(-0.98)	(0.44)	(-1.59)	(0.47)	(-1.54)	(0.52)
LNBVA	-0.119	-0.149	0.728	0.267	0.612	0.083
	(-0.52)	(-0.66)	(2.13)**	(0.85)	(1.24)	(0.18)
LNBVA2	-0.005	-0.005	-0.033	-0.021	-0.030	-0.015
	(-0.75)	(-0.84)	(-3.48)***	(-2.36)**	(-2.18)**	(-1.20)
LNAGE	0.246	0.234	0.185	0.189	0.117	0.216
	(2.96)***	(2.87)***	(1.37)	(1.37)	(0.74)	(1.38)
LNAGE2	-0.053	-0.067	-0.054	-0.074	-0.038	-0.070
	(-3.32)***	(-4.17)***	(-2.10)**	(-2.78)***	(-1.26)	(-2.28)**
ODIR	0.073	0.005	0.171	0.096	0.233	0.109
	(0.62)	(0.04)	(0.80)	(0.43)	(1.04)	(0.48)
INSIDERB	0.827	0.771	1.611	1.200	2.061	1.537
	(7.00)***	(6.75)***	(7.62)***	(5.86)***	(9.35)***	(7.24)***
BOSS	0.006	-0.043	0.010	-0.126	0.065	-0.089
	(0.11)	(-0.85)	(0.11)	(-1.33)	(0.64)	(-0.90)
UNDREP	5.633	5.129	12.570	11.615	14.458	13.234
	(7.77)***	(7.44)***	(8.85)***	(8.49)***	(9.80)***	(9.27)***
Industry dummies	No	Yes	No	Yes	No	Yes
Year dummies	No	Yes	No	Yes	No	Yes
N	3,779	3,779	3,771	3,772	3,740	3,740
R^2	0.1368	0.3073	0.1546	0.3142	0.1432	0.3210

Table 6. Relationship between TMT quality, VC-backing, and the extent of information asymmetry facing IPO firms

The sample consists of 3,903 IPOs conducted between 1993 and 2012. BIDASK is the mean daily bid-ask spread as a percentage of the stock price, calculated over 252 trading days after the IPO. EST is the number of analysts following IPO firm at the end of the fiscal year of the IPO. INSTP is the proportion of IPO firm's shares held by institutional investors at the end of the first quarter after the IPO. INSTN is the number of institutional investors holding shares of IPO firm at the end of the first quarter after the IPO. VCDUM is a dummy variable equal to one for VC-backed IPOs and zero for non-VC-backed IPOs. MQFVC is the TMT quality factor score obtained using common factor analysis on the firm-size-, firm-age-, industry-dummies-, and VC-dummy-adjusted TSIZE, MBA, FTEAM, LAWACC, CPA, CORE, COMP, and BOARDS. TENURE is the average number of years TMT members have been with a firm. TENHET is the coefficient of variation of the team members' tenures. LNBVA is the natural logarithm of the book value of assets immediately prior to the IPO. LNBVA2 is the squared term of LNBVA. LNAGE is the natural logarithm of one plus the firm age. LNAGE2 is the squared term of LNAGE. ODIR is the proportion of outside directors in the board of directors. INSIDERB is the proportion of voting power owned by firm officers and directors immediately prior to the IPO. BOSS is an indicator variable equal to one if a CEO is also a Chairman of the board of directors, and zero otherwise. UNDREP is underwriter reputation measured as the lead IPO underwriter's share of total proceeds raised in the IPO market in the previous five years. Specifications (1) and (2) are OLS regressions. Specifications (3) and (4) are Poisson maximum-likelihood estimations. Specifications (5) and (6) are estimated using logistic regressions. Specifications (7) and (8) are estimated using negative binomial maximum-likelihood estimations. *t*-statistics of OLS regressions and z-statistics of Poisson maximum-likelihood, logistic, and negative binomial regressions are in parentheses. ***, **, and * indicate significance at the 1, 5, and 10 percent levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable	BIDASK	BIDASK	EST	EST	INSTP	INSTP	INSTN	INSTN
Intercept	0.321	0.353	-9.032	-9.351	-26.157	-10.223	-11.093	-11.030
	(9.31)***	(10.28)***	(-10.79)***	(-10.20)***	(-7.03)***	(-0.02)	(-13.29)***	(-11.62)***
VCDUM	-0.008	-0.004	0.308	0.214	1.111	1.049	0.312	0.226
	(-8.15)***	(-4.40)***	(11.06)***	(7.29)***	(7.10)***	(6.12)***	(9.91)***	(7.11)***
MQFVC	-0.003	-0.002	0.088	0.073	0.407	0.440	0.129	0.113
	(-7.55)***	(-4.72)***	(7.74)***	(6.30)***	(4.37)***	(4.40)***	(8.20)***	(7.29)***
TENURE	-0.000	-0.000	-0.003	0.005	0.015	0.029	-0.004	0.001
	(-1.96)*	(-0.85)	(-0.90)	(1.28)	(0.67)	(1.15)	(-0.95)	(0.23)
TENHET	0.001	-0.000	-0.021	-0.005	0.120	0.135	0.002	0.017
	(2.82)***	(-1.06)	(-1.99)**	(-0.46)	(2.12)**	(2.23)**	(0.18)	(1.62)
LNBVA	-0.025	-0.029	0.820	0.862	2.771	2.339	1.252	1.237
	(-6.61)***	(-7.55)***	(8.93)***	(9.21)***	(6.10)***	(4.38)***	(13.24)***	(12.99)***
LNBVA2	0.001	0.001	-0.017	-0.018	-0.068	-0.053	-0.027	-0.026
	(5.20)***	(6.49)***	(-6.87)***	(-7.17)***	(-4.95)***	(-3.23)***	(-10.18)***	(-9.88)***
LNAGE	-0.001	0.001	0.219	0.140	0.212	0.248	0.061	0.016
	(-0.45)	(0.79)	(4.73)***	(2.88)***	(0.91)	(0.98)	(1.12)	(0.30)
LNAGE2	0.000	-0.000	-0.052	-0.039	-0.076	-0.084	-0.019	-0.007
	(1.08)	(-0.70)	(-5.56)***	(-3.91)***	(-1.48)	(-1.51)	(-1.68)*	(-0.66)
ODIR	-0.013	-0.002	0.324	0.119	0.796	0.796	0.409	0.258
	(-6.56)***	(-1.32)	(5.52)***	(1.91)*	(2.92)***	(2.67)***	(6.27)***	(3.94)***
INSIDERB	-0.006	-0.003	0.076	0.011	0.142	0.078	0.060	0.022
	(-3.76)***	(-2.18)**	(2.04)**	(0.29)	(0.60)	(0.31)	(1.25)	(0.47)
BOSS	0.002	0.001	0.030	0.039	0.079	0.034	-0.007	-0.010
	(2.11)**	(0.86)	(1.36)	(1.75)*	(0.58)	(0.24)	(-0.24)	(-0.38)
UNDREP	-0.086	-0.056	2.660	1.573	5.765	6.637	3.161	2.522
	(-14.53)***	(-10.44)***	(12.85)***	(7.22)***	(2.25)**	(2.37)**	(10.02)***	(8.07)***
Industry dummies	No	Yes	No	Yes	No	Yes	No	Yes
Year dummies	No	Yes	No	No	Yes	No	Yes	No	Yes
N	3,872	3,872	3,903	3,903	3,903	3,813	3,903	3,903
R^2	0.3083	0.4514	0.1246	0.1641	0.2334	0.2965	0.0549	0.0661