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Antecedents of target CEO departure in acquisitions of small high-tech firms: The leading role of founder

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Abstract

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Acquisitions of small high-tech firms (target) by established companies (acquirer) have become important means for technology sourcing in the form of either artifacts including patents, prototypes and products or tacit knowledge embedded in human capital. Target's top management team (TMT) in general and CEO specifically can be considered not only as regulator of knowledge transfer in post-acquisition period between two organizations but also as a source of human capital for the acquirer.

State of The Art: Prior studies on the role of target CEO in post-acquisition, highlighted that acquirers can keep target CEO to act as soft coordinator to facilitate knowledge transfer, and to manage transitions in post-acquisition period (Graebner, 2004). Also literature reported that general managerial skills of target CEO, is valuable for an acquirer in unrelated acquisitions that information asymmetry is high (Datta & Grant, 1991). In acquisition of small high-tech firms, the CEO may possess specific human capital such as technological and industrial know-how that are also valuable for the acquirer (Wulf & Singh, 2011).

Research Gap: CEO's specific human capital in small high-tech firms is presumed valuable for the acquirer. No study has been conducted directly to empirically test the importance of this source of human capital so that acquirer decides to keep the target CEO in post-acquisition.

Theoretical Argument: In This respect, we expect that if the CEO is also founder of the target, the human capital embedded in CEO such as social capital and technological know-how is valuable for the acquirer and therefore it decreases the likelihood of CEO departure in post-acquisition. Additionally, we argue that human capital embedded in founder CEO is so considerably important for the acquirer that, in the absence of information asymmetry or redundancy of soft coordinating role due to target's structural integration as the choice of hard coordinating mechanism (Puranam, Singh & Chaudhuri, 2009), acquirer prefers to keep the CEO in post-acquisition.

Method: The sample of this study consists of 366 acquisitions of small high-tech firms between 2001 and 2005 extracted from two renowned databases: Zephyr and SDC Platinum. The high-tech sectors were chosen based on the SIC code, namely: Drugs (283), Computer and office equipment (357), Electronic and other electrical equipment and components except computer equipment (36), Instruments (38) and Software programming (737). The sample consists of acquirers and targets headquartered either in USA or Europe. Necessary variables for empirical analysis are constructed directly from the aforementioned databases as well as other complementary databases such as Capital IQ, Lexis-Nexis and Orbis.

Results: Structural integration increases the probability of CEO departure significantly in our sample which confirms the redundancy of soft coordination mechanism. The result of empirical also indicates that being founder decreases the probability of target's CEO departure in post-acquisition. The interaction between structural integration and founder CEO in our sample reveals that CEO being a founder is so valuable for the acquirer that even if the acquirer decides to structurally integrate the firm, therefore ruling out soft coordination role, the acquirer prefers to keep the CEO.

Additionally, the interaction between founder and product relatedness reveals that when the target CEO is also a founder of the company, it is more likely that the CEO stays afterwards even in highly related acquisitions with no information asymmetry. From this stand, our result suggests that CEO being a founder possesses certain human capital beyond the so called general managerial skills that encourages the acquirer to keep the target CEO in post-acquisition.

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Antecedents of target CEO departure in acquisitions of small high-tech firms: The leading role of founder

By: Keivan Aghasi, Massimo Colombo, Cristina Rossi-Lamastra

Abstract

Acquisitions of small high-tech firms are commonly practiced for technology and human capital sourcing. These firms' CEOs can be considered as a source of human capital for the acquirer. In this respect, in small high-tech firms we expect that all else being equal if the CEO is also founder, the human capital embedded in CEO such as social capital and technological know-how is valuable for the acquirer. Therefore the acquirers prefer to keep them in post-acquisition. The sample of this study consists of 372 acquisitions of small high-tech firms between 2001 and 2005. The result indicates that being founder decreases the probability of CEO departure in post-acquisition.

Introduction

Acquisitions of small high-tech firms (target) by established companies (acquirer) have become important means for technology sourcing in the form of either artifacts including patents, prototypes and products or tacit knowledge embedded in human capital (Ahuja & Katila, 2001). Target's top management team (TMT) in general and CEO specifically can be considered not only as regulator of knowledge transfer in post-acquisition period between two organizations but also as a source of human capital for the acquirer (Zollo & Singh, 2004; Wulf & Singh, 2011). Prior studies on the role of target CEO in post-acquisition, highlighted that acquirers can keep target CEO to act as soft coordinator to facilitate knowledge transfer, and to manage transitions in post-acquisition period (Graebner, 2004). In addition, literature reported that general managerial skills of target CEO, is valuable for an acquirer in unrelated acquisitions as the acquirer's knowledge about the industry and product is not sufficient (Datta & Grant, 1991; Walsh, 1989).

In acquisition of small high-tech firms, the CEO may possess specific human capital such as technological know-how that is also valuable for the acquirer (Wulf & Singh, 2011). CEO's specific human capital in small high-tech firms is presumed valuable for the acquirer however no study has been directly test the importance of it for the acquirer. In this respect, this paper by borrowing some insights from founder-CEO succession literature, investigates on importance of human capital in founder-CEOs so that the acquirer keep them in post-acquisition. The second objective of this paper is to indicate the relative importance of being founder for the acquirer compare to other human capital in CEO. This paper argues that if the human capital of founder-CEOs is valuable for the acquirer, then when acquirer structurally integrates target as the choice of hard coordinating mechanism (Puranam, Singh & Chaudhuri, 2009), and redundancy of soft coordinating role, acquirer still prefers to keep the founder-CEO in post-acquisition. Similarly, in highly related acquisitions that founder-CEO's general knowledge

about industry and product is not unique and valuable for the acquirer, still the probability of CEO departure should be low.

The main contribution of this paper is to post-acquisition CEO succession literature by differentiating between founder and professional CEOs from human capital perspective. Second this paper contributes to post-acquisition implementation literature by showing that different post-acquisition implementation dimensions has direct effect on one another by considering the effect of structural integration on CEO departure. Finally, this paper tests the prior results of the qualitative studies on CEO retention/departure in post-acquisition literature (See for example: Graebner, 2004; 2009; Ferrari, 2011; Mayer & Kenney, 2004). The sample consists of 372 acquisition of small high-tech firms between 2001 and 2005. The results confirm that the probability of CEO departure decreases in case of founder-CEO and increases in structural integration as well as high product relatedness. In addition, this study also shows that acquirers keep founder CEOs even in highly related acquisition or when the target is structurally integrated into acquirer's organization.

Theoretical Framework

CEO Departure vs. Retention

Post-acquisition scholars have been interested on studying the role of target CEO since the pioneering work of Kitching (1967). The interest on target CEO in post-acquisition in general and in technologically motivated acquisitions in particular rooted in resource based view (RBV): first CEOs are considered as managerial resources, who serve as the highest rank executive officer in the firm before acquisition and therefore, their managerial knowledge might be invaluable for the acquirer after the acquisition as well (Barney, 1991). The target CEO in post-acquisition may join senior executive team of acquirer to bulwark managerial competitiveness of the company (Cannella & Hambrick, 1993). Besides that, post-acquisition implementation process is generally time and resource consuming, complex and full of uncertainties (Jemison & Haspeslagh, 1991). Thus acquirer should spend a lot of managerial resources to deal with implementation problems and issues (Hitt et al, 1991). Marks & Mirvis (2010) reported from multiple case studies that the amount of managerial resource devoted to post-acquisition implementation process is considerably farther than negotiation process and other pre-acquisition activities. Management deviation from the daily operational issues is costly for the acquirer (Hitt et al, 1991). Alternatively, target CEO is a suitable candidate for dealing with transitional issues in post-acquisition (Walsh, 1989). Third, target CEO retention is a strong signal for the other employees to continue working for the new employer (Graebner, 2004). One of the main problems for acquirers is post-acquisition demotivation especially among target employees due to survival guilt and moral hazard after lay-offs (Ahuja & Katila, 2001).

CEO retention may alleviate employee's motivation and also encourage key personnel to stay in post-acquisition. In case of small high-tech firm's acquisitions this symbolic role of target CEO becomes more important because they are highly knowledge intensive and it is embedded inside the human capital, departure of key personnel such as inventors may put the future innovation and technological development into jeopardy (Kapor & Lim, 2007). Fourth, there is usually information asymmetry between acquirer and target about target's capabilities and strategic resources (Buchholtz, Ribbens, & Honle, 2003). Once more, in acquisition of small high-tech firms the tacit nature of the knowledge and technological capabilities are considerably high, and consequently the information asymmetry between acquirer and target is high as well (Ahuja & Katila, 2001). Keeping the target CEO after the acquisition help to regulate and coordinate the knowledge transfer from target to the acquirer, Graebner (2004) calls it "soft coordination" role. Finally, related to acquisition of small high-tech firms, usually top executives are themselves can be the source of human capital not only for their managerial skills as explained before, but also for their technical skills (Wulf & Singh, 2011). Many CEOs in small high-tech firms possess certain individual capabilities in terms of technical background, firm specific background (if they are founder of the company) and also in many cases they are inventors (for instance patent holders) as well (Buchholtz et al, 2003). These certain capabilities make them even more valuable compare to CEOs belong to non-high-tech sectors. If these individual decides to leave the firm after the acquisition they take away their tacit stacks of knowledge. Finally rooted in agency theory and market for corporate control, acquisition can be perceived as a mechanism to change the incompetent CEO through merger with or acquisition by another firm (Walsh, 1988; Jensen & Meckling, 1976; Fama & Jensen, 1983). Although this argument seems valid only for established firms with more complex ownership structure compare to entrepreneurial firms in high-tech firms, relatively this arguments is valid for established non entrepreneurial small high-tech firms at least.

Empirical literature indicated that in post-acquisitions, often there are considerable changes in managerial structure of the target (Cannella & Hambrick, 1993; Buchholtz et al, 2003). Walsh (1988) reported that US targets often lose about two-thirds of their CEOs in five years period after the acquisition. Related to market for corporate control, Zollo and Singh (2004) reported that CEO replacement does not improve post-acquisition performance, particularly for the targets with mediocre performance in pre-acquisition era. However as theory suggested, they found significant improvement in performance for low performing target firms. Cannella & Hambrick (1993) differentiated between top executives according to their rank, and from resource based view, they reported that as CEOs (highest senior executive) are the most valuable managerial resource of the target, their departure negatively affect the post-acquisition performance. All in all, empirical studies demonstrate that CEO retention in post-acquisition

implementation process modifies the negative impact of organizational changes (Graebner, 2004; Ullrich, Wieske, & Dick, 2005).

Founder

Based on the founder-CEO succession literature, founder-CEOs are different in three aspects compare to professional CEOs which are insightful in post-acquisition departure or retention. First, founder-CEOs unlike their non-founder ilk, professional CEOs, own larger portion of their company's equity. Thus, the so called ownership and control schism that exists in larger companies which is the main concern of agency theory is not equally important for this type of CEOs (Wasserman, 2003). Consequently, prior arguments on acquisition as a mechanism of change in corporate control are less relevant when studying founder-CEO departure.

Second founder-CEO's identity and organizational identity of their firms are tightly link together, although the linkage depreciates as organizational age and size grows (Dobrev & Barnett, 2005). Therefore, the employee's psychological bond to their organization is defined through their bonds with the founder. The organizational reputation and symbolic position resulted from the individual-organizational bond plays significant role in persuading the key personnel in staying in post-acquisition (Ranft & Lord, 2000). Consequently, founder-CEOs have advantage over professional CEOs to manage the transitional period in post-acquisition (Graebner, 2009).

Third, founder-CEO has specific human capital that professional CEO does not possess (Becker, 1994). Founder CEO may have certain technical competencies and technological know-how, for instance holding a patent or being part of product development team (Boeker & Karichalil 2002). Also a founder CEO has deeper understanding of the technologies compare to the CEOs who joined the company later. In addition, founder CEO may possess specific social capital which includes networks of suppliers, VCs, and etc. that may also be valuable for the acquirer (Boeker & Fleming, 2010). Therefore:

H1: In acquisition of small high-tech firms, if the target's CEO is a founder the likelihood of CEO departure decreases.

Structural Integration

In post-acquisition implementation, one of the main aspects is related to target's structural form. It involves mainly determining overall post-acquisition implementation strategy as the structural integration vs. separation of the acquired organization (Puranam & Srikanth 2007; Puranam et al. 2009). Structural integration is perceived as a formal coordinating mechanism to foster efficient technological know-how transfer between the two firms. It provides the opportunity to merge

formerly separated organizational units (entities) into a unit in post-acquisition era (Pablo 1994; Ranft & Lord 2002; Schweitzer, 2005; Puranam et al, 2006; Puranam & Srikanth, 2007).

Puranam et al. (2009) suggested that whenever organizational interdependencies are necessary (and/) or prevalent, coordination is the formal organization choice of the acquirer coordination mechanism for the newly bought target. Structural integration enhances coordination capacity via defining common goals, procedures and authority between target and acquirer's employees in the newly merged unit (Haspeslagh & Jemison, 1991).

Structural integration has certain drawbacks. Integration may provoke disruption of target pre-existing routines, since it ends the target's autonomous existence. In high-tech acquisitions, structural integration may result in loss of autonomy of target's inventors which leads into suppressed motivation and productivity (Paruchuri et al, 2006). Second, extensive integration implies common authority, routines and procedures. To become a part of such an integrated unit, target's established routines and procedures have to be altered inevitably (Puranam et al, 2009). Such changes disturb valuable organizational routines, which resulted in current organizational capabilities (Ranft & Lord, 2002). Empirical studies have provided evidence in support of this view, structural integration on average damages innovation of the target. For instance, Paruchuri et al. (2006) and Kapoor and Lim (2007) found severe drop in the innovation productivity of target inventors when target was integrated into the acquiring organization.

In conclusion, the empirical studies indicate that structural integration through the acquirer and target operations' alignment, permanently alters target's organizational properties, affects its existing routines and destructs its innovative capabilities, at least in the short run (Zollo & Singh, 2004). According to our previous discussion on the role of target CEO as a strong candidate for transitional management and facilitator of knowledge transfer between two firms (soft coordination), becomes redundant if acquirer applies structural integration (hard coordination). Therefore:

H2a: In acquisition of small high-tech firms, target structural integration increases the likelihood of CEO departure.

In case of founder-CEO, when the acquirer decides to structurally integrate the target, although soft coordinating role of the CEO becomes redundant, still human capital of this type of CEOs such as technical competencies and technological know-how is valuable for the acquirer. In this case, founder-CEO should be considered as one of the key personnel that prior to the acquisition played an integral role in the target's technological development. Henceforth, acquirer is interested to keep the founder-CEO like any other key personnel in post-acquisition. Therefore:

H2b: In acquisition of small high-tech firms, the likelihood of target CEO departure decreases if the CEO is founder of the company even though the company is structurally integrated

Product Relatedness

The value of human capital for a firm depends on availability of human capital either inside the firm or in the labor market. From this stand, value of CEO for a firm depends on the uniqueness of his skills and expertise for the firm (Frederickson, Hambrick, & Baumiran, 1988). In acquisition, the value of target CEO for the acquirer depends on the internal availability and uniqueness of such skills and expertise (Buchholtz, Ribbens, & Honle, 2003). Relatedness as a measure of acquirer and target overlapping area of expertise (Coff, 1999) indicates the extent of target's human capital uniqueness for the acquirer. When relatedness is high, the uniqueness of human capital is lower. Respectively, acquirer places lower value for target CEO's skills in related acquisitions as availability of such skills in acquirer's executive team members are higher (Buchholtz, Ribbens, & Honle, 2003).

Additionally, based on Cohen and Levinthal (1990), the extent of shared knowledge and expertise fosters firm's absorptive capacity, communication, evaluation of new knowledge and expertise. From this stand when acquirer and target shares some degree of common expertise and knowledge base, acquirer has better assessment of target processes, operations and values (Kogut & Zander, 1992; Grant, 1996). When relatedness is low, acquirer has limited knowledge of target business, respectively keeping the target CEO in charge would seem a better choice compare to assigning an external executive (Walsh, 1988 & 1989). In addition in unrelated acquisition, target CEO's specific skills about the industry-product sector would be unique to the acquirer (Wulf & Singh, 2011). Accordingly, it is expected that relatedness increases CEO departure in post-acquisition. Therefore:

H3a: In acquisition of small high-tech firms, higher product relatedness increases the likelihood of CEO departure.

If the CEO of the target is founder, the above argument on CEO departure and relatedness would not be valid anymore. Similar to the argument presented for H2b, founder-CEO has valuable human capital such as social capital and technological know-how that even the acquirer's familiarity on the industry and product does not make this type of CEO redundant for the acquirer. Highly related acquisitions, makes acquirer even more capable of assessing and appreciating the potential human capital embedded in the founder CEO. Therefore, it is expected that higher relatedness results in higher likelihood of founder-CEO retention. Therefore:

H3b: In acquisition of small high-tech firms, target CEO being founder negatively moderates the positive effect of product relatedness on the likelihood of CEO departure

Data Collection & Methodology

The acquisition deals between 2001 and 2005 in high-tech sectors have been gathered from two databases namely: Zephyr and SDC Platinum. The following criteria have been applied to construct the sample: First, the acquirers were public firms. As commonly practiced, public companies have relatively higher level of data availability. The targets however consist of both public and private firms. Second, All the target companies should actively operate in high-tech sectors at the time of acquisition. Although seems straightforward, there are various methods in defining a firm as a high-tech firm. For this database the definition of high-tech sectors conforms to the definition offered by (OECD, 1997) with the exclusion of aerospace and defense as few firms in Europe operate in this industry. In OECD (1997) the demarcation between various industries is numerated by SIC codes. Accordingly, a firm actively operates in one of the following sectors, are considered to be high-tech: Drugs (283), Computer and office equipment (357), Electronic and other electrical equipment and components except computer equipment (36), Instruments (38) and Software programming (737).

Since structural integration is one of the main independent variable we have chosen only deals in which the acquirers own 100% of the target after the focal acquisition. Forth, the population includes transactions that both the acquirer and target's country of origin are located either in USA or Europe. Finally, in this study the definition of size for both companies are based on number of employees (Damanpour, 1992). Accordingly, the targets and acquirers should employ respectively less than 500 and more than 1000 personnel at the time of acquisition.

In order to understand the events related to the acquisition between acquisition announcement and effective date, the related news in the published online journals, daily newspapers and professional industrial magazines are used. Lexis Nexis is the database chosen to retrieve related news. These pieces of articles contain valuable information about the motivations behind the acquisition, top executives personal information, their titles and reflections about the acquisition from target and acquirer, as well as the acquirer's further decision related to formal organizational structure (Puranam et al, 2009; Parunchuri et al, 2006). In total, news was gathered and variables were codified for 688 deals. The target CEO's names were gleaned from their interviews and public statements about the acquisition in the news. In the last step by cross searching the names in Capital IQ, Bloomberg and LinkedIn for each CEO a personal CV was gathered which makes the final sample limited to 372 acquisitions.

Dependent variable

CEO Departure (ceo_dep): the dependent variable is a binary variable defined as 1 if the CEO is departed from the target after the acquisition and 0 otherwise. The information related to CEO's decision of departure or stay is gleaned from their CVs. Initially the name of the CEO of target was identified from the news related to the focal acquisition. Then CV was collected from Capital IQ and Bloomberg for each identified name and later cross checked with the individual's LinkedIn page if available. Using two direct sources for each individual and LinkedIn increases the validity of the data collected.

Independent variables

Founder: This variable equals to 1 if the CEO is also founder of the company and 0 otherwise. This variable is constructed via checking CVs provided from Capital IQ and LinkedIn profiles. In the case that the profiles have lack of sufficient information, other web sources have been checked.

Structural Form (tar_integ): the acquirer's decision related to structural form revolves around two alternatives of separation or integration. After the acquisition, the acquirer should decide whether to treat the target entity (entities) as separate subsidiary (subsidiaries) with respect to its focal organization or integrate the target entity (entities) into its existing organizations. In this database the variable is integration. It is a binary variable which zero represents separation and one represents integration. Two methods applied here to codify this variable from the news:

1. *Acquirer's official announcements:* the news usually include acquirer's official announcement for the structural status of the target. Top executives of the acquirer (mostly CEO) announce the acquirer's official decision with regard to the structural form.
2. *Deal's description:* the deal's description in the news often covers the operational details of the transaction including the future formal structure of the target, lay-offs and etc.

Product Relatedness: It is calculated as the overlap between the product codes assigned to target and acquirer. Following Puranam & Srikanth (2007) and Puranam et al (2006), the extent of overlap was calculated as the number of 3-digit SIC codes common to acquirer and target divided by the total number of product codes assigned to target.

Control variables

Cross Border: Technological global market, accessing to new markets and international R&D forces many companies to acquire beyond their headquarters' geographic region (Hitt et al., 2001). While the potential slumbering values such as accessing to scarce knowledge and complementary resources that might not be available locally as well as a greater learning opportunity (Bakerma & Vermeulen, 1998;

Vermeulen & Bakerma, 2001) appears to be higher in international acquisitions, the information asymmetry between acquirer and target would be higher as well. Language differences, cultural and national differences between the acquirer and target may exacerbate this asymmetry (Angwin, 2001; Kissin & Herrera, 1990) therefore we expect that, acquirers become more dependent on target's CEO retention in managing their newly bought unit. *Cross_border* is equal to 1 if acquirer and target does not belong to the same country, and zero otherwise.

Acquirer Experience: Success of serial acquirers, such as Cisco or Dessault Systemes, suggests that acquisition experience affects focal acquisition performance at least partly through building expertise in post-acquisition implementation (Puranam & Srikanth, 2007; Haleblan & Finkelstein, 1999; Hayward, 2002; Zollo & Singh 2004). With the improved capability of managing integration, an acquiring firm may also learn how to alleviate its disruptive consequences. This effect may reduce the need for target CEO to alleviate the disruptive effects of integration. To construct the measure initially all acquisitions conducted by the acquirer in the last five years prior to the focal acquisition are collected and divided into two categories of high-tech and non-high-tech acquisition experience (Haleblan & Finkelstein, 1999). In high-tech experience we include only acquisitions of targets in the following industries: Drugs (283), Computer and Office Equipment (357), Electronic and other electrical equipment and components except computer equipment (36), Instruments (38) and Computer programming (737). It is expected that high-tech acquisition experience may be more relevant for experiential learning and building of acquisition capabilities for small high-tech firm acquisitions (Hayward, 2002). The experience is collected from three major sources namely: Mergerstat, SDC Mergers & Acquisitions and Corpfin Worldwide.

Tenure (*ln_tenure*): It is calculated as natural logarithm of number years of the CEO's occupational experience at the time of acquisition. Wulf & Singh (2011) and Buchholtz et al, (2003) argued that tenure decreases the probability of CEO departure due to accumulation of human capital over time.

Target age (*ln_tar_age*): The age of the target is a suitable measure to assess its maturity. From this stand integration of a young small firm compare to mature small firm would be different. Similarly CEO of small young firm is different from small mature firm (Boeker & Fleming, 2010; Buchholtz et al, 2003). Wulf & Singh (2011) reported that the probability of CEO departure increases by relative size. In this paper, we use natural logarithm of the age.

Relative Size (*rel_size*): it is measured by target's total number of employees to the acquirer's total number of employees at the time of acquisition (Haleblan & Finkelstein, 1999). As the target size grows it is expected that acquirer depends less on target CEO to manage transition period in post-acquisition

(Wulf & Singh, 2011). The information related to the number of employees was gathered from SDC Platinum and Orbis.

Minority stake (min_stake): it is equal to 1 if the acquirer holds a minority share relative before the focal acquisition. In the dataset, for some acquisitions the bought stake is not 100% although the finalized ownership is 100%. In this case, the acquirer previously bought some shares of the company and in the focal transaction they bought the remaining shares. As the prior transactions brought to both companies better understanding of operations of the other as well as more trust between top managements of both sides, it is expected that minority stakes may result in lower probability of CEO departure (Graebner, 2009).

Industries: To acknowledge differences between the high tech industries in the estimations the binary controls both for industry based on primary SIC to the model.

Since some of the independent variables are codified based on the acquisition's related news, to check for the data validity, a random sample based on 100 observations was generated. Two independent researchers codified the variables for the random sample and the correlation between their codifications and the sample codification was over 90%. Finally, by checking the list of subsidiaries of the acquirer and the legal status of the target in Orbis for this sample in 2012, the correlation between codified variable of structural integration and Orbis generated variable is 90%.

Model Specification

As the dependent variable in this study is a binary of whether the target CEO has departed or not, probit model is used for estimations. Based on the probit model specification (Cameron & Trivedi, 2005) and independent variables, the models for this study are:

$$\Pr(\text{CEO_dep} = 1 | X) = \Phi(X'\beta) = \Phi(\alpha_0 + \alpha_1 \text{tar_int eg} + \alpha_2 \text{found} + \alpha_3 \text{prod_rel} + \alpha_j \text{Controls}_j) \quad (1)$$

$$\Pr(\text{CEO_dep} = 1 | X) = \Phi(X'\beta) = \Phi(\beta_0 + \beta_1 \text{tar_int eg} + \beta_2 \text{found} + \beta_3 \text{prod_rel} + \beta_4 (\text{tar_int eg} \times \text{found}) + \beta_5 (\text{prod_rel} \times \text{found}) + \beta_j \text{Controls}_j) \quad (2)$$

Equation 1 estimates the probability of CEO departure for hypotheses H1, H2a and H3a, and respectively equation 2 estimates for hypotheses H2b and H3b.

Results

Table 2 shows grouping of some main variables based on CEO departure and retention. In our sample of 372 acquisitions, 114 CEOs departed and 258 CEOs stayed after the acquisitions. Additionally, 125

targets were structurally integrated, out of which for 69 targets, CEO left the company. The figures confirm our argument on structural integration as one mechanism of coordination makes CEO retention as another mechanism for coordination redundant. Also, 32 founder-CEOs departed after the acquisition while 113 founder-CEOs stayed after acquisition. Product relatedness' mean difference between CEO retention and departure shows that related acquisitions has higher rate of CEO departure. Descriptive statistics on founder-CEO and product relatedness initially confirms our arguments that human capital of founder-CEO decreases probability of CEO departure and relatedness increases probability of CEO departure. In the sample, 94 acquisitions were cross border, that in 75 of them CEO stayed in post-acquisition. The mean of target age and prior high-tech experience in logarithmic measure, show that target age and acquirer prior experience increases probability of CEO departure. The mean difference between relative size in logarithmic measure when CEO departed (-4.02) and CEO stayed (-4.28) contradicts studies such as Wulf & Singh (2011) and Buchholtz et al (2003) that argued as the target organically grows, probability of CEO departure increases in post-acquisition. Table 3 shows descriptive statistics and pair wise correlation matrix.

Table 4, shows the results of five models estimations. Model 1, is a probit estimation of control variables. The first control variable is natural logarithm of number of prior high-tech acquisitions that has significant positive impact on probability of CEO departure at 10% level. This result suggests that similar to studies conducted by Halebian & Finkelstein (1999) and Hayward, (2002) acquirer's prior experience in high-tech sectors makes acquirer less inclined on target CEO to manage the transitional period after the acquisition, and therefore increases the probability of CEO departure. Cross-border has negative significant effect on probability of CEO departure at 5% level. This result confirms the prior studies such as Angwin (2001) and Kissin & Herrera (1990) that reported in cross border acquisitions, acquirers face with cultural barriers and information asymmetry and therefore, the reliance on target CEO in post-acquisition process becomes more. Finally, relative size defined as employee head-counts of target and acquirer, has positive significant effect on CEO departure at 5% level. This finding does not confirm the study conducted by Wulf & Singh (2011) claiming that as target becomes bigger, it resembles more to larger firms and therefore acquirer does not need target CEO for transitional period. Other control variables such as CEO's tenure, target's age and minority stake, are not significant in the model, although they have expected signs.

Model 2 has estimated the three independent variables with probit specifications. The first independent variable, structural integration has positive significant effect on CEO departure at 0.01 % level. This result confirms our hypothesis (H2a) that structural integration as formal mechanism of coordination makes CEO retention as informal mechanism of coordination redundant. As suggested by Zollo & Singh

(2004) and Graebner (2004) integration increases coordination while decreases autonomy in post-acquisition. Decreasing autonomy increases the probability of CEO departure. The second independent variable, founder has also negative significant effect on CEO departure at 0.01% level. The result confirms our hypothesis (H1) based on the insight from founder-CEO succession literature, that founder-CEO possesses valuable human capital that acquirer keeps them in post-acquisition. The third variable is product relatedness. Although it has positive effect on CEO departure as expected, it is not significant. Hence at this stage, we cannot confirm our hypothesis (H3a) that higher relatedness results in increasing the likelihood of CEO departure.

Model 3, 4 and 5, introduces the interaction variables. Model 3, includes the interaction between structural integration and founder. As expected, the interaction variable has negative effect on probability of CEO departure. The joint probability of being a founder-CEO and also structurally integrate the target on CEO departure is equal to -0.611 and it is significant at 5% level. This result confirms our hypothesis (H2b) that even by ruling out soft coordination role for founder-CEOs in structural integration, the acquirers keep them in post-acquisition because of their human capital that exceeds beyond their general managerial skills. Model 4, includes the interaction between product relatedness and founder. The interaction variable has negative effect on probability of CEO departure. This result confirms our hypothesis (H3b) that although higher relatedness between acquirer and target, reduces uniqueness of founder-CEOs' industrial and product specific know-how for the acquirer, their technological know-how makes them valuable for acquirer so that they keep them in post-acquisition. Figure 1 show the difference between founder-CEO and professional CEO when it comes to the effect of product relatedness on probability of CEO departure. In case of professional CEO, as expected, the probability of departure increases as product relatedness increases, on the other hand, in case of founder-CEO, the probability of departure decreases as product relatedness increases. This behavior of acquirer in highly related acquisitions when it comes to founder-CEO, confirms our argument that in highly related acquisitions, the acquirer has better assessment and acknowledgement of the founder-CEO's human capital, and consequently acquirer's intention to keep the founder-CEO increases.

Robustness check for Endogeneity

Structural integration as form of post-acquisition implementation strategy for the acquirer (Puranam et al, 2009; Haspeslagh & Jemison, 1991) is an endogenous variable in our model. Because the decision related to CEO departure or retention as another post-acquisition implementation strategy (Haspeslagh & Jemison, 1991) shares common antecedents with integration. As shown in Model 1, acquirer's prior experience has positive effect on probability of CEO departure; in addition, prior experience also increases the probability of integration as acquirer develops a routine for managing the transitional period

(Zollo & Singh, 2004). Also, relative size of target and acquirer decreases the probability of structural integration, due to increasing complexity of target's organization (Puranam et al, 2009). For cross border vs. local acquisitions, the same argument on probability of CEO departure is also valid for probability of structural integration. So it is expected that in cross border acquisitions, the probability of structural integration is lower than local acquisitions.

In dealing with endogeneity, we follow Vella & Verbeek (1999) by using two approaches namely: two-stage IV estimations and two-stage Heckman Model (Heckit). In all approaches, we consider structural integration as a treatment effect. IV estimations are two stage least square (2SLS) and Probit-OIS, that in the former maximum likelihood and in the latter probit estimation of treatment effect based on other independent variables and instruments generate the predicted value of structural integration, which sets as an independent variable for the restricted equation along other independent variables to estimate probability of CEO departure (Cerulli, 2010). In Heckit model also, the selection model is probit of the treatment effect based on other independent variables and instruments to generate selection sample variable, Lambda, which added directly as independent variable to the second stage which is a maximum likelihood estimation of dependent variable (CEO departure). In this study we introduce two instruments. The first is component technology, as introduced by Puranam et al (2009), is a measure that specifies the importance of a target's technological artifact that acquirer intends to integrate it as a component to its current product(s) or ongoing product development. In case of component technology, the interdependencies between acquirer and target increase the probability of structural integration. To assess whether certain target's technology is considered as component technology for the acquirer, similar to Puranam et al (2009) we relied on the news related to the acquisitions from Lexis Nexis. If the news mentions that the acquirer is interested to obtain certain target's technology to add to their existing product (enhancement) or new product, then the variable is equal to 1, otherwise 0. The second instrument is target's public status. When the target is a public company, then company's released are more credible and therefore acquirer has better assessment over target's performance. Additionally, information asymmetry is lower between acquirer and target (Reuer & Ragozzino, 2008). Considering, firms going public as an end to their entrepreneurial status, coordination becomes more important aspect compare to autonomy for the firm as the company resembles more to larger firms.

Table 5 shows the model specifications for dependent and endogenous variable. In Model 6, target public status and component technology has positive significant effect on probability of structural integration respectively at 1% and 5% level. Model 7, shows that target IVs does not have any significant effect on probability of CEO departure.

Table 6, Model 8, 9 and 10 consider endogeneity of structural integration based on two stage least square (2SLS), probit-OLS and Heckman treatment specifications. The results show that structural integration and product relatedness has significant positive effect on probability of CEO departure at 5% level. Founder has negative significant effect on probability of CEO departure at 5% level. The results not only re-confirm H1 and H2a but also validate H3a, that product relatedness increases probability of CEO departure. Similarly Table 7 shows the interaction effect between product relatedness and founder that confirms our earlier result on its significant negative effect on probability of CEO departure at 1% level.

Discussion & Conclusion

This paper has studied determinants of target CEO departure or retention after the acquisition of small high-tech firms with special investigation on the effect of CEO being founder of the company (the so-called founder-CEO). The findings corroborate the main presented arguments about three determinants namely: founder, structural integration, and product relatedness. Before elaborating on the main findings, it is noteworthy to acknowledge the limitations. First, as explained before, pre-acquisition performance of target CEOs plays important role on their retention or departure that this research could not investigate. Since the main focus was on targets that are private and small, financial performances were not available for substantial portion of the sample. For the same reason, ownership structures of the firms were not available to consider the so called control and ownership separation. Thus this study did not investigate on agency theory. Having mentioned the main limitations, the findings of this study highlights important insight to our understanding of post-acquisition CEO departure. In the following each of them elaborated briefly.

The result of empirical indicates that target CEO's who founded the company, decreases the probability of CEO departure. This suggests that human capital embedded in founder-CEO is valuable for the acquirer. As explained in the theory before, we can divide the managerial human capital into general and specific skills. The interaction between structural integration and founder CEO reveals that CEO being a founder is so valuable for the acquirer that even if the acquirer decides to structurally integrate the firm, the acquirer prefers to keep the CEO. This finding brings a new insight to post-acquisition CEO successor literature. By ruling out soft coordination role for the founder-CEO in structurally integrated units, general managerial skills of this type of CEOs to serve as transitional manager are undermined, while specific skills such as technological know-how are more attractive for the acquirer. Additionally, the interaction between founder and product relatedness reveals that when the target CEO is also a founder of the company, it is more likely that the CEO stays afterwards even in highly related acquisitions. From this

stand, our result suggests that CEO being a founder possess certain human capital beyond the so called managerial skills of target CEO that encourages the acquirer to keep the CEO in post-acquisition. The result even shows that when product relatedness is high, acquirer is more willing to keep the founder-CEO. One explanation for this behavior would be acquirer in related acquisitions has better evaluation and appreciation of founder-CEO human capital, and therefore all else being equal the probability of founder-CEO departure decreases. This insight contributes to post-acquisition literature on CEO succession specifically and top management team (TMT) generally, by empirically showing the significance of human capital embedded in managerial resources of small high-tech firms. These findings on founder, suggest more in-depth studies on their retention on post-acquisition. The research, is extendible to other founder executives to first understand whether there is a difference between founder CEO and other top executives for the acquirers and second, whether acquirers are willing to keep the founding team as a whole or founders individually.

Structural integration increases the probability of CEO departure significantly. This validates aforementioned argument of coordination and autonomy. Formal mechanism of coordination, structural integration, affects negatively delegated autonomy. In addition, as explained and expected before, formal mechanism of coordination makes informal coordination mechanism redundant. In other words, if the acquirer decides to structurally integrate the newly bought firm into its organization, the role of CEO as soft coordinator becomes unnecessary. The choice of hard (formal) coordination mechanism impedes autonomy; on the other hand soft coordination mechanism exerts some level coordination while delegating the autonomy. This result brings new insight to post-acquisition implementation studies. A decision related to one dimension (here, structural form) affects directly the decision related to other dimensions (here, CEO departure vs. retention). This paper is also among one of the few studies that empirically shows integration increases coordination at the expense of losing autonomy (As an exception see: Zollo & Singh, 2004). For future research it would be interesting to study how other forms of organizational integration described by Haspeslagh & Jemison (1991) would affect probability of CEO departure.

Finally, product relatedness in our findings increases the probability of CEO departure which is in-line with main stream CEO succession literature such as Walsh (1988 & 1989), Datta & Grant (1990) and more recently Buchholtz et al (2003) and Wulf & Singh (2011). An interesting subject for further studies in this area can be conducted by determining the effect of other measurements of inter-firms dyadic relatedness for instance human capital (Neffke & Cuning, 2013) and technology (Puranam et al, 2009) on target CEO departure. This subject becomes more interesting in studying CEO succession of high-tech firm post acquisitions as they are more knowledge and human capital intensive.

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TABLE 1: THE VARIABLE DESCRIPTION

Variable	Definition	Symbol
CEO departure	It is equal to 1 if target CEO leaves the company after the acquisition and 0 otherwise.	ceo_dep
target structural integration	It is equal to 1 if the acquirer structurally integrates the target after the acquisition and 0 if the acquirer leaves the target as a separate subsidiary.	tar_integ
founder	It is equal to 1 if the target CEO is also founder of the company, and 0 otherwise.	found
product relatedness	It is measured as total number of common SIC codes between target and acquirer in the third digit divided by total number of target assigned SIC codes.	prod_rel
experience	It is the natural logarithm of total number of acquirer's prior experience in high-tech sectors, five years prior to the acquisition.	hitechexp
tenure	It is the natural logarithm of target CEO occupational years of experience at the time of acquisition.	ln_tenure
cross border	It is equal to 1 if target and acquirer are headquartered in different countries and 0 otherwise.	cross_border
target age	It is the natural logarithm of target age in terms of years between the foundation year and acquisition year.	ln_age
relative size	It is equal to target number of employees divided by the acquirer number of employees at the time of acquisition.	rel_size
minority stake	It is equal to 1 if the acquirer possesses a minority stake before the focal acquisition and 0 otherwise.	min_stake
electrical equipment	It is equal to 1 if the target company's primary SIC code starts with 36 and 0 otherwise.	el_equipment
drugs	It is equal to 1 if the target company's primary SIC code starts with 283 and 0 otherwise.	drugs
computer office equipment	It is equal to 1 if the target company's primary SIC code starts with 357 and 0 otherwise.	comp_office
instruments	It is equal to 1 if the target company's primary SIC code starts with 38 and 0 otherwise.	instruments
software	It is equal to 1 if the target company's primary SIC code starts with 737 and 0 otherwise.	software

TABLE 2: THE GROUPING OF THE VARIABLE BASED ON CEO DEPARTURE OR RETENTION

variables	CEO Retention (N=258)	CEO Departure (N=114)
structural Integration	56	69
founder	113	32
product Relatedness (mean)	0.66	0.78
high-tech experience (mean)	2.12	2.24
cross border	75	19
relative size(mean)	-4.28	-4.02
target age (mean)	2.39	2.41

TABLE 3: DESCRIPTIVE STATISTICS & CORRELATION MATRIX

Variable	Mean	S.D.	Min	Max	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. ceo_dep	0.29	0.46	0	1	1														
2. tar_integ	0.34	0.47	0	1	0.19	1													
					(0.00)														
3. found	0.39	0.49	0	1	-0.1	-0.05	1												
					(0.03)	(0.31)													
4. prod_rel	0.69	0.4	0	1	0.15	0.03	-0.05	1											
					(0.00)	(0.58)	(0.28)												
5. ln_hitechexp	2.06	1.04	0	4.74	0.1	0.09	-0.03	0.13	1										
					(0.04)	(0.07)	(0.48)	(0.01)											
6. ln_tenure	1.84	0.71	0	3.22	-0.03	-0.12	0.5	-0.11	-0.07	1									
					(0.59)	(0.02)	(0.00)	(0.03)	(0.16)										
7. cross_border	0.27	0.44	0	1	-0.15	-0.07	0.03	-0.02	0.02	0	1								
					(0.00)	(0.13)	(0.56)	(0.72)	(0.66)	(0.98)									
8. ln_age	2.4	0.73	0	4.77	-0.03	-0.1	-0.23	-0.11	-0.1	0.31	-0.03	1							
					(0.54)	(0.04)	(0.00)	(0.02)	(0.04)	(0.00)	(0.52)								
9. rel_size	-4.11	1.86	-9.83	-0.16	0.06	0.01	-0.16	0.08	-0.34	-0.07	-0.07	0.13	1						
					(0.2)	(0.86)	(0.00)	(0.11)	(0.00)	(0.19)	(0.15)	(0.01)							
10. min_stake	0.04	0.19	0	1	-0.02	-0.08	0.05	-0.12	-0.05	0.03	0.02	0.01	-0.04	1					
					(0.62)	(0.09)	(0.25)	(0.01)	(0.28)	(0.57)	(0.7)	(0.89)	(0.37)						
11. instruments	0.1	0.3	0	1	-0.01	-0.02	-0.09	0.02	-0.07	0.12	0.09	0.23	0.03	0.02	1				
					(0.88)	(0.68)	(0.07)	(0.64)	(0.15)	(0.01)	(0.07)	(0.00)	(0.59)	(0.71)					
12. comp_office	0.04	0.2	0	1	-0.01	0.07	-0.02	-0.09	-0.01	-0.05	0	-0.01	-0.02	-0.04	-0.07	1			
					(0.89)	(0.14)	(0.61)	(0.06)	(0.79)	(0.36)	(0.94)	(0.8)	(0.67)	(0.41)	(0.16)				
13. drugs	0.08	0.28	0	1	0.16	-0.11	-0.12	0.16	-0.02	-0.09	-0.02	0.08	-0.06	0.03	-0.1	-0.06	1		
					(0.00)	(0.02)	(0.01)	(0.00)	(0.61)	(0.06)	(0.63)	(0.11)	(0.2)	(0.55)	(0.03)	(0.19)			
14. el equipmen	0.13	0.34	0	1	-0.08	-0.09	-0.03	-0.14	-0.06	0.07	0.1	0.16	0.08	-0.08	-0.13	-0.08	-0.12	1	
					(0.09)	(0.06)	(0.5)	(0.00)	(0.17)	(0.17)	(0.03)	(0.00)	(0.09)	(0.11)	(0.01)	(0.09)	(0.01)		
15. software	0.45	0.5	0	1	0.18	0.09	-0.2	0.09	0.03	-0.1	-0.25	0.14	0.31	0.12	0.02	0	0.19	-0.04	1
					(0.00)	(0.05)	(0.00)	(0.05)	(0.5)	(0.04)	(0.00)	(0.00)	(0.00)	(0.01)	(0.66)	(0.99)	(0.00)	(0.45)	

The Correlation coefficients are presented with their corresponding Pvalues

TABLE 4: BASIC ESTIMATIONS

VARIABLES	Model 1	Model 2	Model 3	Model 4	Model 5
tar_integ		0.665*** (0.157)	0.723*** (0.193)	0.652*** (0.158)	0.722*** (0.197)
found		-0.510*** (0.193)	-0.451** (0.226)	0.225 (0.320)	0.302 (0.343)
prod_rel		0.299 (0.198)	0.296 (0.199)	0.714*** (0.269)	0.716*** (0.272)
found x tar_integ			-0.161 (0.311)		-0.193 (0.309)
found x prod_rel				-1.028*** (0.379)	-1.036*** (0.378)
ln_hitechexp	0.133* (0.0809)	0.0840 (0.0763)	0.0839 (0.0763)	0.0822 (0.0761)	0.0819 (0.0762)
ln_tenure	-0.0139 (0.105)	0.244* (0.140)	0.247* (0.141)	0.237 (0.145)	0.241* (0.146)
cross_border	-0.388** (0.171)	-0.323* (0.176)	-0.321* (0.175)	-0.298* (0.178)	-0.296* (0.178)
ln_tar_age	-0.0334 (0.126)	-0.138 (0.140)	-0.136 (0.140)	-0.112 (0.144)	-0.110 (0.144)
rel_size	0.0840** (0.0417)	0.0726* (0.0416)	0.0710* (0.0419)	0.0676 (0.0418)	0.0658 (0.0422)
min_stake	-0.168 (0.432)	0.0530 (0.428)	0.0561 (0.429)	0.0889 (0.412)	0.0921 (0.414)
instruments	0.130 (0.261)	0.119 (0.250)	0.114 (0.251)	0.130 (0.251)	0.126 (0.252)
comp_office	0.107 (0.315)	-0.00667 (0.331)	0.00528 (0.332)	0.00903 (0.330)	0.0265 (0.330)
drugs	0.724*** (0.222)	0.803*** (0.250)	0.805*** (0.251)	0.781*** (0.252)	0.783*** (0.253)
el_equipment	-0.131 (0.262)	-0.0383 (0.257)	-0.0435 (0.256)	-0.0626 (0.259)	-0.0684 (0.257)
Constant	-0.321 (0.383)	-0.792* (0.430)	-0.829* (0.436)	-1.171** (0.470)	-1.219** (0.478)
Pseudo R ²	0.045	0.108	0.1086	0.124	0.1248
Observations	372	372	372	372	372
Log likelihood	-218.9	-204.5	-204.3	-200.8	-200.6
Wald Chi2	21.08	43.00	43.43	45.39	45.32

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

FIGURE 1: THE INTERACTION BETWEEN PRODUCT RELATEDNESS AND FOUNDER

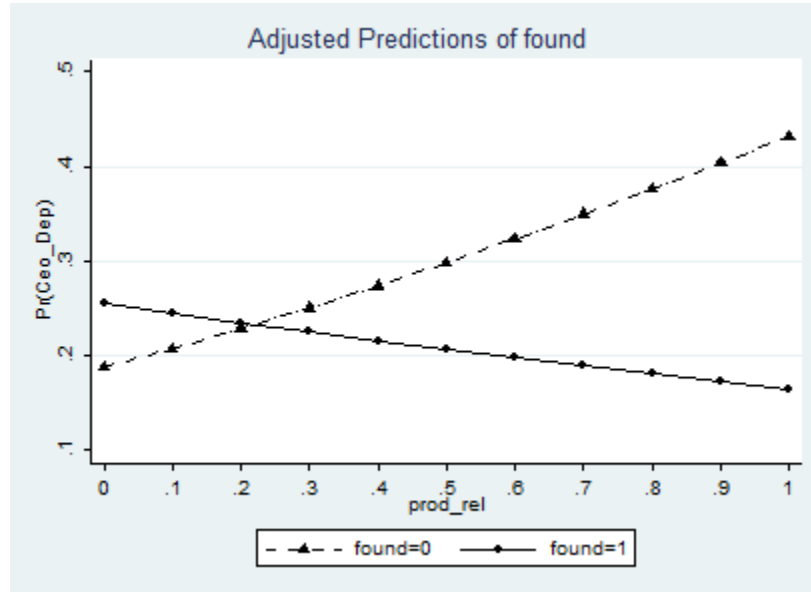


TABLE 5: INSTRUMENTS

VARIABLES	Model 6 Target Integration	Model 7 CEO Departure
found	-0.0499 (0.194)	-0.496** (0.194)
prod_rel	-0.0127 (0.182)	0.267 (0.197)
component	0.645*** (0.169)	0.188 (0.171)
tar_pub	0.363** (0.161)	0.257 (0.158)
ln_hitechexp	0.0592 (0.0915)	0.0726 (0.0819)
ln_tenure	-0.0753 (0.139)	0.220 (0.135)
cross_border	-0.272 (0.169)	-0.326* (0.171)
ln_tar_age	-0.134 (0.148)	-0.163 (0.147)
rel_size	-0.0313 (0.0511)	0.0445 (0.0457)
min_stake	-1.066** (0.517)	-0.185 (0.429)
Instruments	-0.352 (0.282)	0.0300 (0.256)
comp_office	0.502 (0.400)	0.0694 (0.306)
Drugs	-0.869* (0.446)	0.526** (0.235)
el_equipment	-0.290 (0.241)	-0.100 (0.275)
Constant	-0.336 (0.451)	-0.635 (0.454)
R ²	0.1050	0.07042
Wald Chi	43.79	31.19
Log likelihood	-212.53	-212.23
Observations	372	372

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

TABLE 6: ENDOGENITY ESTIMATIONS

VARIABLES	Model 8 Direct_2SLS	Model 9 Probit-OLS	Model 10 Heckman
tar_integ	0.428** (0.208)	0.433** (0.177)	0.369** (0.170)
found	-0.155** (0.0617)	-0.154** (0.0624)	-0.153** (0.0605)
prod_rel	0.110* (0.0599)	0.110* (0.0590)	0.117** (0.0573)
ln_hitechexp	0.0238 (0.0249)	0.0232 (0.0261)	0.0269 (0.0252)
ln_tenure	0.0913** (0.0448)	0.0911** (0.0444)	0.0896** (0.0431)
cross_border	-0.0685 (0.0549)	-0.0666 (0.0571)	-0.0739 (0.0551)
ln_tar_age	-0.00948 (0.0362)	-0.0101 (0.0362)	-0.00591 (0.0351)
rel_size	0.0176 (0.0128)	0.0175 (0.0138)	0.0163 (0.0134)
min_stake	0.0686 (0.126)	0.0738 (0.143)	0.0577 (0.139)
instruments	0.0580 (0.0795)	0.0580 (0.0907)	0.0493 (0.0879)
comp_office	-0.0322 (0.118)	-0.0321 (0.123)	-0.0192 (0.119)
drugs	0.318*** (0.101)	0.316*** (0.0962)	0.303*** (0.0937)
el_equipment	0.0126 (0.0786)	0.0150 (0.0807)	0.00641 (0.0780)
lambda			-0.0863 (0.106)
Observations	372	372	372
R ²	0.366	0.363	
Wald Chi			242.87
F-value	14.38	15.73	

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

CONTINUING TABLE 6

	Model 8	Model 9	Model 10
component	0.2396*** (0.0612)	0.636*** (0.1647)	0.646*** (0.172)
tar_pub	0.141*** (0.0535)	0.3369** (0.1624)	0.369** (0.166)
found	0.0139 (0.6031)	0.0642 (0.1869)	-0.0499 (0.1934)
prod_rel	0.0892 (0.0588)	0.0232 (0.1819)	0.325 (0.1876)
ln_hitechexp	0.034 (0.0255)	0.0724 (0.0734)	0.0599 (0.0758)
ln_tenure	0.0157 (0.0432)	0.0799 (0.1297)	0.0753 (0.1348)
cross_border	-0.0594 (0.0561)	-0.2243 (0.1691)	-0.254 (0.177)
ln_age	0.0206 (0.034)	-0.1509 (0.1213)	-0.180* (0.108)
rel_size	-0.0232 (0.0143)	-0.0129 (0.0466)	-0.0115 (0.0448)
min_stake	-0.2307*** (0.0798)	-0.753** (0.3416)	-1.031* (0.579)
instruments	-0.1227 (0.0854)	-0.0634 (0.2583)	-0.263 (0.279)
comp_office	0.2263 (0.1467)	0.5426* (0.3284)	0.513 (0.326)
drugs	-0.3151*** (0.077)	-0.6791** (0.2787)	-0.951*** (0.31)
el_equipment	-0.0966 (0.0813)	-0.2839 (0.2427)	-0.36 (0.248)
Constant		-0.281 (0.387)	-0.314 (0.345)
R ²	0.1117	0.0998	0.0998

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

TABLE 7: ENDOGENITY ESTIMATION WITH INTERACTION

VARIABLES	Model 11 Direct_2SLS	Model 12 Probit_OLS	Model 13 Heckman
found	0.0533 (0.0936)	0.0635 (0.102)	0.0747 (0.0972)
tar_integ	0.388* (0.210)	0.327* (0.184)	0.267 (0.175)
prod_rel	0.221*** (0.0783)	0.233*** (0.0758)	0.245*** (0.0725)
found x prod_rel	-0.313*** (0.115)	-0.325*** (0.120)	-0.340*** (0.114)
ln_hitechexp	0.0209 (0.0245)	0.0239 (0.0257)	0.0270 (0.0246)
ln_tenure	0.0878** (0.0443)	0.0857* (0.0439)	0.0842** (0.0422)
cross_border	-0.0696 (0.0552)	-0.0744 (0.0565)	-0.0806 (0.0540)
ln_tar_age	-0.0242 (0.0360)	-0.0212 (0.0358)	-0.0183 (0.0343)
rel_size	0.0202 (0.0127)	0.0188 (0.0137)	0.0179 (0.0131)
min_stake	0.0617 (0.123)	0.0531 (0.142)	0.0394 (0.136)
instruments	0.0665 (0.0771)	0.0574 (0.0895)	0.0498 (0.0859)
comp_office	-0.0281 (0.115)	-0.0136 (0.122)	-0.00173 (0.117)
drugs	0.305*** (0.100)	0.286*** (0.0963)	0.274*** (0.0928)
el_equipment	0.00258 (0.0785)	-0.00233 (0.0802)	-0.0107 (0.0767)
lambda			-0.0300 (0.109)
Observations	372	372	372
R-squared	0.389	0.380	
Wald Chi			265.31
F-Value	14.28	15.69	

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

CONTINUING TABLE 7

	Model 11	Model 12	Model 13
VARIABLES	Direct_2sls	Probit_OLS	Heckman
component	0.2335*** (0.0619)	0.6335*** (0.1647)	0.653*** (0.171)
tar_pub	0.1346** (0.0534)	0.3387** (0.1632)	0.354** (0.173)
found	0.1838* (0.1002)	0.3886 (0.3152)	0.279 (0.301)
prod_rel	0.1747** (0.0682)	0.2898 (0.2415)	0.273 (0.248)
found x prod_rel	-0.2437** (0.1167)	-0.6079* (0.3541)	-0.536 (0.367)
ln_hitechexp	0.0308 (0.0254)	0.0742 (0.0737)	0.0608 (0.0775)
cross_border	-0.0593 (0.056)	-0.2098 (0.1696)	-0.242 (0.178)
ln_age	0.0105 (0.034)	-0.1418 (0.0448)	-0.178 (0.111)
rel_size	-0.0198 (0.0141)	-0.0117 (0.0448)	-0.0155 (0.0462)
min_stake	-0.2275*** (0.0864)	-0.7645** (0.3425)	-1.021* (0.588)
instruments	-0.109 (0.0847)	-0.0442 (0.2596)	-0.269 (0.284)
comp_office	0.2236 (0.1444)	0.5632* (0.3305)	0.528 (0.332)
drugs	-0.3182*** (0.0759)	-0.702** (0.2802)	-1.009*** (0.318)
el_equipment	-0.1038 (0.0786)	-0.3119 (0.2445)	-0.381 (0.253)
Constant		-0.4928 (0.407)	-0.499 (0.416)
R ²	0.1228	0.1058	

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1