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**“Assessing the Impact of Publicly Funded
Business Advisory Services on
Entrepreneurial Outcomes”**

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ASSESSING THE IMPACT OF PUBLICLY FUNDED BUSINESS ADVISORY SERVICES ON ENTREPRENEURIAL OUTCOMES*

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ASSESSING THE IMPACT OF PUBLICLY FUNDED BUSINESS ADVISORY SERVICES ON ENTREPRENEURIAL OUTCOMES

Abstract

Given the mixed evidence for the impact of various publicly funded initiatives that aim to foster entrepreneurial activity, this paper empirically examines the efficacy of publicly funded business advisory services in relation to entrepreneurial outcomes. Based on a sample of 228 early-stage firms, of which 101 used business advisory services focused on helping companies secure 1st rounds of financing and start generating revenues, we examine the firm-level impact such services can have on sales growth, innovation, finance and alliances. We find services are positively associated with firms' sales growth, patents, finance and alliances. We assess statistical and economic significance, and assess robustness to controls for the non-randomness of the firm's matching with the business advisory service program, as well as endogeneity of advisors' hours spent with firms, among other robustness checks. We find significant robustness of hours spent on sales and finance, but sensitivity of the effect of hours on patents and alliances after controlling for endogeneity.

Keywords: Entrepreneurship, Business Advisory Services, Alliances, Angel Equity Finance, Patents, Public Policy

JEL Codes: L26, L50, M13, O3, G24

1. Introduction

In both developed and developing countries, governments are interested in fostering entrepreneurial activity in their economies (e.g. Storey, 2000; Acs, 2005, 2006; Toschi and Murray, 2009). And increasingly, public policy makers are distinguishing between supporting entrepreneurial activity versus supporting small and medium sized enterprises (SMEs) more broadly defined. In recent years policy makers from many countries have moved toward differentiating entrepreneurial firms from SMEs (OECD 2008): they adopt definitions of entrepreneurial activity that recognize it as “enterprising human action in pursuit of the generation of value, through the creation or expansion of economic activity, by identifying and exploiting new products, processes or markets” (Ahmad and Peters, 2007, p. 4). And they note that while such activity *may* occur in SMEs, many SMEs are not growth oriented and demonstrate little truly entrepreneurial activity. Thus the challenge for public policy makers is to find means of support that are effective in promoting and fostering entrepreneurial outcomes and that do not merely sustain low-performing SMEs.

Various types of ambitious and costly initiatives have been implemented with the goal of supporting entrepreneurial activity. These range from the creation of business incubators or science parks to the financing of entrepreneurial ventures by government backed programs to the fostering of business clusters (e.g. Harrison et al., 2004; Joseph et al., 2005; Phan et al., 2005; Klonowski, 2007; Cumming et al., 2007). The efficacy of such programs for achieving entrepreneurial outcomes is yet to be determined: available evidence to date yields mixed findings in support of a link between many initiatives and entrepreneurial outcomes, and suggest that costs to taxpayers outweigh benefits (Cooper, 1985; Cooke, 1996; Nowak and Grantha, 2000; Rice, 2002; Colombo and Delmastro, 2002; Siegel et al., 2003; Bøllingtoft and Ulhøi, 2005; Clarysse et al., 2005; Rothaermel and Thursby, 2005). This raises the question of whether there are forms of government support that foster entrepreneurial performance, and that do so cost-

effectively. The goal of this paper is to consider whether business advisory services can be conducive to entrepreneurial outcomes, and whether they can be cost-effective.

Business advisory services (also often referred to as coaching) are one of the most ubiquitous and persistent forms of government support. Partially or fully publicly funded advisory services are continuously undertaken in nearly every developed country (Hjalmarsson and Johansson 2003, OECD 1995). Given how long many of these programs have been in existence, it is not surprising that most have their origins in public policy goals of supporting SMEs, rather in helping to foster entrepreneurial activity per se. This is reflected in the name and purported targets of programs in many countries. For example, in the United States, “Small Business Development Centers (SBDCs) provide management assistance to current and prospective *small* businesses” (<http://www.sba.gov/services/counseling/index.html>; italics added). Hjalmarsson and Johansson (2003) trace the emergence of business advisory services targeted toward SMEs to the 1960s; they suggest the provision of such advising grew out of extension services provided by governments to farmers.

As public policy has shifted toward fostering entrepreneurial outcomes, the hope that publicly funded business advisory services can foster entrepreneurial performance (versus the partially overlapping goal of supporting SMEs) has become apparent. This is reflected in part in the target markets for such services. For example, the government of Ontario describes the target of its business advisory services as follows: “The Ontario government has Business Advisors in regional offices who provide consulting services to Ontario's innovative, SME growth firms” (http://www.canadabusiness.ca/servlet/ContentServer?cid=1085667965904&lang=en&pagename=CBSC_ON%2Fdisplay&c=Services). While SMEs are mentioned, it seems clear that in Ontario, at least, the emphasis is not on serving all SMEs, but rather on advising those that are oriented toward innovation and growth, that is, toward entrepreneurial outcomes.

In the current study, our question is whether publicly funded advisory services can in fact help to foster entrepreneurial outcomes for businesses when they are targeted toward the subset of

SMEs that are growth and innovation oriented. An equally important consideration is whether such services can be provided cost effectively. Based on a sample of 228 firms, of which 101 used business advisory services in the Province of Ontario, Canada, we examine the firm-level impact such services can have on sales growth, innovation, angel equity finance and alliances. We find services are positively associated with firms' sales growth, patents, angel equity finance and alliances. We assess statistical and economic significance, and assess robustness to controls for the non-randomness of the firm's matching with the business advisory service program, as well as endogeneity of advisors' hours spent with firms, among other robustness checks. We find significant robustness of hours spent on sales and angel equity finance, but sensitivity of the effect of hours on patents and alliances after controlling for endogeneity.

This paper is organized as follows: Section 2 reviews prior theory and research on the provision of business advisory services. Section 3 first describes the particular advisory service studied here, then introduces the data and provides summary statistics. Multivariate regression analyses are presented in section 4. Section 5 discusses limitations and extensions. Concluding remarks follow in section 6.

2. Business Advisory Services: Related Research, Theory, and Hypotheses

2.1. Prior Research on Impacts of Business Advisory Services

Given the considerable amounts invested by governments in the provision of business advisory services, it is not surprising that a number of studies have attempted to gauge the impacts of such services. Approaches taken to assessing impact have varied in terms of the methods used for assessing the extent to which outcomes have been achieved. Variations in the types of advice provided in the programs (Hjaalmarsson and Johansson 2003; Mole and Keogh 2009) under investigation have also meant that assessment approaches have differed.

One popular approach has been to survey clients about their perceptions of the impact of advice received. In general, recipients of advising services report that their companies' capabilities are enhanced by the advising they receive (e.g. Roper and Hart 2005, Smallbone et al. 1993). Occasionally, complaints do surface that advisors lack expertise or do not fully understand the client's business (Smallbone et al. 1993).

Given that perceptions of impact may not be commensurate with measurable outcomes, approaches attempting to quantify the impact of business advisory service in terms of growth, or in terms improvements to specific business functions, have also been undertaken. Storey (2000), however, has argued that many such assessments have fallen within the category of monitoring rather than of impact evaluation because they fail to adequately control for the effects of selection bias. That is, they do not consider how a control group of firms that did not receive advice performed in terms of outcomes of interest. For that reason, we confine our review here to studies that attempted to control for selection factors in some manner.

In the category of studies that have compared recipients with non-recipients of services, some positive outcomes have been reported. For example, a U.S. based study by Chrisman and Katrishen (1994) found that established business clients who indicated that SBDC services were beneficial (80%) enjoyed significantly higher sales growth rates after the consultancy than did the average US business (7.78% between 1990 and 1991 versus 1.13%). It should be noted however that the comparison does not take into account the initial sales levels or growth rates of the two groups of firms, as other studies have done (Labrecht and Pirnay 2005).

Among studies that have taken into account the initial sales, employment, and growth rates, results have been less supportive of a positive impact of advisory services. For example, in their study conducted in the Walloon region of Belgium, Labrecht and Pirnay (2005) found no evidence that publicly funded advisory services had a significant impact on net job creation, sales, or financial indicators such as liquidity. Mixed results have also been found in a series of studies of the UK's Business Links program. Roper and Hart (2003) compared a matched sample of

firms that did and did not receive business advising services between 1996 and 1998. They found that receipt of advisory services had a positive and statistically significant effect on productivity growth over the subsequent four year period. Using the same sample, they examined the effects of business advising on growth in either sales or employment over the subsequent four year period (Roper and Hart 2005): they found no significant relationship between receipt of advising and either sales or employment growth when selection factors were taken into account. Mole, Hart, Roper and Saal (2008) compared firms that, in 2003, received “intensive” (repeated) advising to those that received limited advising or no advising; their impact measures were growth in sales and growth in employment between 2004 and 2005. They found that those firms that had received intensive advising experienced significantly greater employment, but not sales growth, than both comparator groups. Firms that had received limited advising performed no better than those receiving no advising on the outcomes assessed.

Several observations can be made about this prior research. First, the studies that have been undertaken to date have been of advisory services offered to a broad cross section of SMEs in an effort to improve the average performance of SMEs in the regions studied. These studies do not, therefore, provide direct evidence of whether advisory services can effectively enhance entrepreneurial outcomes when they are deliberately targeted to innovation and growth oriented firms. Second, when selection factors are controlled for, there is some, but rather modest, evidence of a positive impact of advisory services. Third, there is reason to consider the intensity or volume of advisory services: the Mole, Hart, Roper and Saal (2008) study suggests that the benefits of advising may be most likely when advising occurs over as series of interactions rather than being restricted to one or two advising sessions. This insight is reinforced by results from a study by Chrisman, McMullen and Hall (2005) who compared the impacts of varying levels of pre-venture counseling on the performance of businesses founded after the counseling was received: Chrisman et al report a positive, but diminishing impact of the amount of counseling.

Taking these findings into account, the question we now consider is whether it is reasonable to posit that advising can promote entrepreneurial performance when the goal is not SME support broadly defined but rather than attainment of entrepreneurial outcomes by firms that are growth and innovation oriented. We draw on theories of dynamic capabilities to develop our hypothesis in this regard.

2.2 Theory Linking Business Advisory Services to Entrepreneurial Outcomes.

Those studies which have attempted to develop a theoretical link between the use of advisory services and desired performance outcomes (e.g. Chrisman and McMullan 2004; Chrisman, McMullan and Hall 2005) have developed arguments that can be seen to fit with a dynamic capabilities perspective on how organizations compete and thrive. The dynamic capabilities perspective holds that to ensure competitive advantage, firms will often need to acquire, create and integrate resources into dynamic capabilities (Teece et al., 1997). Organizational capabilities are regarded as the ability of the firm to combine efficiently a number of resources so as to engage in productive activity and attain a certain objective (Amit and Schoemaker, 1993); examples of capabilities that have been studied range from innovation and customer service capabilities (Calantone et al., 2002) to logistical capabilities (Daugherty et al., 1998) to information technology capabilities (e.g. Aral and Weill 2007). A large and growing literature has developed to examine both how firms can use or leverage capabilities they currently possess (e.g., Danneels 2002) and how they can develop new capabilities (e.g., Ethiraj et al., 2004, McEvily and Markus, 2005).

Adapting this theoretical perspective and applying it in the context of business advising, this suggests that the advice provided by skilled counselors is a resource that some firms will be able to combine with other resources to translate into new capabilities. This rationale is consistent, for example, with arguments made by Chrisman and colleagues (2003, 2005) that skilled advising can provide even seasoned entrepreneurs or entrepreneurial teams with new

knowledge that allows them to develop new capabilities. We would further argue that, relative to the general population of SMEs, the firms most likely to have the motivation and resources to develop new capabilities based upon advice obtained are those that have the high growth and innovation intentions.

The dynamic capabilities perspective further provides support for the argument that, in order for firms to effectively integrate externally provided knowledge resources into new capabilities, it is likely to be necessary that there be more than a minimal exposure to the resource. For example, Ethiraj et al (2005) found that in order for firms in the software industry to acquire the types of capabilities they investigated, repeated interactions and persistent investments in learning were required. Supporting this view, Anand and Khanna (2000) argue that an organizational capability is a historical concept by its very nature, developed over time by integrating past experiences with the resources currently being acquired. In considering the case of firms integrating business advice into their existing resources in order to achieve new capabilities that are conducive to entrepreneurial outcomes, we posit that there will be a significant relationship between the amount of advising time the firm receives and the extent to which entrepreneurial outcomes are warranted.

Together, these arguments lead us to the proposition at the core of this paper which is the following: *The amount of advising a growth-oriented firm receives is positively and significantly related to entrepreneurial outcomes subsequently attained by the firm.*

To translate this proposition into a series of testable hypotheses, we consider what should be taken as indicators of entrepreneurial outcomes. One outcome on which most advisory service impact studies have focused is sales growth (e.g. Roper and Hart 2003, 2005). While sales growth on its own is not necessarily indicative of entrepreneurial performance, it is the case that firms engaging in entrepreneurial activity are more likely, *ceteris paribus*, to grow in terms of sales. Moreover, higher rates of sales growth are considered an entrepreneurial performance

indicator by the OECD (Ahmad and Peters, 2007). Thus our first specific hypothesis is the following:

Hypothesis 1: *The number of advisor hours a firm receives will be positively and significantly associated with sales growth, taking into account selection effects and endogeneity.*

A more specific indicator of entrepreneurial performance is attracting investors. The fact that an investor, who typically can choose from an array of possible firms, decides to put money into a particular venture conveys investor confidence that the firm has entrepreneurial potential. Moreover, the funds provided can fuel later entrepreneurial performance. Thus our second hypothesis is that:

Hypothesis 2: *The number of advisor hours a firm receives will be positively and significantly associated with the probability of angel financing taking into account selection effects and endogeneity.*

Another indicator of entrepreneurial performance is innovation by the firm. Indeed, firm innovativeness is considered one of the crucial entrepreneurial outcomes by most public policy makers (e.g. OECD 2008). Patents and patent applications have frequently been used to assess innovations of the firm. Thus we propose that:

Hypothesis 3: *The number of advisor hours a firm obtains will be positively and significantly associated with obtaining or applying for patents taking into account selection effects and endogeneity.*

A final indicator of entrepreneurial performance is the demonstrated ability of a firm to form alliances. The willingness of other businesses to form an alliance with a firm indicates that it is considered to have assets or capabilities that are valuable and that distinguish it from peers. Thus the fourth hypothesis is that:

Hypothesis 4: *The number of advisor hours a firm obtains will be positively and significantly with the likelihood of forming alliances, taking into account selection effects and endogeneity.*

3. Data and Summary Statistics

3.1 Institutional Research Context: The Investment Network of the Innovation Synergy Program in Markham.

The Innovation Synergy Centre in Markham was founded in 2003 with goal of a providing a "one-stop" centre, operating on a non-profit basis, where senior managers of established businesses could gain access to the advisory services of experienced consultants and business professionals. It works as a coordinating "couple" (Mole and Keogh 2009) or advisory hub that coordinates, but does not deliver, advisory services. In such models, the couple or hub promotes the advisory services and other programs offered to potential clients, who make initial contact with the couple. The staff of the couple evaluates potential clients to determine their advisory needs. They then pair them with advisors (also referred to as consultants or mentors) who are coordinated, evaluated, and partially subsidized by the centre (Lambrecht and Pirnay 2005; Mole and Keogh 2009). As of 2009, the Innovation Synergy Centre as a whole had coordinated advisory services for over 1400 firms (<http://www.iscm.ca/about.htm>).

One sub-program within the Innovation Synergy Centre that was launched in 2006-Q4 is called the Investment Network. The targeted profile of the target clients of the Investment

Network is those that are innovation and growth oriented. That is, the specific intention of the Investment Network is to target the subset of SMEs that are pursuing entrepreneurial outcomes. To this end, the Investment Network advertises that its focus is on companies that: are generating revenue or will generate revenue within 12 months; have the capacity to generate a minimum of \$2M in revenue within 3 to 4 years; have a sustainable competitive/technical advantage; have a current company valuation of less than \$2M; and will be looking for up to \$500K in financing within 24 months (<http://www.iscm.ca/invest/default.htm>). As such, this subprogram is a particularly appropriate one in which to attempt an assessment of the impact of advisory services on entrepreneurial outcomes among firms with growth and innovation intentions and potential.

3.2 Data

The sample comprises the population of firms that have contacted or been clients of the Investment Network. As at June 2009, there are 101 firms that were actively part of the Investment Network. These 101 firms were part of a larger population of 228 firms with which the Investment Network had come into contact, such as through media, governmental referral or consultant referral. Not all firms that come into contact with the Investment Network use their services, and the details in the data collected by the Investment Network allow us to control for this non-random matching.

The Investment Network has collected a range of information for each firm in its database. The information in the data is summarized in Table 1. Table 1 categorizes the variables into six areas: (1) dependent variables that are the outcome variables of interest, (2) factors that influence whether or not the firm is part of the Investment Network, (3) value added provided by advisors, (4) firm characteristics, (5) top management team characteristics, and (6) market conditions. The data span the period 2006-Q4 to 2009-Q2.

[Insert Table 1 About Here]

As described in the section above, a range of dependent variables reflecting entrepreneurial outcomes was selected.

Sales Growth. We consider the change in sales from 2008-2009, based on the most recent information from the 12-month sales statistics in 2008 versus 2009. The sales statistics indicate the firms in the sample are on average very high growth with an average change in sales of 101%. The median sales change, however, is 0, and one firm had a reduction in sales of 100% and another experienced an increase in sales of 490%.

Investments. The firms affiliated with the investment network are sufficiently small that none would qualify for venture capital financing. Nevertheless, 72.3% of the firms are seeking (or have recently obtained) equity financing from an angel investor (i.e., a high net worth individual). Where data are available, the extent of angel equity capital obtained ranges from \$60,000 to \$500,000, while one firm was successful in raising \$1,000,000.

Patents. Many (67.3%) of the firms affiliated with the Investment Network have applied for or have recently obtained patents. This is not surprising given that 54.5% of the firms affiliated with the Investment Network are either in the software or electronics industries and given that the Investment Network targets firms with innovation and growth potential. The median firm was incorporated in 2005, and the range of firm incorporations is from 1985 to 2009. Because many firms in the data are only recently formed, we consider patent applications for firms with a realistic hope of obtaining a patent in addition to those that have obtained patents since there are delays in patent applications.

Alliances. Slightly less than half (42.6%) of the firms have formed a strategic alliance as at 06/2009. Certainly an objective of the Investment Network is not just facilitating growth in terms of sales, obtaining financing and protecting intellectual property; as well, a major potential benefit for firms is in developing strategic alliances with suppliers, customers, financiers, working shareholders and other advisors that will aid rapid growth of the firm.

The largest source of referrals to the Investment Network (35.1%) is from the personal contacts of those who coordinate the Network (hereafter referred to as COR). This is followed by referrals from other programs of the Innovation Synergy Center (ISCM) (18.0%) and general media (12.7%). Governmental organizations referred 6.6% to the Network, while various consultants referred 3.5% of the total population of firms. Not all firms that are referred to the Network actually go into its advising program; rather, only 101 of 228 (44.3%) became part of the program. Firms might not receive services for two reasons: some are not selected, others chose not to partake.

Of those firms that did receive services, the median firm had 20.5 hours of assistance from advisors in the investment network. One firm had received almost 125 hours of advisor time. Most firms had one advisor, although one firm had 6 advisors and the average number of advisors per firm was 1.277. A priori it is difficult to assess whether a team of advisors facilitates greater benefits for the firm. One benefit is that teams of advisors can discuss what works and does not work for the firm. Further, different advisors can bring different sets of skills and provide different potential contacts and alliances for the firm. On the other hand, it is possible that the advice relayed might provide mixed signals and be a distraction. Note that the median advisor had 10 portfolio companies, while one advisor had just one firm and another had 18 firms.¹

The Investment Network groups firms into different stages of development. Of the 228 potential firms, as at June 2009 there were 127 that were referred elsewhere, 47 that were assisted non-financially (a classification given to firms that did not attract outside financing at the time of data collection), 17 were closed after assisted financially, 7 were about to be closed as the

¹ In our empirical tests below we considered controlling for the number of firms per advisor (with the idea that there are potential complementarities in advisor support across firms but diminished time; see Kannianen and Keuschnigg, 2003, 2004; Keuschnigg, 2004), but this variable was immaterial to any of our analyses. We believe the exact number of hours is a much more precise statistic for value-added.

advisor(s) could not assist the firm further, 17 were in the investment readiness stage and getting ready to seek financing, and 13 were actively seeking financing. It is noteworthy that 73.3% of the 101 firms in the Investment Network had a product before entering the program.

Of the firms that were in the Investment Network, 57.4% had international work experience. Many of the firms' top management team were of international origin representing regions that include China (3%), Israel (5%), Romania (2%), the Caribbean (3%), the Middle East (6.9%), and India (4%). As well, many of the top management team had advanced degrees, including MBAs (8.9%), law (1%), MSc or MEng (3%), other Master's (3%), PhD (3%), professional Engineers (5%), and professional MD or Dental degrees (2%). The average (median) age of the founders was 44 (45), with the range from 22 to 62.

The firms in the Investment Network are ranked by the coordinators of the program at the start of the mentoring process for their: "coachability" (the extent to which the personality of the top management team is open to suggestions) and business acumen (the extent to which the top management team understands markets and running a firm). These rankings are done on a 1-5 scale, with 1 being the lowest and 5 being the highest. The average coachability ranking was 3.074, median ranking was 3, and there was a full range of rankings from 1 – 5. Similarly, the average business acumen ranking was 2.748, median 3, and there was a full range of rankings from 1 – 5. The size of the top management teams ranges from 1 – 4, with the average 1.653 and median was 1.

With firms entering the Investment Network between 2007-Q1 and 2009-Q2, there are significant differences in market conditions over the period examined. The decision to enter the program may be influenced by market conditions, and the performance during the tenure in the program may be enhanced by changes in market conditions. As such, we account for market conditions with the Morgan Stanley Capital International (MSCI) index for Canadian markets for the quarter prior to firms entering the program, as well as for the period over which the firms are in the program.

3.3 Summary Statistics

Table 2 presents summary statistics for our four main hypotheses. We present statistics for advisor hours above and below a cutoff of 20 (approximately at the median number of hours spent per firm). The data indicate both average and sales are higher when advisor hours are above 20. That is, there is an average (median) increase of sale by 106.7% (72.3%) for advisor hours above 20, and an increase by 360.9% (35.4%) for advisor hours below 20. Note, however, that while these differences are large, and in particular for the case of average values driven by a few outliers.

[Insert Table 2 About Here]

Table 2 shows further differences in angel equity finance, patents and strategic alliances depending on whether the firm received more or less than 20 hours of advisor support. Seventy five percent of firms have or are actively applying for angel equity when they have more than 20 hours advisor time, compared to only 58.3% of firms with less than 20 hours. This difference is significant at the 10% level. Eighty nine percent of firms have or are applying for patents among those with more than 20 hours of advisor time, compared with 54.2% of firms with less than 20 hours, and this difference is significant at the 1% level. Finally, firms with more than 20 hours advisor time are more likely to have strategic alliances: 47.2% have strategic alliances with more than 20 hours, compared to 37.5% with less than 20 hours; however, this difference is not statistically significant. These statistics are suggestive that advisor hours are important for entrepreneurial development in terms of sales growth, and obtaining patents, angel equity finance and strategic alliances.

Table 3 presents a correlation matrix for the main variables used in the multivariate tests provided in the next section. The correlations are consistent with the comparison tests in Table 2

discussed above. The next section explores these relationships further in a multivariate context and with consideration to collinearity and causality issues, among other things.

[Insert Table 3 About Here]

4. Regression Analyses

4.1. Impact on Sales

Table 4 presents regression analyses of the impact of advisor hours on the percentage change in sales from 2008 to 2009. Four different models are presented to show robustness in terms of statistical and economic significance to different specifications. Model 1 comprises three steps. The first step (Model 1A) uses a logit regression to assess whether the firm is in the Investment Network advisor program, which is modelled as a function of the different sources of referral as well as market conditions. This regression is based on the population of 228 potential firms. The second step (Model 1B) involves a Heckman (1976, 1979) selection correction regression for the total number of hours that the advisor spent with the firm. That is, the regression takes into account the non-randomness of the firm in the program in assessing how many hours the advisor decides to spend with the firm. The third step is a Heckman (1976, 1979) selection regression for the change in sales based on the non-randomness of the firm being in the program, as well as the endogeneity of advisor hours. Fitted values from Model 1B are used instead of the actual advisor hours. Model 2 is a regression that is completely analogous to Model 1C, but does not account for the non-randomness of the firm being in the Investment Network, and does not account for possible endogeneity of the advisor hours vis-à-vis sales.

Model 3 in Table 4 comprises two steps. The first step (Model 3A) is a tobit regression that explains total advisor hours, similar to Model 1B, but with a greater number of explanatory variables. We use Tobit regressions because the dependent variable is bounded below by zero,

and the dependent variable is equal to or close to zero for some of the firms that just signed up into the program at the time of data collection (and hence the dependent variable is not observed or not fully observed); regardless, OLS estimates are quite similar. The second step (Model 3B) explains sales using fitted value of the Model 3A regression instead of actual hours. Finally, Model 4 is a tobit regression that does not account for possible endogeneity of advisor hours. We use tobit regressions to explain the percentage change in sales because the percentage change is bounded and not observed for firms that did not have any sales in the prior year (but again, OLS regressions were considered and the results are quite similar). Note as well that we considered other specifications not explicitly presented but available on request. We found the statistical significance of results pertaining to the effect of hours on sales to be quite robust to alternative specifications, albeit with some changes in economic significance (the size of the coefficients), as illustrated by the results presented.

In all of our specifications we model the effect of hours with the use of logs. This specification accounts for the fact that the marginal impact of hours on entrepreneurial diminishes as there are more hours of advice. Various model specification criteria suggested this logarithmic specification was appropriate for the data. We note that while the use of logs impacted the economic significance of the coefficient estimates, the results reported below were robust and not impacted in terms of their statistical significance.

[Insert Table 4 About Here]

Importantly, all model specifications in Table 4 show a positive association between advisor hours and increases in sales, and this effect is always significant at the 5% level in all specifications. Note further that the economic significance is lower when we do not account for endogeneity and sample selection (Models 2 and 4). In Model 1C, an additional hour gives rise to a positive change in sales by 13.3% for a move from 10 to 11 hours, while a move from 20 to

21 hours increases sales by 6.8%. The economic significance is slightly higher in Models 1D and Model 3B, but slightly in Model 2 and 4 where there are no controls for endogeneity or sample selection. Hence, regardless of whether there are controls for endogeneity or sample selection, there is a substantial improvement in sales created by advisory through an Investment Network. The importance of this result is highlighted by the fact that, from a public policy perspective, advice plus allocation of program costs per hour costs the public \$80. Further, note that advisor hours are the most robust and economically significant variable affecting sales.

We note that in other specifications considered but not explicitly presented in Table 4, we considered various interaction terms with advisor hours and other variables that reflect the potential learning capacity of a young firm, such as age, size of top management team and business acumen. These interaction terms were statistically insignificant. The data do not reveal moderating factors pertinent to the relationship between advisor hours and sales.

The control regressions in the models in Table 4 provide some further interesting insights into firms in terms of how they become part of an Investment Network, as well as how much support they receive. First, note that from Model 1A, firms are more likely to seek assistance from a publicly funded investment network in times of worse economic conditions. A 1-standard deviation increase in quarterly stock returns lowers the probability that a firm will join the Investment Network by 10%. By contrast, if the firm is referred to the network by the Network's coordinators or a governmental organization then the probability that the firm becomes part of the Investment Network by 56% and 35%, respectively.

Also, it is worth pointing out that the total number of hours that advisors spend with the firm is negatively associated with market conditions in both Models 1B and 3A. An increase in market conditions by one standard deviation reduces the total number of hours by approximately 9-11, depending on the model specification.² Model 3A further shows advisor hours are greater

² This finding is robust when we include controls for the number of quarters that the firm has been in the

for referrals from the coordinators and government organizations, when there are more advisors, and when firms are at an earlier stage of development (in the investment readiness phase). Note as well that entrepreneurs of Middle East origin receive on average 15.5 more hours of advice, and entrepreneurs with a Masters degree receive on average 20 more hours of advice, while females receive on average 16 fewer hours advice, all else being equal.³ Finally, note that more advice is provided to firms with higher rankings in terms of coachability and business acumen, while less advice is provided to firms with more people that are part of the top management team.

In sum, the primary finding from Table 4 is that the data strongly support Hypothesis 1. Mentor hours are consistently positively associated with a greater percentage change in sales. This result holds for all specifications regardless of whether controls are included for endogeneity and/or Heckman-sample selection corrections.

4.2. Impact on Patents, Angel Finance and Alliances

Table 5 presents analyses of the effect of advisor hours on patents, angel finance and alliances. As in Table 4, we consider the possibility of endogeneity of hours with two-step regressions, using Model 3B from Table 4.⁴ We do not report sample selection regressions for reasons of conciseness, but such specifications are available on request. The results are robust to a wide range of different specifications.

[Insert Table 5 About Here]

Investment Network program.

³ There are different interpretations of this statistic. It may be that female top management teams needed less advice, or they were afforded less advice. Our interest is not in measuring the possibility of bias in terms of a mismatch between needs and services provided; rather, we simply control for factors correlated with advice provided to control for possible endogeneity of hours vis-à-vis sales.

⁴ We considered specifications of the first step hours regression that likewise included sample selection corrections as in Table 4 Model 1, but the results were not materially different.

Table 5 Model 5 shows, accounting for the possible endogeneity of hours spent, that hours do not statistically increase the probability of patents. Without controlling for endogeneity (as in Model 6), there is a statistical association between hours and patents which is significant at the 5% level of significance. In Model 6 a move from 10 to 11 hours increases the probability of patents by 0.6%, while a move from 20 to 21 hours increases the probability of patents by 0.3%. Overall, therefore, the data do not offer strong support for Hypothesis 2; rather, the results depend on whether or not there are controls for endogeneity. That is, causality from mentor hours to patents is not unambiguous. Note as well in Models 5 and 6 that patents are more likely for firms with a product before entering the program, as well as firms with older founders, higher business acumen rankings, and firms with smaller top management teams (the latter result is significant in Model 6 only).

Models 7 and 8 show advisor hours positively influences angel financing, and this effect is significant at the 5% and 1% levels, respectively. In Model 7 (accounting for endogeneity) a move from 10-11 hours increases the probability of angel financing by 0.7%, and a move from 20 to 21 hours increases the probability of angel financing by 0.4%. In Model 8 (not controlling for endogeneity) the economic significance is 0.6% for a move from 10 to 11 hours and 0.3% for a move from 20 to 21 hours. Overall, this provides very strong support for Hypothesis 3: mentor hours significantly affect the probability of angel finance. The only other variable associated with angel finance is the control variable for the software industry.

Further to Models 7 and 8, we note that in other specifications considered but not explicitly presented (although available on request), we considered interaction terms between advisor hours and proxies for the learning capacity of a young firm, such as age, size of top management team and business acumen. The data revealed one significant (at the 10% level) coefficient for an interaction term for hours and business acumen (and inclusion/exclusion of this term does not materially impact any other variables reported in Table 5), but other potential

moderating factors were statistically insignificant. The size of the interaction term is such that a 1-point reduction in the acumen ranking reduces the strength of the relation between hours and obtaining equity financing by approximately 10%. Business acumen therefore is statistically and economically important for enabling advisors to facilitate advice towards obtaining financing.

Models 9 and 10 show a positive association between hours and obtaining a strategic alliance, but the effect is statistically significant in Model 10 only (at the 5% level), and insignificant in Model 9 with controls for endogeneity. Model 10 shows an increase in the probability of an alliance by 0.6% for a move from 10 to 11 hours and 0.3% for a move from 20 to 21 hours. But this effect is not robust to controls for endogeneity of mentor hours, thereby only offering weak support for Hypothesis 4. Also, it is noteworthy in Models 9 and 10 that alliances are less likely for firms with top management from the Middle East, but more likely with firms older top management teams and firms founders with higher rankings for business acumen.

5. Limitations and Extensions

This paper provided a unique analysis of the impact of publicly funded business advisory hubs on entrepreneurial outcomes in terms of changes in sales, attracting angel finance, and obtaining patents and alliances. Data were considered for 228 firms, of which 101 made use of the advisory hub's services. The data enabled analyses of endogeneity of mentor hours to entrepreneurial outcomes as well as an assessment of the non-random matching of the entrepreneurial firm to the center.

The data in this paper are both its primary strength and its primary weakness. Since few organizations of this kind devote energy to preliminary data collection and ongoing record keeping, we are fortunate to have the data we do. However, finer grained data (for example on organizational capabilities, specifically related to the organizational competencies and practices

in place prior to the firms' engagement with advisors) would allow for more sophisticated theoretical contributions and potentially for more nuanced practical contributions.

Comparative data with other programs would also help with verification and replications of the findings here. However our efforts to obtain comparable data from other publicly business advisory centers have to date been unsuccessful. Record keeping is not consistent and statistics are not readily available. This is unfortunate, as it does not enable effective analysis of the utility of public expenditures. Our hope is that the analyses herein will encourage other centers to keep more accurate records of activities and entrepreneurial outcomes so that costs and benefits may be assessed in centers located elsewhere.

6. Implications and Conclusions

At a theoretical level, this paper provides support for the perspective that has emerged within the dynamic capabilities literature which holds that for firms to effectively integrate externally provided knowledge resources into new capabilities, they need extended exposure to those resources (e.g. Anand and Khanna 2000; Ethiraj et al 2005). In comparison with prior studies that have focused primarily on large established firms, ours provides evidence in the context of very small, relatively young entrepreneurial firms; this exploration of the premises of the dynamic capabilities perspective in a novel context constitutes a theoretical contribution of our paper (cf. Bamberger 2008). It is also of theoretical interest that, in this context, we found no evidence that those resources the firms possessed prior to their engagement with external knowledge providers mattered to their ability to acquire resources, since in other context moderators of capability acquisition have been found (Capron and Mitchell 2009). In our study, none of the resource measures available (age, size of top management team, business acumen and coachability) moderated the impact of duration of exposure on the firm level outcomes of interest. We speculate, however, that if we had more fine-grained and relevant measures of extant resources we might find that some types of a priori resources do moderate the relationship

between duration of exposure to knowledge based resources and organizational outcomes. For example, the capabilities possessed by owners with prior founding experience (cf Hsu 2007) might moderate the focal relationship in this context.

This paper provides an empirical assessment of the impact of publicly funded business advisory hubs on entrepreneurial outcomes. Advising is a potentially cost effective means of bringing about entrepreneurial outcomes when firms with high growth and innovation intentions are targeted. Indeed, for the Investment Network program based in Ontario, we noted that as at June 2009 early-stage entrepreneurial firms had raised \$6,545,000 in financing, while the program costs were totaled at \$662,360, thereby giving a ratio of financing raised per dollar of cost at only \$0.10. From a public policy perspective, therefore, the program is arguably highly efficient and cost effective in term of the costs incurred relative to the financing obtained by client firms.

Our empirical analyses showed that advising hours significantly and positively impact sales and financing, regardless of econometric controls for sample selection and endogeneity. Further, there was a positive association between hours and patents and alliances, but the causality was more ambiguous.

This paper has both theoretical and practical implications. From a theoretical perspective, it offers support to the view that firms with pre-existing resource profiles that give them growth potential can dynamically integrate new knowledge provided through advising. Moreover, within the restricted range of hours that are represented in the data in this study, it appears that “more is better.” That is, high potential firms that receive more advising to better in terms of sales growth and access to financing, *ceteris paribus*. The theoretical implications reinforce and extend our understanding of dynamic capabilities are acquired by young and small firms.

At a practical level, this paper suggests it is reasonable to pursue publicly funded program that selectively support firms with high growth potential. Investments in advising and

coaching customized to the needs of these firms seems likely to yield benefits to the firms themselves and thereby to the economies in which the firms operate. Caveats, of course, are warranted. Beyond some threshold level, it is likely that greater levels of advising will not yield greater benefits. Moreover, the quality of the advising is obviously of importance, and the likelihood of positive impact is a function of the advisors capabilities as well as the learning capacity of the firm receiving advice. With these cautions in mind, there is reason for optimism that publicly funded advisory services can benefit entrepreneurially oriented firms.

Future research that corroborates or qualifies these findings is of course warranted, and we conclude this paper with a call for attention to record keeping and outcome monitoring. The Network studied here devoted considerable energy to these activities and unless other advising programs do likewise it will not be possible to fully investigate this important phenomenon.

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Table 1. Variable Definitions and Summary Statistics

This table defines the variables in the paper and presents summary statistics. The sample comprises 228 entrepreneurial firms that were in contact with the Innovation Center's Program between 2006-Q4 and 2009-Q2, of which 101 went through the Innovation Center's mentoring process.

Variable	Definition	Mean	Median	Std.Dev.	Minimum	Maximum	Number of Observations
<u>Dependent Variables</u>							
Sales 08/09	The percentage change in sales from 2008 to 2009, based on the most recent 12 month financial information as at 06/2009	101.04	0.00	498.51	-100.00	490.00	101
Angel Equity	A dummy variable equal to 1 for firms that are either actively seeking equity capital from an angel investor, or have been successful from obtaining angel capital from an equity investor, as at 06/2009	0.723	1	0.450	0	1	101
Patents	A dummy variable equal to 1 for firms that have applied for and/or obtained a patent as at 06/2009	0.673	1	0.471	0	1	101
Strategic Alliances	A dummy variable equal to 1 if the firm has developed strategic alliances at at 06/2009	0.426	0	0.497	0	1	101
<u>Variables Affecting Whether the Firm is in the Investment Network</u>							
Referral Consultant	A dummy variable equal to 1 for firms that came into contact with innovation center through a referral from a professional consultant	0.035	0	0.184	0	1	228
Referral COR	A dummy variable equal to 1 for firms that came into contact with innovation center through a referral from the COR	0.351	0	0.478	0	1	228
Referral Government Organization	A dummy variable equal to 1 for firms that came into contact with innovation center through a referral from a governmental organization	0.066	0	0.248	0	1	228
Referral ISCM	A dummy variable equal to 1 for firms that came into contact with innovation center through a referral from the Innovation Synergy Center at Markham	0.180	0	0.385	0	1	228
Referral Media	A dummy variable equal to 1 for firms that came into contact with innovation center through awareness from media	0.127	0	0.334	0	1	228
<u>Value Added Provided by Advisors</u>							
Total Hours	The total number of hours spent by advisors with aiding the firm.	29.082	20.500	26.949	1	124.583	101
Number of Advisors	The number of different advisors that worked with the firm.	1.277	1	0.709	1	6	101
<u>Firm Characteristics</u>							
Year of Incorporation	The year in which the firm was incorporated	2003.960	2005	5.059	1985	2009	101
Software Industry	A dummy variable equity to 1 for firms in the software industry	0.446	0	0.500	0	1	101
Telecommunications Industry	A dummy variable equity to 1 for firms in the telecommunications industry	0.020	0	0.140	0	1	101
Electronic Industry	A dummy variable equity to 1 for firms in the electronics industry	0.099	0	0.300	0	1	101

Table 1 continues on the following page

Table 1. Continued

Variable	Definition	Mean	Median	Std.Dev.	Minimum	Maximum	Number of Observations
Financing Discussion Stage	A dummy variable equal to 1 for firms in the mentoring program stage of financing discussions where the firm is seeking external capital	0.057	0	0.232	0	1	228
Investment Readiness Preparation Stage	A dummy variable equal to 1 for firms in the mentoring program stage of investment readiness preparation where the firm is preparing itself for seeking external finance	0.075	0	0.263	0	1	228
To be Closed Stage	A dummy variable equal to 1 for firms in the mentoring program stage of to be closed - advisor(s) cannot assist firm further	0.031	0	0.173	0	1	228
Closed - Financed Stage	A dummy variable equal to 1 for firms in the mentoring program stage of achieved financing	0.075	0	0.263	0	1	228
Closed - Non-Financial Stage	A dummy variable equal to 1 for firms in the mentoring program stage of non-financial assistance	0.206	0	0.405	0	1	228
Product Before Program	A dummy variable equal to 1 if the firm had a product before entering the program	0.733	1	0.445	0	1	101
<u>Top Management Team (TMT) Characteristics</u>							
TMT International Experience	A dummy variable equal to one if the founders have international work experience	0.574	1	0.497	0	1	101
TMT China	A dummy variable equal to 1 for founders from China	0.030	0	0.171	0	1	101
TMT Israel	A dummy variable equal to 1 for founders from Israel	0.050	0	0.218	0	1	101
TMT Romania	A dummy variable equal to 1 for founders from Romania	0.020	0	0.140	0	1	101
TMT Caribbean	A dummy variable equal to 1 for founders from Caribbean	0.030	0	0.171	0	1	101
TMT Middle East	A dummy variable equal to 1 for founders from the Middle East	0.069	0	0.255	0	1	101
TMT India	A dummy variable equal to 1 for founders from India	0.040	0	0.196	0	1	101
TMT MBA	A dummy variable equal to 1 for founders with an MBA	0.089	0	0.286	0	1	101
TMT Law	A dummy variable equal to 1 for founders with a law degree	0.010	0	0.100	0	1	101
TMT MSc or MEng	A dummy variable equal to 1 for founders with a MSc or MEng degree	0.030	0	0.171	0	1	101
TMT Masters - Other	A dummy variable equal to 1 for founders with a Masters degree in a field other than business, science or engineering	0.030	0	0.171	0	1	101
TMT Professional Engineer	A dummy variable equal to 1 for founders with a professional engineering designation	0.050	0	0.218	0	1	101
TMT PhD	A dummy variable equal to 1 for founders with a PhD	0.030	0	0.171	0	1	101
TMT MD or Dentist	A dummy variable equal to 1 for founders with a medical or dental professional degree	0.020	0	0.140	0	1	101
TMT Female	A dummy variable equal to 1 if the founder is female	0.238	0	0.428	0	1	101
TMT Age	The average age of the founders	44.248	45	10.383	22	62	101
TMT Coachable Ranking Start	A Ranking Variable (1- lowest, 5 Highest) for the extent to which the TMT was coachable at the start of entering the advisor program	3.074	3	0.912	1	5	101
TMT Business Acumen Ranking Start	A Ranking Variable (1- lowest, 5 Highest) for the extent to which the TMT had business acumen at the start of entering the advisor program	2.748	3	1.108	1	5	101
Number of TMT	The number of people in the firm considered in the TMT	1.653	1	0.842	1	4	101
<u>Market Conditions</u>							
MSCI Index - Current	The return in the MSCI index from the date at which the firm entered the advisor program to 06/2009	-0.122	-0.177	0.259	-0.358	0.297	101
MSCI Index - Lagged	The return in the MSCI index over the quarter before the firm entered the advisor program	-0.069	-0.006	0.173	-0.336	0.144	101

Table 2. Comparison Tests

This table presents comparison of means and medians tests for high (>20) versus (<20) number of hours that the advisor(s) spent with the firm. Percentage changes for sales are for the subset of firms (48 in total) that had sales in 2008. Variables are defined in Table 1. P-value presented for the median test. *, **, *** Significant at the 10%, 5% and 1% levels, respectively.

Variable	<u>Advisors >20 hours</u>			<u>Advisors <20 hours</u>			Comparison of Proportions	Comparison of Means	Comparison of Medians
	Number of Observations	Mean	Median	Number of Observations	Mean	Median			
Sales 08/09	28	106.674	72.321	20	360.915	35.417		-104.282***	P<=0.000***
Angel Equity	53	0.755	1	48	0.583	1	1.834*		
Patents	53	0.887	1	48	0.542	1	3.870***		
Strategic Alliances	53	0.472	0	48	0.375	0	0.981		

Table 3. Correlation Matrix

This table presents correlations for selected variables in the data. Variables are defined in Table 1. Correlations greater than 0.17, 0.21 and 0.25 in absolute value are significant at the 10%, 5% and 1% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)		
(1) Sales 08/09	1.00																								
(2) Angel Equity	-0.12	1.00																							
(3) Patents	0.11	0.23	1.00																						
(4) Strategic Alliances	0.16	0.13	-0.05	1.00																					
(5) Referral Consultant	-0.15	-0.05	-0.07	-0.12	1.00																				
(6) Referral COR	0.10	0.03	-0.21	0.01	-0.18	1.00																			
(7) Referral Government Organization	-0.00	0.13	0.02	0.12	-0.04	-0.38	1.00																		
(8) Total Hours	-0.01	0.20	0.32	0.14	-0.09	0.06	0.07	1.00																	
(9) Number of Advisors	-0.04	0.03	0.18	0.12	-0.06	-0.10	0.20	0.31	1.00																
(10) Year of Incorporation	0.01	-0.11	-0.13	-0.11	0.10	-0.01	-0.06	-0.11	0.03	1.00															
(11) Financing Discussion Stage	0.29	0.08	-0.16	0.03	-0.05	-0.07	0.11	0.14	-0.11	-0.09	1.00														
(12) Investment Readiness	-0.06	-0.08	-0.49	0.09	0.13	0.13	-0.03	-0.37	-0.18	0.03	-0.17	1.00													
(13) Preparation Stage To be Closed Stage	-0.06	-0.06	-0.18	0.00	-0.04	0.05	0.06	-0.13	-0.11	0.16	-0.10	-0.12	1.00												
(14) Closed - Financed Stage	0.01	0.09	0.10	-0.01	-0.06	0.19	-0.13	0.20	0.09	0.00	-0.17	-0.20	-0.12	1.00											
(15) Product Before Program TMT		0.25	0.33	-0.16	0.09	0.04	-0.07	0.18	-0.05	-0.21	0.03	-0.15	-0.19	0.21	1.00										
(16) International Experience	-0.07	0.08	-0.04	0.13	-0.17	0.12	-0.12	0.04	-0.12	-0.09	0.21	0.12	0.00	-0.09	-0.11	1.00									
(17) TMT MBA	0.02	-0.08	-0.12	0.08	-0.04	0.03	0.17	-0.05	0.12	-0.07	0.19	0.14	-0.09	-0.05	0.03	0.13	1.00								
(18) TMT Professional Engineer		0.06	-0.06	-0.01	-0.03	-0.01	-0.07	-0.17	-0.09	-0.02	-0.09	0.26	-0.06	-0.10	-0.07	0.10	-0.07	1.00							
(19) TMT Female	-0.05	-0.06	0.09	-0.01	0.09	0.00	-0.08	-0.05	0.01	-0.09	-0.01	-0.13	0.03	0.06	0.07	-0.04	-0.09	-0.02	1.00						
(20) TMT Age	0.03	0.29	0.03	0.23	0.06	-0.08	0.02	0.09	0.03	-0.24	0.09	0.06	-0.04	-0.24	-0.04	0.14	-0.22	0.04	-0.04	1.00					
(21) Number of TMT	0.06	-0.09	0.06	0.21	-0.11	0.04	-0.10	0.17	0.06	-0.10	0.02	-0.04	-0.07	0.09	-0.01	0.22	0.21	-0.07	0.29	-0.07	1.00				
(22) TMT Coachable Ranking Start	-0.01	0.05	0.09	-0.05	-0.01	0.00	0.06	0.06	-0.01	0.16	0.10	-0.01	0.15	0.15	-0.11	0.08	-0.04	0.03	0.03	-0.18	-0.12	1.00			
(23) TMT Business Acumen Ranking Start	-0.04	0.34	0.06	0.11	-0.03	0.08	0.13	-0.20	-0.04	0.17	-0.03	0.07	0.17	0.10	-0.13	0.24	0.10	0.01	-0.06	0.01	0.06	0.47	1.00		
(24) MSCI Index - Current	-0.19	-0.19	-0.28	0.05	0.05	0.05	0.02	-0.49	-0.19	0.13	-0.05	0.49	0.13	-0.25	-0.19	0.00	0.12	0.14	-0.16	-0.10	-0.13	0.03	0.07		

Table 4. Regression Analyses of Impact on Sales

This table presents regression analyses of the impact of total mentor hours on the percentage change in sales. Model 1 Parts A, B and C involves controls for sample selection and endogeneity before the analysis of sales. Model 1A is a logit analysis of whether the firm entered the mentor program, subject to different referral sources and market conditions. Model 1B is a sample selection regression considering the non-randomness of entering the Mentor Program, explaining the number of hours worked subject to referral sources, firm characteristics and market conditions. Model 1C is a sample selection regression considering the non-randomness of entering the mentor program explaining the impact of the program on sales, controlling for the endogeneity of hours worked using the fitted values from Model 1B. Model 2 shows robustness to not considering sample selection and endogeneity but rather a non-adjusted specification explaining sales analogous to Model 1C. Model 3 Parts A and B consider a more complete specification of variables explaining the affect on sales while controlling for endogeneity. Model 4 is analogous to Model 3B but without controls for endogeneity to show robustness. Models 1D, 2, 3B and 4 exclude observations where sales in 2008 were 0, while Model 1C uses 0 for the percentage change for those observations. Variables are defined in Table 1. *, **, *** Significant at the 10%, 5% and 1% levels, respectively.

	Model 1A		Model 1B		Model 1C		Model 1D		Model 2		Model 3A		Model 3B		Model 4	
	Logit		Heckman Selection		Heckman Selection and Instrumental Variables		Heckman Selection and Instrumental Variables (Excluding Sales in 2008=0)		Tobit (Excluding Sales in 2008=0)		Tobit		Tobit and Instrumental Variables		Tobit	
	In the Mentor Program?		Total Hours		Sales 08/09		Sales 08/09		Sales 08/09		Total hours		Sales 08/09		Sales 08/09	
	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic
Constant	-1.335	5.945***	441.399	0.468	-65.491	-0.333	-288.783	-0.829	-319.652	-0.692	-442.139	-0.454	-296.707	-0.622	-321.805	-0.653
<u>Variables Affecting Whether the Firm is in the Innovation Network</u>																
Referral Consultant	0.427	0.498	-2.218	-0.130							5.200	0.306				
Referral CVM	2.527	7.177***	-5.234	-0.191							12.962	2.414**				
Referral Government Organization	1.507	2.628***	5.396	0.285							19.723	2.054**				
<u>Value Added Provided by Mentors</u>																
Log of Total Hours (Fitted Values from 1st Stage Regression)					3.211	2.236**	5.734	2.337**					4.084	2.268**		
Log of Total Hours									2.270	1.965**					2.367	2.003**
Number of Mentors											6.109	1.870*	-1.098	-0.490	-0.415	-0.186
<u>Firm Characteristics</u>																
Year of Incorporation			-0.202	-0.432	0.028	0.288	0.136	0.786	0.158	0.683	0.208	0.429	0.147	0.619	0.160	0.654
Software Industry					-0.433	-0.422	-0.967	-0.472	0.222	0.085	0.064	0.013	-0.498	-0.183	0.218	0.079
Electronic Industry					-0.734	-0.438	-2.468	-0.821	1.010	0.283	-5.001	-0.557	-0.484	-0.122	0.917	0.230
Financing Discussion Stage			6.333	0.901							2.653	0.333				
Investment Readiness Preparation Stage			-12.438	-1.611							-21.191	-2.386**				
To be Closed Stage			-11.801	-1.221							-4.492	-0.517				
Closed - Financed Stage			5.117	0.771							4.632	0.732				
Product Before Program											5.318	0.923				

Table 4 Continues on the following page

Table 4. Continued

	Model 1A		Model 1B		Model 1C		Model 1D		Model 2		Model 3A		Model 3B		Model 4	
	Logit		Heckman Selection		Heckman Selection and Instrumental Variables		Heckman Selection and Instrumental Variables (Excluding Sales in 2008=0)		Tobit (Excluding Sales in 2008=0)		Tobit		Tobit and Instrumental Variables		Tobit	
	In the Mentor Program?		Total Hours		Sales 08/09		Sales 08/09		Sales 08/09		Total hours		Sales 08/09		Sales 08/09	
	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic
<u>Top Management Team (TMT) Characteristics</u>																
TMT International Experience													-1.789	-0.660	-3.034	-1.108
TMT China										4.390	0.303					
TMT Israel										2.793	0.265					
TMT Romania										-11.139	-0.750					
TMT Carribean										20.231	1.387					
TMT Middle East										16.790	1.950*					
TMT India										-5.624	-0.520					
TMT MBA										-10.205	-1.037					
TMT Law										10.013	0.464					
TMT MSc or MEng										18.648	1.263					
TMT Masters - Other										21.629	1.644*					
TMT Professional Engineer										-10.099	-0.885					
TMT PhD										-10.387	-0.564					
TMT MD or Dentist										12.085	0.755					
TMT Female										-17.308	-2.964***	1.722	0.521	-0.086	-0.028	
TMT Age										0.346	1.363	0.039	0.294	0.050	0.371	
TMT Coachable Ranking Start										9.430	3.290***	-3.434	-1.838*	-1.950	-1.137	
TMT Business Accumen Ranking Start										8.211	2.488**	1.856	1.201	0.586	0.410	
Number of TMT										-8.745	-3.428***	-0.569	-0.334	0.357	0.215	
<u>Market Conditions</u>																
MSCI Index - Current			-43.979	2.847***	8.243	2.361**	19.053	2.632***	14.231	2.066**	-33.254	-3.086***	17.505	2.322**	14.430	2.033**
MSCI Index - Lagged	-2.338	2.263**														
Lambda			-14.548	-0.511	-0.149	-0.125	1.155	0.470								
# observations	228		101		101		48		48		101		48		48	
Adjusted R ² (Pseudo for Logit) (ANOVA for Tobit)	0.233		0.233		0.013		0.044		0.011		0.348		0.264		0.259	
Chi-Square (LM test for Tobit)			4.03***		14.85**		16.30**				44.221***		99.164***		92.709***	

Table 5. Regression Analyses of Impact on Patents, Angel Equity and Alliances

This table presents regression analyses of the impact of total advisor hours on patents (Models 5 and 6), angel equity finance (Models 7 and 8) and alliances (Models 9 and 10). Models 5, 7 and 9 used instrumental variables from Model 3A (Table 4) and fitted values for total hours; Models 6, 8 and 10 present respective robustness checks without the use of instruments. Variables are defined in Table 1. *, **, *** Significant at the 10%, 5% and 1% levels, respectively.

	Model 5		Model 6		Model 7		Model 8		Model 9		Model 10	
	Logit and Instrumental Variables Patents		Logit Patents		Logit and Instrumental Variables Angel Equity		Logit Angel Equity		Logit and Instrumental Variables Alliances		Logit Alliances	
	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic
Constant	25.832	0.208	45.260	0.345	161.900	1.339	186.693	1.462	92.570	0.864	93.090	0.871
<u>Value Added Provided by Advisors</u>												
Log Total Hours (Fitted Values from 1st Stage Regression)	-0.095	-0.171			1.095	2.172**			0.331	0.746		
Log Total Hours			0.891	2.024**			0.947	2.723***			0.576	1.772*
Number of Advisors	0.381	0.751	0.121	0.239	1.119	1.270	1.368	1.507	0.949	1.687*	0.935	1.613
<u>Firm Characteristics</u>												
Year of Incorporation	-0.017	-0.269	-0.027	-0.414	-0.085	-1.401	-0.097	-1.519	-0.049	-0.917	-0.050	-0.931
Software Industry	0.267	0.384	0.457	0.627	1.427	1.901*	1.629	2.092**	0.168	0.277	0.221	0.360
Electronic Industry	-0.608	-0.463	-0.906	-0.702	0.095	0.082	-0.070	-0.061	-1.022	-0.973	-1.160	-1.069
Product Before Program	2.470	2.779***	2.243	2.493**	1.177	1.799*	1.373	2.039**	-0.467	-0.751	-0.516	-0.829
<u>Top Management Team (TMT) Characteristics</u>												
TMT International Experience	0.505	0.669	0.716	0.912	-0.078	-0.114	-0.066	-0.094	0.827	1.362	0.814	1.352
TMT China	1.589	0.673	0.411	0.123					2.215	1.274	2.069	1.175
TMT Israel					0.857	0.642	0.832	0.632	-1.986	-1.504	-2.062	-1.526
TMT Middle East	-1.065	-0.778	-1.567	-1.180					-2.935	-2.038**	-3.097	-2.118**
TMT MBA	-1.114	-0.850	0.353	0.217	-0.663	-0.568	-0.559	-0.455	-0.145	-0.133	0.314	0.258
TMT Masters - Other	-1.815	-1.139	-2.544	-1.387	-2.415	-1.284	-2.342	-1.047	2.383	1.101	2.491	1.088
TMT Professional Engineer	1.448	0.801	1.982	1.276	1.495	1.018	1.059	0.854	-0.320	-0.257	-0.103	-0.088
TMT Female	0.033	0.041	0.690	0.811	0.679	0.841	0.575	0.685	-0.429	-0.660	-0.355	-0.572
TMT Age	0.087	2.501**	0.087	2.522**	0.015	0.488	0.014	0.438	0.054	1.849*	0.057	1.952*
TMT Coachable Ranking Start	-0.329	-0.801	-0.664	-1.508	0.200	0.513	0.225	0.565	-0.316	-0.902	-0.392	-1.133
TMT Business Acumen Ranking Start	1.557	3.430***	1.857	3.779***	0.470	1.374	0.449	1.298	0.547	1.737*	0.623	1.991**
Number of TMT	-0.623	-1.436	-0.950	-2.077**	0.152	0.358	0.254	0.558	0.319	0.894	0.332	0.953
<u>Market Conditions</u>												
MSCI Index - Current	-1.378	-0.736	1.292	0.768	1.891	1.134	1.671	1.164	2.009	1.244	2.788	1.915*
# observations	101		101		101		101		101		101	
Pseudo R ²	0.350		0.388		0.295		0.322		0.209		0.230	
Chi-Square	44.672***		49.447***		35.175***		38.453***		28.812***		31.755***	

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