

Estimating the Scale of Angel Investment Activity in Canada: A Comparative Analysis

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Little data is available about the level of angel investment in Canada, to enable policy decisions and to make comparisons to other jurisdictions. There is a lack of knowledge of the numbers of angel investors, the total investment support provided and the number of ventures that receive investment. This study provides a conservative estimate of Canadian angel activity using a deductive reasoning approach and survey data from both the demand and supply side of equity investment in Canada. A comparative analysis is made against previous estimates, other parts of the entrepreneurship ecosystems, and other jurisdictions.

Keywords: entrepreneurship, start-ups, venture capital, angel investment, entrepreneurial ecosystems

INTRODUCTION

There is increasing academic interest in how entrepreneurial ecosystems foster the creation and development of early stage ventures. While there is no accepted definition of the “entrepreneurial ecosystem”, most efforts are built around a value-chain of resources, from the ideation and networking activities that lead to the birth of new ventures, to the business accelerators incubators (“BAIs”) that feed angel investors (“angels”), to the venture capital (“VC”) funds that fuel the ongoing growth of ventures towards maturity. As Mitra (2008) states “The bulk of the responsibility of early stage investment is shouldered by angels.”

Angel investment is a critical component of the entrepreneurial ecosystem that supports Canadian new ventures. Previous studies (Liu, 2000) have suggested that angel investment may have greater impact on new venture formation and economic development in Canada than the much more frequently publicised investments of VCs. Although it is often suggested that the levels of total investment by Angels and VCs are broadly similar, angels tend to make smaller investments in many more companies than do VCs. For example, in the United States, Entrepreneur Magazine estimated in 2013 that angels invest in 16 times as many startups as do VCs (Entis, 2013) and Mason (2008), drawing on Gaston (1998) and Sohl (2007) claims that Angels are the most important source of equity capital, significantly exceeding the investments of VCs. Thus, their impact on economic development, particularly on employment is likely much higher than that of VC investment. Surprisingly, the impact of angel investment in Canada is unclear, especially when compared to the data available in other jurisdictions such as the United States. Very little is known,

except anecdotally, about the number of angels in Canada, the total investment support they provide and the number of ventures that receive investment. This lack of data is a major concern.

Hechavarria and Ingram (2014) suggest that measures of entrepreneurial activity are very important in evaluating an entrepreneurial ecosystem. Estimates of angel investment activity in Canada should be updated periodically for three reasons. The first is to better assess whether there exists a systemic problem related to the availability of angel investment in Canada. Several federal, provincial and municipal-level policies and initiatives exist to encourage angel investment. Yet, if the scale of angel activity in Canada is not known, then it is not possible to know whether or not there is a problem that requires policy intervention in the first place. Secondly, assuming that a problem related to angel activity does indeed exist, updated estimates on the size of angel activity in Canada are needed to measure the effectiveness of policies and initiatives designed to encourage angel investment. In the absence of such updated estimates, policymakers are left to rely on anecdotal evidence that is prone to confirmation bias and provides, at best, an incomplete picture of the impact of these policies. Finally, periodic estimates are necessary to benchmark changes in Canadian angel investment activity against other parts of the entrepreneurial ecosystem, and other comparable jurisdictions. Comparative analysis can help explain whether changes in angel investment activity are the result of regional conditions or part of cyclical or global economic trends. Clearly, a need exists to better inform public policy with respect to the characteristics, practices, patterns and perspectives of Canadian angel investors.

This study provides updated estimates of the scale and impact of angel investment activity in Canada, using data from Statistics Canada's 2018 Survey on Financing and Growth of Small and Medium Enterprises. The updated estimates are compared to previous estimates to extrapolate the growth in Canadian angel investment activities from 2011 to 2018. These growth rates are contrasted with those of other jurisdictions, and with the growth in BAIs, to offer evidence that Canadian angel activity is keeping pace with other parts of the entrepreneurship ecosystem.

PREVIOUS RESEARCH

This section provides a brief review of the extant literature on the role of risk capital within entrepreneurial ecosystems, the unique nature of angel investment and previous estimates of angel activity in Canada.

Entrepreneurial Ecosystems

Ketikidis et al. (2017) et al claim that entrepreneurship "can only thrive if equipped with a well-developed ecosystem, with coordination between all relevant stakeholders". In recent years, increasing interest has been given to the concept of an entrepreneurial ecosystem, to such an extent that Brown and Mason (2017) has called it "...one of the latest 'fads' in entrepreneurship research".

Spigel and Harrison (2017) defined an entrepreneurial ecosystem as "...a conceptual umbrella for the benefits and resources produced by a cohesive, typically regional, community of entrepreneurs and their supported that help new high-growth ventures form, survive and expand." The term is widely used by policymakers and practitioners to characterize the resources required by new ventures, and the relationships between these resources. However, the concept lacks conceptual rigour and its theoretical development lags behind policy and practical interest (Speigel and Harrison, 2017, Stam, 2015). Stam (2015) further argues that, "the entrepreneurial ecosystem approach speaks directly to practitioners, but its causal depth and evidence base is rather limited." Alvedalen and Boschma (2017) suggested that the concept should further exploit the insights from network theory and should consider the systematic evolution of entrepreneurial ecosystems over time.

Population ecology and resource dependence theories that govern our understanding of natural ecosystems can also inform our understanding of how entrepreneurial ecosystems function. Carroll (1988) described the population ecology theory of organizations as an ecosystem-level process of selection and replacement, based largely an organization's compatibility to the ecosystem. Ventures must compete for financial and human capital much like flora and fauna compete for resources within a natural ecosystem.

The munificence of resources within an ecosystem dictates its carrying capacity - the size of the population it can support (Abernethy, 2001). Hence, the density of ventures that can survive within an entrepreneurship ecosystem is moderated by its resource availability through a dynamic process of venture birth and death (Hannan & Freeman, 1988). An increase in the availability of resources such as investment capital may lead to a temporary increase in the rate of new venture creation. However, the increase in the density of new ventures will create greater competition, making it increasingly difficult for new ventures to obtain the resources they need to survive, causing the population of ventures in the ecosystem to level off (Specht, 1993). Further ecosystems are not equally effective, and methods of assessment are limited.

Resource dependency theory explains the role of interdependence between organizations on the procurement of resources within an ecosystem (Pfeffer and Salancik, 2003). Access to resources such as investment capital may become a basis of power when the resources required by an organization are controlled by other organizations. New ventures compete for access to capital within an ecosystem through a number of stages, with a new set of stakeholders controlling access to these resources at each stage.

Initial investment is often provided by the new venture founders themselves, or by friends and family who invest for non-economic reasons (Grant et al, 2018). In some jurisdictions, new ventures may qualify for government grants, loans or equity-based financing. Promising new ventures may be accepted by business accelerators and incubators (BAIs). In addition to any financial and/or in-kind support they provide, BAIs perform a signalling function within the ecosystem that provides potential investors with information on the quality of new ventures (Plummer et al, 2015).

New ventures with the greatest potential become candidates for equity financing. In most jurisdictions, angel investors are the earliest source of equity financing (Grant et al., 2018) Ventures that perform well using angel investment may receive follow-on financing from a VC firm. VC financing may continue over several investment rounds, and later-stage rounds may involve a mix of equity and debt instruments. A small proportion of ventures that receive equity financing will have a liquidity event that provides a return on investment for angels or VCs, either through an Initial Public Offering or the acquisition of the venture (Rowley, 2017).

Angel Investment

The availability of capital is a critical resource within entrepreneurial ecosystems (Mason and Brown, 2014). Specifically, Mason and Brown state: “Particularly important is a critical mass of seed and start-up investors to provide finance and hands on support.” Angel investors are wealthy individuals who invest their own money in new ventures of their choosing (Lerner, Hardyman et al., 2012). Their investment criteria are highly individualized and, unlike VCs, may include both economic and non-economic criteria (Riding, Madill, & Haines, 2007). Compared to VCs, angels also generally invest in earlier stage ventures. Angels often prefer to invest within industries they know well through their own experience (Grant et al, 2018) As a result, they may provide valuable operational support to new ventures in addition to capital, and may use their professional network to provide access to potential customers or strategic partners.

Angel investment is informal by nature and has traditionally operated with a high-level of discretion, with “lone-wolf” angels investing ad hoc in opportunities presented through their professional networks. Over the last twenty years, an increasing number of angels have been participating in managed groups (Mason, Botelho et al., 2019). Angel networks are membership-based organizations that aim to streamline access to high-potential investment opportunities, share the burden of conducting due diligence, and provide opportunities for networking and collaboration. As a result, angels are increasingly making syndicated investments, with one experienced or knowledgeable angel acting as lead investors, and other angels following suit (Harrison and Mason, 2019). However, many angel investments take place outside of networks and other portals and are inherently difficult, if not impossible, to measure and study (OECD, 2016).

Angel Activity in Canada

The National Angel Capital Organization (NACO) is Canada’s national industry association of angel networks. It reports that in the 10-year period from 2010-2019, its members have invested more than \$1

billion, with a record high of \$163.9 million in 2019 (Mason, 2020). The annual gross value added to the Canadian economy by new ventures funded by NACO-affiliated angels over the 7-year period from 2010 to 2016 is estimated at CDN\$1.7 billion (Grant, Croteau et al., 2019). However, the detailed data provided by NACO is drawn only from its own Angel group members and thus represents only one part of the Canadian Angel community.

Venture capital activity has been extensively studied in many jurisdictions including Canada due to the availability of reliable data sources. In 2019, Canadian VC firms invested \$6.2 billion in 539 ventures, representing an increase of 69% from 2018 (CVCA, 2019). In comparison, the level of angel investment activity in Canada is not well understood. Some observers have suggested the total annual angel investment in Canada might significantly exceed CDN\$1 billion, but the figure has never been substantiated. Kerr, Lerner and Schoar (2010) found that total angel investment is likely greater than total VC investment in many industrialized countries.

NACO is the only organization that tracks angel investment activity in Canada, but its data is restricted to that provided voluntarily by its member angel networks. It remains unclear what proportion of total angel investment in Canada such angel networks represent, let alone what proportion of total investment is represented by angel investment. The most recent estimate of angel activity in Canada was published in 2011 by the Organisation for Economic Co-operation and Development (OECD) using data provided by NACO (Table 1).

TABLE 1
ESTIMATES OF THE ANGEL MARKET AND COMPARISONS WITH VENTURE CAPITAL
(IN MILLIONS USD)

	“Visible” angel market size (share of total market) in 2009	Estimated size of angel market in 2009
US	469 (3%)	17,700
Europe	383 (7%)	5,557
UK	74 (12%)	624
Canada	34 (9%)	388

The OECD (2011) estimated that the market for angel investment in Canada was USD\$388 million in 2009. The estimate relies upon an extrapolation from the portion of the “visible” angel market represented by the NACO data (Mason and Harrison, 2010). However, the OECD (2011) report provides no information on the source for the assumption that investments through angel groups represent 9 percent of the total angel market in Canada. In addition to this methodological uncertainty, it should be noted that angel activity in 2009 was likely affected considerably by the 2008 financial crisis. Although year-over-year estimates of angel activity in Canada do not exist, angel activity in the U.S. fell sharply from USD\$26 billion in 2007 to USD\$19.2 billion in 2008 and USD\$17.7 billion in 2009 (Sohl, 2010). It is reasonable to assume that the 2009 estimate of Canadian angel activity exhibited a similar decline.

Riding (2008) estimated the number of angel investors in Canada using data from the Statistics Canada’s 2002 and 2005 *Survey of Financing of Small and Medium Enterprises*, which asked Canadian business owners about the number and average amount of investments made in unrelated private companies. Riding (2008) conservatively estimated that the market for informal capital in Canada in 2001 was at least CDN\$9.64 billion, and that 15,800 Canadian angels invested approximately CDN\$1.9 billion in 2004.

Liu (2000) estimated that the total stock of angel investment in Canada could be more than CDN\$12 billion and angel activity could be over CDN\$3 billion in 1999. However, these estimates lacked rigour and were based largely on anecdotal evidence and the crude assumption that the size of the angel market exceeds that of VC. Farrell (2000) described several previous estimates of angel activity in Canada, which ranged dramatically between CDN\$1 and 20 billion annually.

In summary, Liu in 2000 estimated Canadian angel activity at over CDN\$12 billion, while Riding estimated CDN\$1.9 billion in 2004 and the OECD estimated USD\$388 million (approximately CDN\$440 million) in 2011. Given the wide range of estimates, “it seems evident that yet more precise estimates are required” (Riding, 2008, p. 358), ideally using multiple methods.

DATA AND METHODOLOGY

This section describes the sources of data used to estimate angel activity in Canada. It also discusses the estimation techniques considered and the rationale for the chosen method.

Data Source

The source of the data used in this study is the *Survey on Financing and Growth of Small and Medium Enterprises* (Statistics Canada, 2020). The goal of the survey is to collect information on the financing activities of businesses in Canada to inform both public policy and private sector market analysis. The survey collects data on the types of debt, lease and equity financing that small- and medium-sized enterprises (SMEs) have obtained or have attempted to obtain, and the circumstances that have affected the financing and growth of their businesses.

Initiated by the Task Force on the future of the Canadian Financial Services Sector in 1998 (Mason and Harrison, 2008), the survey was first conducted by Statistics Canada in 2000, with subsequent surveys in 2001, 2004, 2007, 2011, 2014 and 2017. The content of the survey has evolved considerably over time based on the needs and interests of policymakers and private-sector stakeholders. The most recent survey was overseen by a consortium led by Innovation, Science and Economic Development Canada, a federal government department mandated to foster a growing, competitive and knowledge-based Canadian economy.

The 2017 *Survey on Financing and Growth of Small and Medium Enterprises* used SMEs as its sampling unit. It included a base sample size of 17,323 SMEs out of a total target population of 840,989 SMEs in Canada on the Business Register, a national database of for-profit companies that reported operating activities in the previous year. Companies that represented certain special populations were added from lists provided by other government departments added, increasing the unduplicated size of the sample to 23,527 SMEs.

The reference period for the survey was the 2017 calendar year. Interviews were conducted using computer assisted telephone interviewing beginning in February 2018 and ending in June 2018. Responding to the survey is voluntary and data are collected directly from the respondents. The response rate to the survey was computed as 59.7%, reducing the likelihood of non-response and selection biases (Riding, 2008). The survey data are an invaluable resource upon which to estimate the size and scope of angel activity in Canada.

Estimation Techniques

Riding (2008) stated that “Collectively, it is understood that business angels invest more funds in more firms than does the formal venture capital industry, particularly with respect to early- stage ^[1]_{SEP} enterprises. However, it is difficult to obtain precise estimates of business Angel activity,” citing the challenges of identifying individual angels and tracking their activities. Despite Wetzel’s (1983) conclusion that the number of angels “is unknown and probably unknowable”, several methodological approaches have since been used to estimate the size and scope of angel activity, and to overcome the challenges inherent in the imperfect data that is typically available.

Mason and Harrison (2008) reviewed and categorized several methods available for estimating the informal investment market, including “playing with numbers”, supply-side approaches, demand-side approaches, investment-oriented approaches.

“Playing with Numbers”

This colourful term was used by Wetzel (1987) to describe “broad-brush” and “back-of-the-envelope” (Mason and Harrison, 2008, p. 313) estimates that use simple arithmetic to extrapolate fragments of data from a variety of sources. Such estimates are useful to provide a broad range and a sense of perspective of the scope of angel activity. However, they tie together disparate data using crude assumptions, leading to “quasi-facts” (Wetzel 1986, p. 87) that lack precision and cannot be relied upon. Nevertheless, they have contributed to our understanding angel investing and helped to advance the field of study.

Supply-side Approaches

Supply-side approaches use data on samples of angel investors to estimate the size of angel activity for the entire population. This approach most often involves surveying the organizations or groups whose members best approximate the conventional profile of angels, which has proved largely ineffective and tautological, and calls into question the representativeness of the estimates (Mason and Harrison, 2008). Riding and Short (1988) made novel use of the “capture-recapture” method commonly applied in biological ecosystems to predict the total number of angel investors in the Ottawa region based on a limited sample. This method is best suited for estimates within regional ecosystems rather than national-level estimates.

Demand-side Approaches

Demand-side approaches to estimating angel activity use data from samples of ventures who received angel financing. This approach generally involves surveying small businesses to gather data on how many received angel financing, and the size and frequency of investment. The proportion of ventures with angel financing is then extrapolated to the entire population and multiplied by the average investment size to determine the total size of angel activity. Surveys of small businesses generally suffer from a low response rate, and a relatively small proportion of total small businesses receive angel financing, resulting in very small sample sizes (Mason and Harrison, 2008).

Investment-oriented Approaches

Investment-side approaches use data from a sample of angel investments to estimate angel activity for the entire population. This approach frequently makes use of data collected by angel networks on the investments made by their members. Since investments through angel networks represent only the “tip of the iceberg” (Mason and Harrison, 2008, p. 323), estimates using this data must rely upon assumptions regarding the proportion of the total market that is made “visible” by angel networks (Mason and Harrison, 2010). As a result, such extrapolated estimates are only as reliable as their underlying assumptions.

McDonald’s (2016) review of angel investment data and analysis found that the unit of analysis – investment, business or angel – can have a considerable impact on the interpretation of estimates of angel activity. Businesses were selected as the unit of analysis in this study for two reasons. First, demand-side approaches that make use of data from businesses are the most popular and have been used extensively in previous studies of other jurisdictions. This provides ample opportunity to incorporate learnings from previous work into our methodology and creates a basis upon which to compare our results with those using similar methods in other jurisdictions. Second, a demand-side estimate of angel activity in Canada has not been undertaken in a generation. Liu’s (2000) estimate would be considered “playing with numbers”, while Riding (2008) and OECD (2011) used supply-side and investment-oriented approaches, respectively. A demand-side estimate would make an important contribution to our understanding of angel activity in Canada.

FINDINGS

The *Survey on Financing and Growth of Small and Medium Enterprises* included several questions that are relevant to the estimation of angel activity in Canada.

TABLE 2
POPULATION AND SAMPLE SIZE FOR BUSINESS AGE AND SIZE

Category	Population	Sample	Expected SE
Canada	840,989	17,323	
Age of business			
General population	810,585	15,485	
Start-ups	30,404	1,838	2.1%
Employment category			
1 to 4	487,166	7,379	1.2%
5 to 19*	253,047	4,187	1.5%
20 to 99*	79,213	2,681	2.1%
100 to 499*	11,061	2,318	2.2%

The survey asked the current owners of the business which sources of finance they used to either start or purchase the business, including financing from angel investor and venture capital providers. The survey also asked if the business sought equity financing in the current year and if so, asked the value of the equity provided.

The target population of SMEs was categorized by the age of the business, its size in terms of number of employees, as well as its industry and geography. According to survey methodology, businesses were considered a start-up if they had been in existence for less than two years. As shown in Table 2, of the base sample of 17,323 SMEs, 1,838 were categorized as startups (10.6%).

Although angel investment is generally considered in the context of early-stage startups, the goal of our study was to estimate full scope of angel investment, regardless of characteristics of the investment target. As a result, the estimate of angel activity in this study was not restricted based on the age or the size of the business.

Estimation of Angel Activity in Canada

The *2017 Survey on Financing and Growth of Small and Medium Enterprises* asked respondents: “In 2017, did your business seek equity financing?, further specifying that “this could be any request for new or additional financing from an investor, venture capital supplier, angel, members of your co-operative or friend or family member in exchange for a share of the ownership of the business.” The results indicate that 0.8% of all SMEs requested equity financing in 2017. As shown in Table 3, the likelihood of seeking equity financing increased with the size of the business – from 0.4% of SMEs with 1-4 employees to 3.5% of those with 100-499 employees.

**TABLE 3
EQUITY FINANCING**

All SMEs	Requested equity financing (%)	Total amount of equity provided (\$)	Avg. amount of equity provided (\$)
<i>1 to 499 employees</i>	0.8	8,448,942,090	1,388,915
<i>1 to 4 employees</i>	0.4	1,366,185,132	776,553
<i>5 to 19 employees</i>	0.9	753,465,971	334,757
<i>20 to 99 employees</i>	2.0	2,871,347,477	1,790,509
<i>100 to 499 employees</i>	3.5	3,457,943,510	7,366,761

Estimating Level of Equity Funding

The survey did not ask how many businesses received equity financing among those that sought it out. However, it did ask the respondents that requested equity financing in 2017 to indicate the value of the equity provided. Total equity financing to SMEs in 2017 from all sources was estimated at \$8.44 billion. The estimated average equity amount provided in 2017 was \$1.38 million. These estimates include equity financing from cooperatives, venture capital firms, angels, and friends and family. Co-operatives represent a minute fraction (0.001%) of the total target population of SMEs in Canada. The estimated \$3.59 million in equity financing raised by co-operatives in 2017 is immaterial and was ignored.

Eliminating VC Funding

In the first step toward isolating total market for angel financing, the amount of venture capital investment was subtracted. In 2017, the Canadian Venture Capital Association (CVCA) reported 592 investments totaling \$3.5 billion (CVCA, 2018). This included venture capital investments in all companies, including an undisclosed number that may not have been SMEs. The CVCA’s Venture Capital Canadian Market Overview for 2017 identified fifteen “mega deals” of over \$50 million. Employment data on the companies involved in these large investments was investigated. Four of the companies were identified as having more than 500 employees at the time of investment, totaling \$440 million. Although a number of non-SME investments are likely still included in the estimate, the revised total amount of venture capital invested in Canadian SMEs in 2017 was \$3.06 billion.

Decomposing the Informal Funding

When venture capital investment is subtracted from the total equity financing to SMEs, the remaining \$5.38 billion represents the market for equity financing from informal investors, namely friends and family, and angels. Although the *Survey on Financing and Growth of Small and Medium Enterprises* provides no data to help in the next step of segregating the estimates from these two distinct sources of informal capital, Riding’s (2008) analysis of the *2001 Survey on Financing of Small and Medium Enterprises* provides some guidance. This earlier iteration of the survey asked business owners a series of questions about their investment activity in other businesses, including whether they acted as operators in any of these other businesses and whether they were owned by family or friends.

As shown in Table 4, Riding (2008) used these data to discern four categories of informal investor in Canada and the proportion of the total market for informal financing represented by each category:

1. Probable angels (13.9% of total)
2. Probable serial entrepreneurs (37.5% of total)
3. Passive love money (14.0% of total)
4. Active love money (34.7% of total)

TABLE 4
TYPES OF INFORMAL INVESTOR

	Invested in businesses owned by family, friends?		Total
	Yes	No	
Acted as operators in investee firms?			
Yes	34.7%	37.5%	72.2%
No	14.0%	13.9%	27.8%
Total	48.7%	51.4%	100.0%

Riding (2008) acknowledged that some unknown proportion of business owners in categories 2-4 were also angel investors, hence “the 13.9% of investors who did not invest in firms owned by friends or family and who did not act as operators must be regarded as a very conservative estimate of angel investors within the sampling frame employed for the survey.” Riding (2008) used additional data from the 2001 survey on the amount and frequency of informal investments made by business owners and found that “probably angels” made larger and more frequent investments compared with other categories of informal investors. As a result, a minimum of 25% of the informal market is attributable to angels. Following Riding (2008), the conservative estimate of angel equity financing in Canada in 2017 is \$1.35 billion (\$5.38 billion x .25). The *2017 Survey on Financing and Growth of Small and Medium Enterprises* estimates are based on sample results, and are subject to sampling error. Statistics Canada provides a statistical measure of the sampling error associated with a given estimate. The estimate of the total amount of equity provided had a Coefficient of Variation of 27.4%. Therefore, our estimate is subject to a margin of error of approximately \$369 million.

It should be noted that this estimate includes only angel equity financing, and excludes other investment instruments like debt. NACO (2018) reported that 13% of the angel investments made by their members in 2017 were structured as loans.

Arriving at the Level of Angel Funding: Assuming that the NACO data on investment instruments can be extrapolated to the entire population of angels, the size of the angel investment market in Canada in 2017, including equity and debt instruments, is estimated to be between \$1.4 billion and \$1.76 billion.

COMPARATIVE ANALYSIS

This project has developed a current and conservative estimate of the scale of angel investment in Canada. It is the first such estimate produced in more than a decade and uses a more rigorous approach than has previously been adopted. As such, it provides a foundation from which comparisons can be made with other parts of the Canadian entrepreneurship ecosystem and with other related jurisdictions.

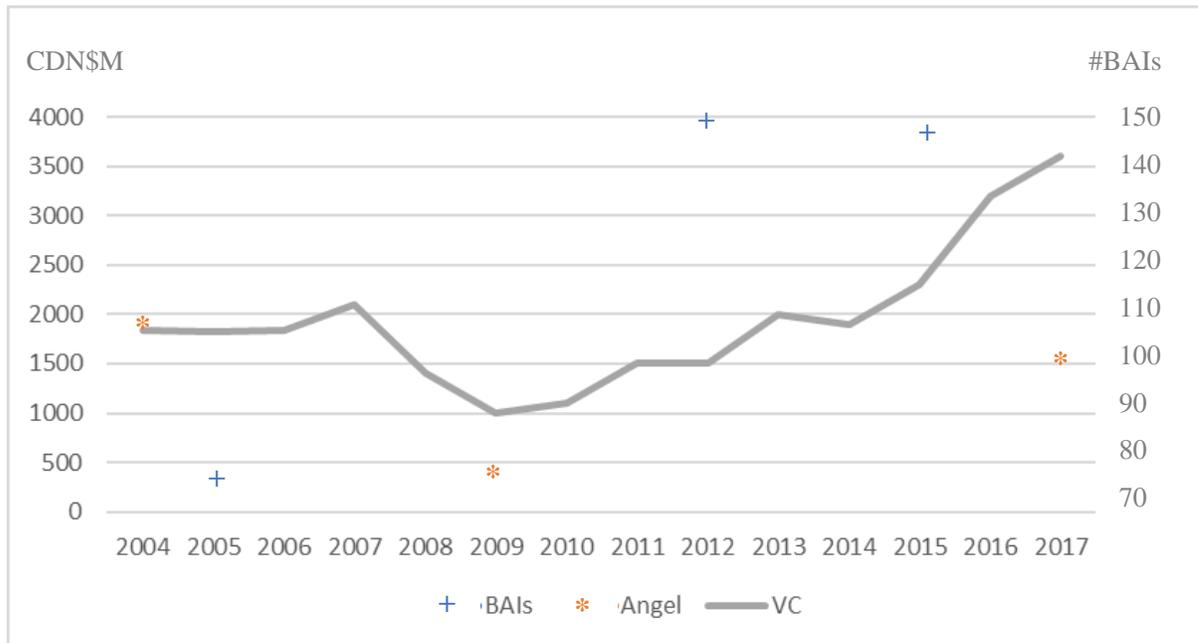
Within the Canadian Entrepreneurial Ecosystem

As described earlier, population ecology and resource dependency theories contend that groups within an ecosystem are interdependent. Changes experienced by one group should result in changes to other groups that are proportionate to the level of dependence on that group. Within an entrepreneurial ecosystem, business accelerators and incubators (BAIs) provide important resources to newly formed ventures. The best among these new ventures may receive financing from angels. The ventures that demonstrate potential for considerable growth within large markets may receive financing from VCs. A longitudinal analysis of the scale of BAI, angel and VC activity was conducted given the interdependence of these groups within the entrepreneurship ecosystem.

Figure 1 illustrates the annual estimates of Canadian VC activity published by the CVCA for the period from 2004 to 2017. The two previous estimates of Canadian angel activity in 2004 and 2009 were added (Riding, 2008, OECD, 2011), along with the current estimate from this study. The estimated number of

Canadian BAIs in 2005, 2012 and 2015 were also added (Joseph et al., 2005, Dalziel, 2012, Deep Centre, 2015). It should be noted that the estimates of angel activity and the number of BAIs were published by different authors and used different methodologies. Although these are the best data available, the results of the comparative analysis should be interpreted with caution.

FIGURE 1
ESTIMATES OF BAI, ANGEL AND VC ACTIVITY IN CANADA, 2004-2017



A sharp increase in the estimated number of BAIs is noted, from 77 in 2005 to 150 in 2012, an increase of 94.8 percent. This may be due in part to an increase in the popularity of incubation, and of acceleration in particular, as modes of assistance to SMEs (Pauwels et al., 2016). It may also be due to increased government support for the creation of BAIs (Isabelle, 2013). The estimated number of BAIs decreased slightly to 146 in 2015, which runs counter to the increase in angel and VC activity over the same period. The variance in the BAI estimates may be due to methodological differences in how they were derived, including different definitions for and boundaries between accelerators, incubators, entrepreneurship centres, co-working spaces, and other related modes of SME assistance.

Canadian VC and angel activity were virtually identical in 2004 (CDN\$1.84 billion and CDN\$1.9 billion, respectively). However, Riding (2008) stated that his estimate of angel activity in 2004 was conservative and underestimated the level of angel activity in Canada (p. 362). The level of activity in both angel and VC financing decreased in 2009 compared to 2004, due largely to the effect of the 2008 financial crisis. VC activity was reduced to CDN\$1 billion in 2009, while angel activity fell more sharply to only CDN\$440 million. This difference suggests that the financial crisis had a disproportionate effect on angels that invest their own money compared to VCs that invest money from funds that were previously raised (Mason and Harrison, 2015). Both angel and VC activity increased at a similar rate between 2009 and 2017. Angel activity in 2017 was more than three times that of 2009, while VC activity was at 2.6 times its 2009 level. These similarities provide clear evidence of the interdependence between angel and VC activity within the Canadian entrepreneurial ecosystem.

With Other Entrepreneurial Ecosystems

Comparing Canada's entrepreneurial ecosystem with that of other jurisdictions is an important way to benchmark relative performance, evaluate the effectiveness of different policies and initiatives, and assess

their generalizability beyond a specific regional context. Canada has particularly strong economic, political and cultural ties to both the United States (US) and the United Kingdom (UK), with one foot in the traditions of each country. Table 5 shows the relative differences in angel activity within these three jurisdictions in 2017.

TABLE 5
ANGEL ACTIVITY IN CANADA, UK & US IN 2017 (USD\$MILLIONS)

	Angel Activity	GDP	Angel to GDP Ratio
Canada	\$ 1,219	\$ 1,649,880	0.074%
UK	\$ 1,300	\$ 2,666,230	0.049%
US	\$ 23,900	\$ 19,485,390	0.123%

The current estimate of Canadian angel activity from our study is compared to a US estimate from the Center for Venture Research (Sohl, 2018), which has published estimates of angel activity using a consistent methodology since 2002. The estimate of UK angel activity in 2017 was published by EBAN, Europe’s leading early-stage investor network (EBAN, 2018). EBAN’s estimate is an extrapolation of the USD\$131 million in angel investment that is visible through angel networks and assumes that the visible market accounts for roughly 10% of the total market.

The most notable difference between the jurisdictions is the scale of angel activity in the US, which dwarfs that of the UK and Canada in absolute terms. This is not surprising given that the US is the world’s largest economy. Even relative to the size of their respective economies, US angel activity is considerably greater than that of Canada and the UK, with an angel activity to GDP ratio of 0.123%, 0.074% and 0.049%, respectively (World Bank, 2018).

Angel activity in Canada and the UK in 2017 was comparable in size but the UK’s GDP was 62% larger than Canada’s. Relative to GDP, angel activity in Canada was roughly 50% greater than in the UK. The relative difference in angel activity between Canada and the UK may be explained by the effectiveness of policies designed to encourage angel investment in both countries. The differences may also be due in part to geo-economic features, including Canada’s proximity to the US.

CONCLUSION

Estimates are very important for those who wish to understand the impact of angels on the entrepreneurial ecosystem and to determine how best to provide support to both the angels who provide risk capital and the entrepreneurs who need it, particularly those that aspire to high growth. As has been well established, quantifying the level of angel investment in an entrepreneurial ecosystem is extremely challenging and often relies on anecdotal evidence and crude assumptions. Despite this, efforts have been made to produce such estimates in a number of national economies.

This study provides the first detailed analysis of the Canadian market for angel financing in nearly a decade, over which period the Canadian entrepreneurial ecosystem has evolved considerably (Startup Genome, 2019). Through deductive reasoning, drawing on demand-side data, supported by the related data provided by CVCA and NACO, has allowed the provision of an estimate range that goes well beyond the “playing with numbers” that Mason and Harrison (2008) used to describe many such efforts.

It would seem reasonable to suggest that the range of \$1.4 to 1.76 billion can be considered an under-estimation of the total market for angel financing in Canada given the highly conservative assumptions used to derive it. First, Riding’s (2008) definition of “probable angels” (13.8% of informal investors) was chosen to specify an “angel”. Riding (2008) acknowledged that this definition excludes an unknown number of angels found among other categories of informal investors. Next, the size of the venture capital market was over-estimated since it includes an unknown number of investments in companies with less than 500 employees. Since the estimated size of the angel financing market is derived from subtracting venture

capital from the total equity market, an over-estimation of venture capital inevitably leads to an under-estimation of the angel financing market.

The comparative analysis finds evidence of an important interdependence between angel and VC activity in the Canadian entrepreneurial ecosystem. Since angels typically invest before VCs, changes in angel activity can serve as an early warning of potential problems in the ecosystem's feeder system of new ventures. While there are reliable annual estimates of VC activity in Canada, there exists no equivalent systematic estimation of Canadian angel activity, exposing the ecosystem to undue risk. Additional work is also needed to explain the relative differences in angel activity in the UK and Canada, including economic, social, geographic and policy considerations.

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