Entrepreneurial IT Firm Value Signaling and the Application of Acquisition Discounts

Completed Research

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Abstract

According to prior research, entrepreneurial IT firms (EIT firms) create many novel innovations in the information technology (IT) industry and are often acquired by larger IT firms to supplement their own innovation endeavors. However, the size and relative obscurity of EIT firms creates ‘information gaps’ that makes it difficult for EIT firms to effectively communicating their quality to potential acquirers resulting in the application of acquisition discounts during the purchase. In this paper, we discuss two ‘information gaps’ i.e., incognito information gap, and firm value equivocality gap and suggest that by communicating signals to bridge these ‘information gaps’ EIT firms can avoid acquisition discounts and procure a higher price when they are acquired. Using an empirical analysis of 239 acquisitions with EIT firm targets, we found that the acquisition prices of EIT firms that did not communicate signals to reduce the ‘incognito’ and ‘firm value equivocality’ gaps were discounted.

Keywords

Entrepreneurial IT firms, acquisitions, acquisition discount, board of directors, venture capital, patents

Introduction

Entrepreneurial IT firms (EIT firms) are companies that bring new information technology products and services to market by creating and seizing opportunities through the use of information technology. After recognizing market opportunities EIT firms quickly create IT products and services that create value and are useful and important to their customers. The information technology industry abounds with examples of privately-held start-ups and entrepreneurial IT firms. More recently, privately-held EIT firms such as Wish (a social e-commerce company), Zenefits (cloud based administrative services provider), Uptake (IOT and analytics services), and Oscar (healthcare services management) have established themselves as the most valuable EIT firms since being founded in 2011 or later. A number of EIT firms exit their existence as a privately-held EIT firm by offering an initial public offering (IPO) and establishing themselves as public companies as was the case with Facebook, Microsoft, Apple, eBay, and Google. On the other hand, a number of EIT firms pursue the acquisition route and are acquired by major public companies as was the case with the acquisition of WhatsApp and Oculus Rift by Facebook in 2014, and the acquisition of Jet.com (an e-commerce start-up) by Walmart in 2016.

Prior research elucidates a number of reasons for why the acquisition of EIT firms is appealing to many incumbent firms (c.f. Banker, Chang, and Cunningham, 2003; Haspeslagh and Jemison, 1991; Larsson and Finkelstein, 1999; Cartwright, 2006). For example, research suggests that many novel innovations originate in EIT firms (Makri, Hitt, and Lane, 2010) and are subsequently acquired by incumbent firms. Thus, the acquisition of start-ups by incumbents has become a popular strategy to supplement internal innovation (Hagedoorn and Duysters, 2002; Makri et al., 2010; Puranam, Singh, and Zollo, 2006). However, while there is significant research on what motivates acquirers to acquire EIT firms, there is limited research on the most important issue facing the owners and managers of EIT firms, namely what signals must an EIT firm send to acquirers to convey information about their quality. There are some notable exceptions. For example, studies in strategic management have highlighted the value of patents as signals of entrepreneurial firm quality (Hsu and Ziedonis, 2008; Haussler, Harhoff, and Mueller, 2009), but these studies have primarily focused on the bio-technology and semiconductor industries, both of
which, unlike the IT industry, are characterized by prolific patenting and a strong regime of value appropriation from patenting. In the IT industry, value appropriation primarily occurs through the innovativeness of the firm’s software-based IT artifact such as a new platform or app. Therefore, patenting is not necessarily on the agenda for many EIT firms seeking to appropriate value. However, it has been noted that patenting in the information technology industry is often defensive (Noel and Schankerman, 2013), and that value appropriation from patenting is indirect i.e., patenting enables patent holders to retain value by preventing erosion of value due to claims on IT artifact features and programing by litigants. Therefore, EIT firms that engage in patenting should appropriate value when they are acquired. This line of reasoning differs from existing empirical studies in on-IT industries and requires empirical analysis.

Similarly, prior research in entrepreneurial finance has studied entrepreneurial firm’s information signaling issues and its subsequent impact on venture capitalist provision of funds, advice, and contacts (Hellmann and Puri, 2001; Hsu, 2004; Bottazzi, Da Rin, and Hellmann, 2008). However, a significant proportion of this research provides implications and interventions that are meaningful to venture capitalists. Less is known about whether venture capital backing results in higher value appropriation by EIT firms when they are acquired.

From an EIT firm owner’s perspective, two fundamental questions deserve attention. First, what signals can the EIT firm send to potential acquirers to convey information about their quality? Second, does the communication of these signals result in higher acquisition price for the EIT firm owners at the time of acquisition? The two questions are connected because in general, acquirers of EIT firms value growth and profitability and will pay more for an EIT firm that can effectively communicate its potential for future value creation. However, it must be noted that EIT firms face distinct disadvantages in communicating their quality to potential acquirers due to the presence of certain ‘information gaps’. Information gaps regarding EIT firms occur due to a lack of available information about the EIT firm’s existence, assets, and the business potential of the information technology involved in their primary activity. The presence of information gaps impedes acquirer assessment about EIT firm profitability, and consequently, deflate the acquisition price of EIT firms.

To address these questions, we draw on previous research in management, entrepreneurship, and financial economics to empirically test the effect of a small array of signals that are used to communicate quality by EIT firms. In the interest of brevity, we only consider three endogenous signals, i.e. signals that are within the control of EIT owners such as the institution of board of directors, procuring greater levels of venture capital backing, and patent ownership. Our hypotheses describe how the communication of endogenous signals affects the acquisition price of the EIT firm in terms of acquisition discounts.

Our study makes two contributions to literature on information technology entrepreneurship. First, we specify a set of endogenous signals that owners of EIT firms might find beneficial to communicate firm quality and obtain superior acquisition prices whilst pursuing acquisition as an exit strategy. Second our use of the acquisitions approach (Koeplin, Sarin, and Shapiro, 2000; Bajaj et al., 2001) makes possible a comparison of acquisition prices paid to EIT targets that were able to signal quality versus those that were not. We present the findings of this comparison as an empirical analysis of acquisition price discounts.

The rest of the paper is organized as follows. In the section that follows, we provide a discussion of some key takeaways from prior academic literature on EIT firm valuation. We then present our hypotheses and describe our methodology for testing our hypotheses. Following this, we present the results of our statistical analysis before concluding the paper with a discussion of our key findings.

**Theoretical Background**

Previous literature on valuation and acquisition of firms has given considerable attention to the lack of information availability regarding privately-held EIT firms and the subsequent acquisition price discounts applied to the acquisition of such firms (Koeplin et al., 2000; Bajaj et al., 2001; Capron and Shen, 2007). The following observations have been noted. First, in the market for corporate control there are far more acquisitions involving EIT targets than publicly held targets. According to prior research, approximately 75% of acquisitions involved EIT targets (Faccio, McConnell, and Stolin, 2006; Capron and Shen, 2007).
Second, an acquisition price discount is often applied during the acquisition of EIT targets due to lack of information about privately-held EIT targets (Hirschey, 2001). This is because the valuation of EIT acquisition targets is often difficult due to information asymmetry between a seller and buyer. Akerlof’s (1970) study of the market for lemons in product markets provides an illuminating example of how information asymmetry increases the threat of adverse selection for potential acquirers and its consequent effect on acquisition prices. Using Akerlof’s example, the owner of an EIT firm with superior information about the quality of his or her firm will be reluctant to sell above-average assets in instances where he or she cannot credibly convey this information and obtain a reasonable price. Thus, under conditions of information asymmetry and given the incentives for misrepresentation by EIT target owners, bidders discount their offer prices in an effort to recuperate the cost of information gathering and extensive negotiations due to the threat of adverse selection. “The classic response to the threat of adverse selection is to reduce the offer price. When a buyer targets a private (i.e., EIT) firm it may discount its offer to reflect the possibility that the target will turn out to be a lemon.” (Capron and Shen, 2007 pg. 896)

Third, information asymmetry is caused due to certain information gaps and results in the application of an acquisition price discount for EIT targets. The first information gap occurs because acquirers are unaware of EIT target firms, i.e., EIT targets are less visible and not on the radar of most acquirers (Deeds, De Carolis, and Coombs, 1999). We refer to this gap as the ‘incognito information gap’. Whereas information on public firms is widely available to acquirers (Ragozzino and Reuer, 2007), the lack of coverage by analysts and business press about EIT targets creates a scarcity of information about the existence of EIT targets. Consequently, EIT targets are less visible to the acquirer community (Deeds et al., 1999). In such cases, EIT targets or ‘sellers’ must offer a discount to offset the higher search costs incurred by the buyer and to maintain their marketability in the market for corporate control (Becchetti and Trovato, 2002). Additionally, lower seller visibility increases buyer power by limiting the pool of potential bidders, severely dents competitive bidding, and deflates EIT target firm selling price (Thompson and Thomas, 2004). Thus, the ‘incognito information gap’ can result in an acquisition price discount for EIT targets.

The second information gap for acquirers occurs when acquirers have inadequate information about the value of an EIT target’s assets (Bajaj et al, 2001; Itami and Roehl, 1987). This problem is exacerbated during the acquisition of EIT targets, many of whom possess intangible knowledge and tacit information-based assets such as employee know-how and non-codified intellectual property (Teece, 2000). Under such conditions, it is often difficult for acquirers to assess the extent to which they can appropriate value from the EIT target’s tacit knowledge. We call this gap the ‘value equivocality gap’.

The two aforementioned information gaps create difficulties for EIT target firms in signaling their quality to acquirers (Becchetti and Trovato, 2002) resulting in the application of an acquisition price discount during acquisition. Conversely, it stands to reason that in comparison to EIT target firms that fail to do so, EIT target firms that are able to bridge the aforementioned information gaps and convey firm quality by employing the appropriate signals are more likely to be valued higher by acquirers. In the section that follows we elucidate the signals used by EIT target firms to ameliorate the deleterious acquisition price effects of the above information gaps.

**Hypotheses**

We now present our hypotheses involving the impact of three signals used by firms to bridge the adverse effects of ‘information gaps’ and its effect on the application of EIT firm acquisition price discounts.

**Venture Capitalists and Board of Director Signals**

The entrepreneurial model highlights three stages in the evolution of EIT firms (Freeman and Engel, 2007). The first stage often begins with a founding event and involves the translation of an idea into action through the creation of a formal business enterprise by the founders. Founders often use seed fund or capital invested by an angel investor to generate prototype versions of the information technology product or service. At this stage, EIT firms tend to be organic in structure with muddled lines of authority and fluid and flexible work roles. The founding team members share the authority to spend money, assign tasks, evaluate performance, and hire and fire employees among themselves. During this stage, EIT firms
search for capital as they continually exhaust their initial line of endowments and resources in the face of negative revenue from sales.

The second stage begins when EIT firms begin to generate revenue from sales. During this stage, customer needs and demands become clear as users begin providing feedback on product functionality, appearance, performance, documentation, and service. EIT firm founders begin to reconcile differences between their view of the nature of the business and the reality of their IT products or service; and streamline and formalize business processes to avoid reinventing the wheel for recurrent problems. During this stage, reoccurring tasks are programmed and mechanized by developing and formalizing organizational routines. More employees are hired as the division of labor becomes less organic and fluid (Freeman and Engel, 2007).

The third stage is marked by the involvement of institutional investors such as venture capitalists and results in the activation of provisions in investment contracts that safeguard the investments. These provisions include the rapid development of governance structures, the creation of top management teams, and the institution of board of directors (Kaplan and Stromberg, 2003; Davila et al., 2003; Freeman and Engel, 2007). During this stage there is rapid structural development, expansion of managerial skills and control, and greater discipline and alignment of interests among various stakeholders. Previous empirical research has found links between venture capital backed EIT firms and increased knowledge creation (Wadhwa & Kotha, 2006), higher rates of technological innovation (Dushnitsky & Lenox, 2005), and higher revenue (Davila et al., 2003). It has also been suggested that venture capitalists take a more active governance role in monitoring the evolution of firms (Shleifer and Vishny, 1989), structuring the compensation of top managers (Kaplan and Stromberg, 1999), and in facilitating access to experts such as infrastructure providers and professional managers. The result of the venture capitalist involvement is the emergence of an EIT firm that may be ready to scale to a large size, successfully compete with older rivals (Freeman and Engel, 2007), and effectively convey these values and quality to acquirers and bridge the 'firm value equivocality gap'.

Venture capitalists also bring significant amount of human capital (expertise) in the form of knowledge about the industry. Additionally, the strategic network of venture capitalists also includes other EIT firms and established companies thereby simplifying and reducing the time and cost involved in the search for strategic business partners (Gulati, Nohria, and Zaheer, 2000). Thus, the involvement of institutional investors such as venture capitalists during the third stage of evolution enables increased networking and an expansion of the firm’s business social network (Gulati et al., 2000) thereby improving the visibility of EIT firms among potential acquirers and reducing the 'incognito information gap'. Thus, in comparison to venture capital backed firms,

**H1:** The acquisition price discount applied to EIT firms with no venture capital backing will be statistically significant.

Related to the above narrative, as EIT firms evolve, an essential mechanism in instituting appropriate governance structures and reducing agency costs is the appointment of a board of directors to monitor and control firm activities. Appointing a board of directors can add value to EIT firms in two ways. First, it signals to the acquirers that the EIT firm has appropriate structures and control mechanisms in place to derive value from its assets and be successful. Second, the relational capital and network connections (Hillman and Dalziel, 2003) of the board members increases the visibility, publicity, and reputation (Certo, Daily, and Dalton, 2001; Certo, 2003; Gabbionetta, Ravasi, and Mazzola, 2007) of the EIT firm among acquirers, thereby expanding the pool of potential acquirers and increasing EIT firm acquisition price through competitive bidding (Thompson and Thomas, 2004). Thus, because the board of directors is instrumental in reducing the 'firm value equivocality' and 'incognito information' gaps we hypothesize that,

**H2:** The acquisition price discount applied to EIT target firms without board of directors will be statistically significant.

**EIT Firm Patenting Activity Signals**

A primary concern for acquirers during the acquisition of knowledge intensive EIT firms is the protection and appropriation of value from the EIT firm’s knowledge assets. In this regard (Mann, 2004) highlights some of the benefits of patenting for EIT firms. First, patents enable EIT firms to carve out a space in...
which it can innovate without competition. This allows EIT firms to grow and profit from their IT products and services. Second, patents enable EIT firms to obtain revenue by licensing the use of their patents to competitors that need to use the patented technology in their own products. Third, patents are often useful as ‘barter’ in cross licensing deals and agreements by the EIT firm with other IT firms. Cross-licensing often serves an important function in getting access to protected information technology from other firms in the industry and is instrumental for building complex IT systems with plug and play components instead of making the components from scratch in-house. Fourth, patenting provides an effective avenue for EIT firms to signal its ability to facilitate the codification of tacit knowledge, signal the discipline and technical expertise that allowed it to codify that knowledge, and use the patent as a signal of the quality of the underlying information technology. Finally, patenting allows EIT firms to protect the contributions of the firm from being expropriated by pre-acquisition investors. This can increase the value of the EIT firm during acquisition by reducing the cost of moral hazards and risk of hold-ups emanating from legal wrangling over intellectual property rights between EIT firm entrepreneurs and their investors (Shane, 2002). Therefore, as patenting serves to reduce the ‘firm value equivocality’ gap we hypothesize that,

**H3:** The acquisition price discount applied to EIT target firms with no patents will be statistically significant.

**Methodology**

**Sample of Firms**

The sample of firms used in our study comprises of privately-owned US entrepreneurial firms that were acquired between January 1, 2005 and June 30, 2016 (inclusive) and were engaged in the provision of products and services in information technology domains featured prominently on Gartner’s hype cycle for emerging information technologies¹ during that period. We only retained those acquisitions where a majority (51% or more ownership) stake in the target firm was acquired by the buying firm. Additionally, only those firms for which data on our dependent, control, and predictor variables was available were included in our study. We chose Gartner’s hype cycle as the basis for choosing our information technologies as it is readily available, verifiable, and provides a well-publicized list of popular information technologies whilst representing the maturity, adoption and social application of each technology.

We limited our list of information technologies to only those technologies that had a significant programming or software product/service component. Therefore, we excluded all technologies that did not mature beyond the ‘technology trigger’ phase. Second, because the information technology industry encompasses a broad swath of industries, we followed industry classification schemes used in prior research (Han, Kuruzovich, and Ravichandran, 2013; Datta, 2011) to identify information technology industry firms. This scheme primarily includes IT industry subsectors involved in the provision of either custom programming services or software products (system, application, network, or mobile software) and services (subscription-based desktop/web-enabled applications, portals or platforms).

The sample of acquired firms meeting our selection criteria was obtained from the SDC Platinum M&A database and includes information on target firm acquisition date, target firm NAICS, target firm enterprise value, and a description of target firm’s primary information technology products, services, and other activities. Additional acquisition price data was obtained from the Software Equity Group’s annual software industry financial reports. The total sample size of target EIT firms included in our study is 239.

**Measures**

**Acquisition Price:** We used two measures - revenue multiple and EBIT multiple as our measure for acquisition price. Enterprise value ratios such as revenue multiple and EBIT multiple have been used in previous research involving acquisition pricing of private entrepreneurial firms (Koeplin et al., 2000;
Bajaj et al., 2001; Lie and Lie, 2002). The revenue multiple is defined as the ratio of the firm’s enterprise value (at the time of acquisition) to its revenue while the EBIT multiple is defined as the ratio of the firm’s enterprise value (at the time of acquisition) to its earnings before interest and taxes (EBIT). Enterprise value is calculated as the purchase price of EIT during the acquisition plus liabilities, minus fees and expenses (Enterprise Value = acquisition price + liabilities - [fees + expenses]). Data on revenue and EBIT multiples was obtained from the SDC merger and acquisitions database and the Software Equity Group’s annual software industry financial reports.

**Venture Capital Backing:** We obtained information on venture capital financing, including the date of funding from the VentureOne and index.co databases. Acquired EIT firms were categorized as venture backed firms if it was a recipient of venture capital backing prior to acquisition.

**Presence of BOD:** Board of director (BOD) data was obtained from the BoardEx database. EIT target firms were categorized into firms with BODs and firms without BODs.

**Patenting Activity:** Patent ownership data was collected from the United States Patent and Trademark Office (USPTO) website. We used the EIT firm name and any alternate or former names listed in VentureOne and index.co to conduct our search. We searched for all patents with an application date prior to the acquisition date listed in the SDC mergers and acquisitions database. Acquired EIT firms were categorized as either firms that had at least one applied patent prior to acquisitions or those with zero applied patents.

**Analysis**

We used the two-sample t-test to determine whether there is a statistically significant difference in the acquisition prices of EIT firms that signaled the hypothesized information versus those that did not. Before doing the analysis, we conducted the Shapiro-Wilk (Shapiro and Wilk, 1965) test for normality of the grouped variable (Acquisition Price). This test was not significant, meaning that our data was normally distributed. Levene’s test for the equality of variances was not significant indicating that there was no violation of the assumption of equal variances between our groups (Gaswirth et al., 2009).

The two-sample t-test was used to analyze the application of acquisition price discounts. In other words, was the acquisition price of EIT firms that did not have board of directors, venture capital backing, or patents ($\mu_1$) lower than the acquisition price of EIT firms that employed these ‘information gap’ reducing signals ($\mu_2$)? Evidence of a statistically higher group mean for the second group ($\mu_2$) meant that the firms in the first group ($\mu_1$) were purchased at a discounted price i.e. an acquisition price discount was applied to the firms in group 1 by acquirers. Thus, for each hypothesis we test whether $\mu_2 > \mu_1$. Differences in acquisition prices between the two groups is expressed as an acquisition price discount ($\mu_2 - \mu_1)/\mu_2$ (in percentage).

To conduct our analyses, we also matched firms on the basis of firm size. According to prior research, larger EIT target firms have more bargaining power during acquisitions (Kooli, Kortas, and L’Her, 2003) leading to a higher acquisition price in comparison to their smaller EIT counterparts. To control for this effect, we matched the EIT firms by classifying them as small-sized firms (EIT firms with less than 26 employees), medium-sized firms (26 to 60 employees), and large-sized firms (more than 60 employees).

**Results**

The two-sample t-test found a significant difference among the mean acquisition prices of venture-backed and non-venture backed firms. Acquisition price measured using both revenue multiple and EBIT multiple were higher for venture-backed EIT firms than non-venture backed EIT firms. As shown in table 1, an acquisition price discount ranging from 22.8% to 46.6% was applied during the acquisition of non-venture backed EIT firms. The applied acquisition discount was statistically significant for large-sized (acquisition discount = 22.8-35.3%, p<0.05), medium-sized (acquisition discount = 32.2-43.1%, p<0.01), and small-sized (acquisition discount = 34.5-46.6%, p<0.01) non-venture backed EIT firms. These results provide statistical evidence in support of hypothesis 1.
Table 1: Acquisition discounts for venture backed versus non-venture backed EITs

<table>
<thead>
<tr>
<th></th>
<th>Non-venture backed EITs (Multiple avg.)</th>
<th>Venture-backed EITs (Multiple avg.)</th>
<th>Acquisition Price Discount: Non-venture backed EITs ((\mu_2 - \mu_1)/\mu_2) (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small-Sized Firms</td>
<td>Revenue Multiple</td>
<td>3.16</td>
<td>4.83</td>
</tr>
<tr>
<td></td>
<td>EBIT Multiple</td>
<td>5.99</td>
<td>11.22</td>
</tr>
<tr>
<td>Medium-Sized Firms</td>
<td>Revenue Multiple</td>
<td>3.30</td>
<td>4.87</td>
</tr>
<tr>
<td></td>
<td>EBIT Multiple</td>
<td>6.39</td>
<td>11.24</td>
</tr>
<tr>
<td>Large-Sized Firms</td>
<td>Revenue Multiple</td>
<td>3.71</td>
<td>4.81</td>
</tr>
<tr>
<td></td>
<td>EBIT Multiple</td>
<td>5.83</td>
<td>9.01</td>
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</tbody>
</table>

*p<0.05, **p<0.01, ***p<0.001 One-tailed tests

Next, we calculated acquisition price discounts applied to firms without board of directors (table 2). Acquisition price discount (37.1 - 47.5%) was highly significant (p<0.001) for large-sized firms without board of directors. Acquisition price discount (19.5 - 27.5%) was moderately significant (p<0.05) for medium-sized firms without board of directors. The corresponding acquisition price discount for small-sized EIT firms was not statistically significant. The results of our statistical analysis, largely, provide support for hypothesis 2.

Table 2: Acquisition discounts for EITs based on presence of board of directors

<table>
<thead>
<tr>
<th></th>
<th>EITs without board of directors (Multiple avg.)</th>
<th>EITs with board of directors (Multiple avg.)</th>
<th>Acquisition Price Discount: Firms without BOD ((\mu_2 - \mu_1)/\mu_2) (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small-Sized Firms</td>
<td>Revenue Multiple</td>
<td>3.83</td>
<td>4.45</td>
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<td></td>
<td>EBIT Multiple</td>
<td>7.88</td>
<td>9.62</td>
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<tr>
<td>Medium-Sized Firms</td>
<td>Revenue Multiple</td>
<td>3.88</td>
<td>4.82</td>
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<td></td>
<td>EBIT Multiple</td>
<td>8.20</td>
<td>11.06</td>
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<tr>
<td>Large-Sized Firms</td>
<td>Revenue Multiple</td>
<td>3.13</td>
<td>4.98</td>
</tr>
<tr>
<td></td>
<td>EBIT Multiple</td>
<td>6.00</td>
<td>11.43</td>
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</tbody>
</table>

*p<0.05, **p<0.01, ***p<0.001 One-tailed tests

Finally, we calculated acquisition price discounts applied to firms with no patenting activity (table 3). In particular, we compared EIT firms with no applied patents prior to acquisition with those that had at least one patent prior to acquisition. Acquisition price discounts (29.2 -36.5%) were highly significant (p<0.001) for small-sized firms with no applied patents. The results of statistical analysis indicate partial support for hypothesis 3.

Table 3: Acquisition discounts for EITs based on patenting activity

<table>
<thead>
<tr>
<th></th>
<th>EITs without applied patents (Multiple avg.)</th>
<th>EITs with at least one patent (Multiple avg.)</th>
<th>Acquisition Price Discount: Firms without patents ((\mu_2 - \mu_1)/\mu_2) (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small-Sized Firms</td>
<td>Revenue Multiple</td>
<td>3.14</td>
<td>4.44</td>
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<td></td>
<td>EBIT Multiple</td>
<td>6.12</td>
<td>9.64</td>
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Medium-Sized Firms  |  Revenue Multiple  |  EBIT Multiple  |  |
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<td></td>
<td>3.83</td>
<td>8.07</td>
<td>14.7%</td>
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<td></td>
<td>4.49</td>
<td>10.04</td>
<td>19.6%</td>
</tr>
</tbody>
</table>
Large-Sized Firms  |  Revenue Multiple  |  EBIT Multiple  |  |
|                   | 3.49             | 7.13           | 14.7% |
|                   | 3.70             | 7.56           | 19.6% |

*p<0.05, **p<0.01, ***p<0.001 One-tailed tests

Discussion of Results and Implications

Our study looks at what signals EIT firms send to potential acquirers to signal firm quality and demand a higher acquisition price. In this endeavor, we found that endogenously originating signals for decreasing ‘firm value equivocality’ and ‘incognito information’ gaps were associated with higher acquisition price. Support for hypotheses 1, 2, and 3 relating venture capital backing, the presence of board of directors, and patenting activity positively with acquisition price suggests that EIT firm use of these signals may alleviate acquirer concerns regarding the value of the EIT firm’s assets and the management of its operations and thereby reduce ‘firm value equivocality’. This indicates that firms that evolve by attracting institutional investors, making deliberate attempts to institute the appropriate governance structure, and by amply demonstrating the value of their knowledge assets through patenting may be more effective in communicating their quality and value to acquirers than EIT firms that do not.

Our analysis of acquisition price discounts (tables 1, 2, and 3) provide an interesting insight with regards to how differently sized EIT firms communicate firm value to potential acquirers. The results suggest that smaller EIT firms are more likely to command a higher price when they attracted venture capitalists and applied for patents to signal firm quality and the quality of their knowledge assets. On average the revenue multiple applied to EIT firms with no venture backing was 34.5% lower (table 1) than that for venture backed firm. Similarly, the revenue multiple applied to EIT firms with no patents was 29.2% lower (table 3) than that for EIT firms with patents. On the other hand, larger EIT firms with board of directors received a higher acquisition price. The revenue multiple discounts applied to large firms with no BOD’s was 37.1% (table 2). This indicates that smaller firms invest in patents and attract venture capitalists to communicate value, and that as these firms grow, the presence of traditional governance structures such as board of directors becomes more salient for obtaining a higher acquisition price during acquisitions.

Support for hypotheses 1 & 2 also indicates that EIT firms benefit from the cachet of social capital and the resultant exposure that comes from associating with venture capitalists and board of directors. However, we must admit that sans a direct measurement of the social capital possessed by the affiliated venture capitalists and board of directors, our suggestion that EIT firms indeed benefit from such associations and bridge the ‘incognito information’ gap has not been directly confirmed. Nevertheless, we are encouraged that the results of our statistical testing for hypotheses 1 & 2 are in alignment with the proposed positive effect any endeavors to publicize an EIT firm would have on its acquisition price.

We culminate this discussion with the specification of three stylized implications from our study for entrepreneurial owners of EIT firms seeking to increase the valuation and acquisition price of their firms. First, EIT owners can increase valuation and acquisition price by attracting venture capitalists. In addition to investing financial capital, venture capitalists often invest their own management talent to deal with high levels of uncertainty, information asymmetry, and risk of their EIT undertaking. Furthermore, venture capitalists undertake coaching of EIT management teams and provide access to external networks of resources, both of which are instrumental in the growth of EIT firms and in improving the EIT firm’s ability to communicate firm value.

Second, EIT firms often possess tacit stores of intellectual capital and knowledge. Our analysis shows that making this knowledge explicit through patenting was associated with higher acquisition price for small-sized EIT firms. This underlines one area EIT owners must emphasize in their firms, i.e. the use of organizational mechanisms, structures, and culture to codify knowledge through patenting as a potent mechanism to communicate firm value to acquirers. Third, as EIT firms grow, EIT firm owners must establish robust mechanisms for governance and control. We found that using the board of directors to
institute governance and control led to higher acquisition prices for medium and large EIT firms. Thus, the institution of a board of directors should be a priority for larger EIT firms aiming to improve its valuation.

Conclusion

In our paper we put the spotlight on a select set of signals that EIT firms utilize to reduce information gaps and communicate firm quality and value. From an EIT firm’s perspective our research finds three endogenous signals i.e., venture capital backing, institution of board of directors, and patenting that were associated with lower acquisition discounts. Our primary implication is to suggest that EIT owners, entrepreneurs and other practitioners that seek acquisition as an exit strategy should be cognizant of and invest in these signals to obtain a superior acquisition price.

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