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Measuring Entrepreneurship Conceptual Frameworks and Empirical Indicators

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Executive summary

This study is the first installment in a long-term research project aimed at measuring entrepreneurship. Entrepreneurship has become a focal point of public policy as governments at all levels have made promoting entrepreneurship a priority. However, existing research is far from conclusive in terms of providing a comprehensive definition or measure of entrepreneurship. If entrepreneurship is not comprehensively defined or measured, then it is virtually impossible to understand where and why it flourishes, and there is no way to assess the effectiveness of public policies aimed at entrepreneurship. Therefore, the most pressing issue for this area of study is the development of a reasonable consensus as to the meaning of entrepreneurship and a measure of entrepreneurship that is reliable and easy to understand.

To help resolve this issue, this study first presents the most important definitions of entrepreneurship and explores their similarities and differences. Then it examines the most widely cited and used measures of entrepreneurship and discusses their strengths and weaknesses. Finally, this study explores a number of empirical indicators that could be used to create a comprehensive measure of entrepreneurship.

Defining entrepreneurship

While research has grown considerably in the last two decades, there is still no consensus regarding the meaning of entrepreneurship. To help fill the void in this area, this study presents the most important conceptual frameworks of entrepreneurship and examines their common themes and differences. One of our most important findings is that, despite their unique characteristics, the German, Chicago, and Austrian schools of thought on entrepreneurship have six common elements:

- Enterprise: entrepreneurship is the process of bringing new ideas into the market for the pursuit of profit;
- Innovation: entrepreneurs “innovate” by being alert to profitable opportunities and having the ability to combine existing resources in new and different ways to bring a new idea into the market;
- Process: entrepreneurship is a temporary process of commercializing an idea that consists of different functions (i.e., the innovating function, the financing function, etc.);
- Risk-taking: the entrepreneurship process consists of bringing a new idea into the market in the face of an uncertain outcome;
- Spectrum of entrepreneurial action: entrepreneurship can range from grand and radical new innovations to more incremental, smaller innovations such that it can exist in a number of different types and sizes of organizations; and,
- Economic change: entrepreneurship is a cause of economic change in that it brings new innovation into the market, creating jobs, wealth, and business opportunities.

These common aspects are important for two reasons: 1) they provide a first step towards a comprehensive definition of entrepreneurship, and 2) they provide criteria for measurement.

Current measures of entrepreneurship

Having multiple definitions of entrepreneurship results in a large number of different measures of entrepreneurship. Many current entrepreneurship measures are limited in scope because they (often purposely) focus on just one aspect of entrepreneurship, such as self-employment or business start-up rates. Moreover, many of these measures suffer from methodological and statistical problems. Overall, the current stock of measures fails to provide a comprehensive picture of entrepreneurship.

For example, one of the mostly widely used measures of entrepreneurship is the Global Entrepreneurship Monitor's (GEM) Total Entrepreneurial Activity (TEA) Index, a calculation of the adult population engaged in entrepreneurial activity. GEM's TEA Index had been widely criticized by numerous researchers for its failure to measure entrepreneurship that occurs within firms, its failure to use better data, and its lack of comparability across regions due to different interpretations of survey responses (Audretsch, 2002; OECD, 2006; Baumol et al., 2007).

Empirical indicators of entrepreneurship

Since the current research fails to provide a comprehensive measure of entrepreneurship, this study presents and discusses 11 empirical indicators that could be used to create such a measure. Our aim is to present a catalogue of indicators that have been cited as important measures of entrepreneurship and/or are well connected to the six common aspects of entrepreneurship listed above. This study also discusses the advantages and disadvantages of each indicator of entrepreneurship. The indicators for which data are readily available and comparable for Canada's provinces and the US states include:

- Business creation: the process of starting a new enterprise, the primary way in which people bring ideas to the market;
- Self-employment: the number of individuals who make an occupational choice and take the risk of working on their own, rather than for an employer;
- Small businesses: defined in this study as having 1-49 employees, these businesses represent another vehicle through which entrepreneurs bring innovations to the market;
- Venture capital: the resources raised for the purpose of investing in potential high-growth businesses. This unique indicator captures numerous functions within the entrepreneurship process;
- Research and development (R&D): the pursuit of a new product or process in the face of an unknown outcome, and a measure of entrepreneurship that occurs within existing and larger firms; and,
- Patents: a proxy for the innovative aspect of entrepreneurship.

The examination of the above-noted indicators is followed by a discussion of indicators that may also be important, but currently suffer from data availability and comparability problems. These include business expansion, business ownership, innovation, initial public offerings, and business losses.

Conclusions and recommendations

This study, the overarching goal of which is to develop a comprehensive measure of entrepreneurship, offers two key recommendations:

- 1) The common aspects of entrepreneurship should be openly and carefully reviewed and discussed in terms of relevance and priority, so as to determine how a unified conceptual framework for measurement could be constructed.
- 2) The empirical indicators presented should be further scrutinized and discussed to determine whether they should be included in a comprehensive measure of entrepreneurship, and how they might best be measured.

Having a sound concept of entrepreneurship and knowing where it flourishes will have a profound effect on the discussion of government policy. Once we are able to measure entrepreneurship, we will be able to investigate the reasons why some regions have more than others, and will begin to understand and promote policies that will create an environment conducive to entrepreneurship.

Introduction

Entrepreneurship has become a focal point of public policy. Governments at all levels and in many countries have made promoting entrepreneurship a priority (OECD, 2006).[1] In addition, there is a growing recognition that entrepreneurship is critical to economic prosperity (Baumol et al., 2007). However, despite the growing interest and focus on entrepreneurship, there is still no adequate comprehensive measure of entrepreneurial activity. In order to assess the effectiveness of public policies aimed at entrepreneurship, we must first define and measure it.

A major problem one encounters when trying to measure entrepreneurship is the lack of consensus regarding its meaning. While the view that entrepreneurship positively impacts economic growth is widely held, the definitions of entrepreneurship are scattered and numerous. This lack of consensus with respect to the meaning of entrepreneurship has created a second problem: a wide array of measures. Some of the most widely cited measures of entrepreneurship use different definitions of entrepreneurship that are narrow in scope. Overall, the current stock of measures fails to provide a tool for comparing entrepreneurship across regions that is reliable and easy to understand.

The Centre for Entrepreneurship and Markets at the Fraser Institute has embarked upon an initiative to help fill the void in this research. This study is part of a long-term research project, the goal of which is to develop a comprehensive measure of entrepreneurship.

Organization of this study

This study is divided into four main sections. The first section summarizes the most important definitions of entrepreneurship. It highlights common aspects of these definitions and potential measurement challenges. The second section briefly reviews the current research on entrepreneurship measurement, while the third discusses empirical indicators that could be used in a comprehensive measure. The fourth and final section presents the conclusions and recommendations of this study.

1 For example, both Canada and the United States have numerous policies and programs that focus on entrepreneurship, including preferential tax rates, start-up subsidies, and favourable regulations.

1 Conceptual frameworks

A major barrier to measuring entrepreneurship is the lack of a consensus as to its meaning. As renowned economist William Baumol has written, the entrepreneur is “at once one of the most intriguing and one of the most elusive characters that constitutes the subject of economic analysis” (1993: 2). However, if we cannot define entrepreneurship, then it will be virtually impossible to measure it. This section presents the research on the main definitions of entrepreneurship.[2]

There are several reasons why researchers have had a difficult time defining entrepreneurship. First, there is no agreement on whether entrepreneurship is a characteristic of people—the so-called “captains of industry”—or whether it is a process. Second, since entrepreneurial activity often overlaps with other business activities, such as management, it is difficult to isolate when and where it actually happens. Third, entrepreneurship can occur in numerous organizational forms, including new small businesses, divisions within firms, and even non-profit organizations.[3] Fourth, there is disagreement on whether entrepreneurship should be defined by the characteristics of entrepreneurs, how they make their decisions, or how they create opportunities (Alvarez, 2005).[4]

The combination of these factors has left researchers without a clear understanding of entrepreneurship and, thus, little ability to develop a comprehensive measure. As Scott Shane and S. Venkataraman explain, “For a field of social science to have usefulness, it must have a conceptual framework that explains and predicts a set of empirical phenomena not explained or predicted by conceptual frameworks already in existence in other fields. To date, the phenomenon of entrepreneurship has lacked such a conceptual framework” (2000: 217).

There are essentially three main schools of thought on entrepreneurship: 1) the German tradition, based almost exclusively on the work of Joseph Schumpeter; 2) the Chicago tradition, based on the work of Frank Knight; and 3) the Austrian tradition, based on the work of Israel Kirzner.[5] Each of these schools offers a relatively distinct conceptual framework.[6]

The German tradition

The German school of thought is based almost entirely on the work of Joseph Schumpeter. Schumpeter viewed entrepreneurship as the process of combining resources in new and different ways to bring ideas to the market. In this sense, Schumpeter’s entrepreneur is an innovator—an individual who disturbs the status quo by replacing existing firms or ideas with new firms,

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- 2 The research on personal characteristics or determinants of the success of entrepreneurial businesses is not discussed in this section. However, there is a large and growing body of research that examines the characteristics of entrepreneurs—namely, psychological traits and demographics. For example, see Lazear (2003), Blanchflower and Oswald (1998), Byers et al. (1997), and Quince and Wittaker (2003).
- 3 For a discussion of entrepreneurship as a non-profit activity, see Benz (2006).
- 4 Adding to the difficulty of defining entrepreneurship is the fact it crosses multiple academic disciplines, including economics, sociology, psychology, business history, and management science.
- 5 A similar conclusion regarding these schools of thought was drawn by Hébert and Link (1989).
- 6 For a historical review of entrepreneurship theory, see Ricketts (2006) and van Praag (1999).

products, or processes. This process is a dynamic one, as the entrepreneurs who bring innovations to the market replace businesses (or their products, services, or processes) that are no longer competitive, while simultaneously placing pressure on existing firms to become competitive. This kind of entrepreneurial action causes economic change.

To understand Schumpeter's concept of entrepreneurship, it is important to review his concept of economic change. He argues that economic growth is based on the evolutionary process of capitalism: "the fundamental impulse that sets and keeps the capitalist engine in motion comes from the new consumers' goods, the new methods of production or transportation, the new markets, the new forms of industrial organization that capitalist enterprise creates" (1942: 83). He describes capitalism as a process of "creative destruction" whereby the economic structure of society is changed from within as new products, processes, and markets replace old ones.

The process of economic change requires what he calls "adaptive responses" and "creative responses." An adaptive response is a mechanical kind of calculation that results in an increase in the size of the economy. For example, if the population were to increase, employers would respond by hiring more workers. While the overall size of the economy would increase, the size of the economy relative to the population would remain unchanged. A creative response, on the other hand, is a process of doing things out of the ordinary whereby people create a unique combination of resources, such as a new product or process. The creativity people use to bring new innovations to the market is critical because it increases the size of the economy relative to its population. Schumpeter describes the creativity involved in creating economic change as entrepreneurial, noting that "the mechanisms of economic change in capitalist society pivot on entrepreneurial activity" (1947/2005: 222).

An important characteristic of Schumpeter's definition of entrepreneurship is that it is a process that consists of different functions. This process is the bringing of a new idea to the market; the functions are the individual actions taken to achieve this process. While in reality these functions often overlap, each action is conceptually different. Central to the entrepreneurship process is the "entrepreneurial function," which is to "identify new combinations and react to these by exercising the leadership to profit from them" (Iversen et al., 2005: 4). Schumpeter identifies five types of innovation, or creative responses, that make up the entrepreneurial function:

- 1) The introduction of a new good, or a new quality of good, that is currently not known to consumers;
- 2) The introduction of a new method of production or process;
- 3) The opening of a new market in an area where that market had not existed previously, whether or not that market had existed previously in some other area;
- 4) The conquest of a new source of raw materials or other inputs, irrespective of whether that source already exists; and,
- 5) The effecting of a new organization of any industry—for example, the creation of a monopoly position or the breaking up of a monopoly position (1934/2005: 66).

The entrepreneurial function, therefore, is the creative and temporary act of combining resources in new ways. In Schumpeter's words, "everyone is an entrepreneur only when he actually 'carries out a new combination,' and loses that character as soon as he has built up his business, when he settles down to running it as other people run their businesses" (1934/2005: 78). Though

the entrepreneurial function is creative, it is distinct from that of the inventor, and from the function of developing ideas (Schumpeter, 1947/2005: 224). As Schumpeter argues, the inventor produces ideas, but the entrepreneur “gets things done” by bringing those inventions to the market. Thus, the entrepreneurial function, according to Schumpeter, is the commercialization of an invention.

Another function within the entrepreneurial process is financing, which Schumpeter describes as the capitalist function. In order to bring innovations to the market, the entrepreneur needs capital to start and operate his or her business (1934/2005: 74). Thus, this function introduces the element of risk into the entrepreneurial process. By lending money to the entrepreneur in exchange for interest, the capitalist bears the risk of the entrepreneurial process.

It is important to note Schumpeter does not limit his theory of entrepreneurship to those who are typically thought of as entrepreneurs—the so-called “captains of industry.” In fact, as Mark Frank (1998) explains in his review of Schumpeter, his theory had far reaching applications to entrepreneurship within corporations and other organizations.

In sum, entrepreneurship, according to Schumpeter, is a process whereby people bring innovations (goods, services, processes, and so on) to consumers. This process is dynamic in the sense that the entrepreneurs who bring innovations to the market replace businesses (or products or processes) that are no longer competitive, while simultaneously placing pressure on existing firms. The entrepreneurial act of bringing new innovations to the market causes economic change.

The Chicago tradition

In contrast to Schumpeter, Frank Knight’s concept of entrepreneurship relies on his view that there are some people who have unique characteristics that make them entrepreneurs. Entrepreneurship, therefore, is defined by the actions taken by these individuals. Knight’s concept of entrepreneurship can be divided into two parts: the first establishes the nature of entrepreneurship, and the second specifies the entrepreneur’s functions.

The nature of entrepreneurship

Knight notes that all people vary in their preferences, knowledge, and abilities, which together determine what people do. According to Knight, foresight, managerial ability, confidence in one’s judgment, and the disposition to “back it up” with action are characteristics that are unique to entrepreneurs (1921/1964: 270). Those who have superior abilities in these areas will make up a “special social class” of business men who direct economic activity: “they are in the strict sense the producers, while the great mass of the population merely furnish them with productive services, placing their persons and their property at the disposal of this class” (1921: 271). This view contrasts with that of Schumpeter, who argues that the potential for entrepreneurship exists in everyone.

According to Knight, a key aspect of entrepreneurship is acting in the face of uncertainty. Entrepreneurs must use their unique skills to deliver a new product or process, though the outcome of their actions is unknown. This burden is unique to entrepreneurs. Employees and managers of firms face no such uncertainty because their incomes are typically known in advance. The reward of the owner of the firm or the entrepreneur for being successful in the face of uncertainty is the (temporary) profit generated by the firm he or she has created.[7]

7 The owner can be an individual, a group, or a legal identity such as a corporation.

Functions of an entrepreneur

Knight specifies three functions of an entrepreneur. The first and primary function is “that of leadership or economic pioneering; it is to initiate useful changes or innovations” (1942: 128). The incentive for this function is profit. Similar to Schumpeter, Knight argues that this innovative function is distinct from that of the inventor or the research scientist in that the entrepreneur brings those inventions to the market. He defines innovation as a novel change in the character of products and/or some improvement in the method of production.

The second function of an entrepreneur is that of “adaptation to changing conditions.” The entrepreneur must be able to “forecast” or anticipate changes in the market in order for his or her business to remain successful. Though Knight does not develop an explicit difference between the “manager” and “entrepreneur,” this function separates one from the other. As Knight notes, “entrepreneurship is the more ‘dynamic’ activity, connected with the major or more important changes, in contrast with management, which is closer to routine activities which can be classed as ‘labour’” (1942: 129).

The third function of an entrepreneur is bearing uncertainty. Knight argues that the entrepreneur, as the owner of any enterprise, “places himself in the position to take the consequences of such [unforeseen] changes, (wholly or up to a point) relieving those from whom he hires productive agents of this uncertainty and insecurity” (1942: 129). This is the most important difference between Knight and Schumpeter, who argues that the entrepreneurial function involves no risk.^[8]

In sum, Frank Knight’s view is that entrepreneurship consists of actions taken by people with certain personal attributes to bring new products and services to the market in the face of uncertain outcomes. Their reward for having these skills and bearing the risk of failure is profit.

The Austrian tradition

As an Austrian school economist, Israel Kirzner has a view of entrepreneurship that is fundamentally different from that of Schumpeter and Knight.^[9] His unique conceptual framework can be divided into three parts: the nature of entrepreneurship, entrepreneurial discovery, and functions of the entrepreneur.

The nature of entrepreneurship

Kirzner argues that there is more to economic activity than just people making mechanical calculations with their resources. He argues that people are alert to the world around them and thus use new information and resources to make better decisions. In this sense, the nature of entrepreneurship is to be alert to better information and to use new information creatively to improve well-being. In this way, Kirzner takes a much broader view of entrepreneurship than Schumpeter and Knight.

8 Within Schumpeter’s theory of the entrepreneurial process, risk bearing is attached to the capitalist function.

9 Kirzner’s seminal work on entrepreneurship is his 1973 book, *Competition and Entrepreneurship*. A similar and shorter description of Kirzner’s entrepreneur can be found in a later text, *Perception, Opportunity, and Profit: Studies in the Theory of Entrepreneurship* (Kirzner, 1979), as well as in an article in the *Journal of Economic Literature* (Kirzner, 1997). See also Douhan et al. (2007) for a summary of this work.

Entrepreneurship can also be understood within the context of decision making. The entrepreneurial element in human action comes into effect when people recognize a new way of doing things. Kirzner called this recognition “alertness to hitherto unnoticed opportunities” (1973: 39). For Kirzner, this “element of alertness to possibly newly worthwhile goals and to possibly newly available resources—which we have seen is absent from the notion of economizing but very much present in that of human action—[is] the entrepreneurial element in human decision making. It is this entrepreneurial element that is responsible for our understanding of human action as active, creative, and human rather than passive, automatic, and mechanical” (1973: 35). Essentially, the nature of entrepreneurship can be understood as the process of seeing (and carrying out) new ways of doing things that were previously unnoticed by others.

Kirzner emphasizes the difference between alertness and the command of knowledge. He explains that there is a “temptation to conceive of the entrepreneur as one who simply knows more accurately than others do where resources can be purchased most cheaply, where products can be sold at the highest prices, what technological or other innovations will prove most fruitful, which assets can be expected to increase most in value, and so on” (1973: 66). However, the most critical aspect of entrepreneurship is alertness to information rather than possession of it. Put differently, “the kind of ‘knowledge’ required for entrepreneurship is ‘knowing where to look for knowledge’ rather than knowledge of substantive market information” (1973: 68).

Entrepreneurial discovery

Kirzner argues that the opportunity to make better decisions exists because no one has perfect information. In other words, because we all make decisions with the (imperfect) knowledge we have, we always have the opportunity to better our decisions through additional information. This constant lack of knowledge provides endless opportunities for people to improve their position by gaining more or better information. Essentially, this means that a knowledgeable entrepreneur is an arbitrageur—an individual who finds and sells some combination of resources for more than their combined purchase price before someone else notices the opportunity. An important aspect of this arbitrage process is that, similar to Knight’s view, entrepreneurs make these decisions and take action in the face of uncertain outcomes.

Kirzner (1982) also explains that there is a spectrum of entrepreneurial opportunities, from the smallest incremental decisions to the more radical innovations. The implication of this view is that entrepreneurship can occur in numerous organizational forms, including small businesses, large firms, and even non-profit organizations.

Functions of the entrepreneur

Similar to Schumpeter, Kirzner makes the distinction between an entrepreneur and a capitalist. He argues that the pure entrepreneur does not need to be a capitalist and, therefore, does not need to invest anything of his own. That is, it is possible for an entrepreneur to make a profit by offering an interest payment attractive enough to persuade someone to advance the necessary funds. In Kirzner’s view, this is merely a component of buying resources at low prices and selling products at higher prices: “the important point is that analytically the purely entrepreneurial role does not overlap [with] that of the capitalist, even though, in a world in which almost all production processes are more or less time-consuming, entrepreneurial profit opportunities typically require capital” (1973: 49).

As with Schumpeter, Kirzner argues that the entrepreneurial function is only temporary. An entrepreneur is no longer only an entrepreneur after the purchase of resources. As a result of earlier entrepreneurial decisions, he has become an owner of resources.[10]

In sum, for Israel Kirzner, entrepreneurship is a process whereby people become alert to opportunities previously unnoticed by others and use these opportunities to bring ideas to the market, in the face of uncertain outcomes. In his view, all people have an entrepreneurial element in their decision making, which he describes as “knowing where to look for knowledge.” Because no one has perfect information, there are always opportunities to act entrepreneurially by acquiring information and making better decisions.

Towards a comprehensive conceptual framework

This section presents common themes and discusses areas of disagreement among the definitions of entrepreneurship discussed above.[11] Despite their unique characteristics, the German, Chicago, and Austrian schools of thought have six common aspects: enterprise, innovation, process, risk-taking, spectrum of entrepreneurial action, and economic change. These common aspects are critical as they not only provide a first step towards a comprehensive definition of entrepreneurship, but they also provide a foundation for measurement. Areas of disagreement are equally valuable, as they indicate which important conceptual issues remain to be resolved.

Enterprise

Schumpeter, Knight, and Kirzner all agree that the pursuit of profit—the desire to capture a reward for one’s effort—is one of the central drivers of entrepreneurial activity. As Schumpeter emphasizes, a critical aspect of the entrepreneurial process is transforming ideas into profits, rather than innovating for the sake of innovation. While this may be obvious, the fact that entrepreneurship is enterprising means that entrepreneurship cannot exist or occur in organizations such as government.[12]

10 Along this line, Kirzner points out that a corporate stockholder is not an entrepreneur. The stockholder is a capitalist who buys a share of ownership in the firm; ownership and entrepreneurship are separate functions. However, “if the institutional environment of the corporate firm is such that managers, in controlling the firm’s operations, are able to reap private benefit for themselves, we may indeed ascribe entrepreneurship to them—not in the sense of ‘control’ but in the sense of putting resources to use in superior (and ‘profitable’) opportunities as yet unnoticed by others” (1973: 62).

11 The key conceptual frameworks discussed in this section are certainly not the only view of entrepreneurship. In the last two decades theoretical research into entrepreneurship has blossomed; however, much of this research is based on the key work discussed (Iversen et al., 2005). For example, see Cunningham and Lischeron (1991), Hébert and Link (1989), Shane and Venkataraman (2000), Casson (2003), Montanye (2006), and Ahmad and Seymour (2008).

12 However, that is not to say that entrepreneurship cannot exist in the non-profit sector. Recent research has argued that the “profit” of entrepreneurs in that sector are the gains (rents) captured by expanding the organization (see Benz, 2006, and Parker, 2005).

Innovation

The second aspect of entrepreneurship is innovation: entrepreneurs “innovate” by envisioning a profitable opportunity and combining resources to bring a new idea to the market. Schumpeter, Knight, and Kirzner all agree that entrepreneurship is characterized by decision making that is beyond the ordinary, mechanical kind of calculations, and is creative and requires foresight. However, there are important differences between their views. Knight argues that these unique characteristics can only be held by certain individuals who are part of a special class of businessmen. Kirzner, in contrast, argues that these unique characteristics can be held by anyone, and that these characteristics are present in creative decision making. He also states that a unique characteristic of entrepreneurship is being *alert* to opportunities. Schumpeter does not make an explicit argument in this regard, but he likely fits in between the two extremes. He argues that the entrepreneurial function requires certain abilities, but that everyone has the potential to act entrepreneurially. In addition, Schumpeter is the leader in terms of emphasizing innovation as the key aspect of the entrepreneurial process.

Process

Entrepreneurship is a temporary process of bringing new ideas to the market. The concept of a process is explicitly proposed by Schumpeter who views the entrepreneurship process as a combination of functions. The entrepreneurial function combines resources in new ways to deliver a new idea to the market. The capitalist function financially supports the entrepreneur. Schumpeter argues that once an idea is brought to the market, the entrepreneur becomes a manager and/or owner of the firm. Kirzner does not make such an explicit separation of functions, but agrees with Schumpeter that the capitalist and managerial functions are separate from that of the entrepreneur. Knight does not argue that entrepreneurship is a process, but he does emphasize that certain people have the ability to bring new ideas to the market. As with Schumpeter, Knight argues that there is an important difference between the entrepreneur and the business manager and/or owner of resources. In addition, Knight argues that the entrepreneur’s reward for being innovative and bearing uncertainty is temporary profit. As such, it is not unreasonable to conclude that Knight’s conceptual framework is consistent with the idea that entrepreneurship is a temporary process.

Risk-taking

Another aspect of entrepreneurship is risk-taking. While all three conceptual frameworks incorporate an element of risk into their framework, the way in which this aspect is treated varies considerably. For instance, both Knight and Kirzner argue that a key aspect of entrepreneurship is acting in the face of uncertainty. Knight puts the most emphasis on aspect, arguing that risk-taking—or, more accurately, acting in the face of uncertainty—is a central function of the entrepreneur. Kirzner places less importance on risk-taking, but argues that entrepreneurial decisions are made based on uncertain outcomes. Schumpeter on the other hand firmly rejects the idea that the entrepreneur bears risk or uncertainty. Instead, he argues that the capitalist who lends funds to the entrepreneur bears all the risk.

Some of the disagreement among these views can be resolved when they are understood in the context of Schumpeter’s separation of the entrepreneurial function and process. Knight bases his concept of entrepreneurship on people who are entrepreneurs by nature, and thus views

entrepreneurs as leaders in both a pioneering and a management sense; he does not explicitly separate these functions. Schumpeter argues that entrepreneurship is a process that can occur in any person, and thus explicitly separates the entrepreneurial function from that of manager or capitalist. However, Schumpeter notes that the capitalist function and the entrepreneurial function often overlap in reality, and thus entrepreneurs often become bearers of risk in their role as capitalist. In other words, while Schumpeter argues that the “pure” entrepreneur does not bear risk, the entrepreneurial process involves risk-taking because of the risk-bearing function of the capitalist.

The spectrum of entrepreneurial action

The fifth aspect of entrepreneurship is the spectrum of entrepreneurial activity. Though this aspect is addressed differently within the three conceptual frameworks, all agree that a spectrum of entrepreneurial innovations exists and ranges from the grand or radical, entirely new product or process, to the incremental, tinkering kind of innovation of a previous radical innovation, all of which can be considered entrepreneurial.^[13] The implication for measuring entrepreneurship is that it can occur in small start-up businesses as well as large existing firms.

Economic change

Finally, each school of thought posits that entrepreneurship is a key driver of economic change. Schumpeter emphasizes this point most strongly, arguing that the entrepreneur is the “agent of economic change.” For Schumpeter, the entrepreneurship process is more than just a catalyst of economic change; it is the cause of economic change. The process of entrepreneurship brings new innovations to the market, creating jobs and other business opportunities, as well as increasing productivity. As a result, entrepreneurs help expand the frontier of economic growth. While he does not emphasize this point to the same extent that Schumpeter does, Knight argues that entrepreneurs bring successful innovations to the market and, as a result, increase competition and economic prosperity. Kirzner takes a different view, arguing that entrepreneurship is a process of correcting knowledge errors in the marketplace, thereby reallocating capital to projects that yield higher returns.

Conclusion

By now, it should be clear that despite numerous attempts to develop a unified theory of entrepreneurship, there is still no agreement as to a conceptual framework, let alone a concise definition. However, a review of the key schools of thought on entrepreneurship reveals that there are some common aspects: enterprise, innovation, process, risk-taking, spectrum of entrepreneurial action, and economic change. While a precise definition of entrepreneurship is not proposed here, the combination of these aspects may be the first step towards developing a reasonable consensus and, ultimately, a unified conceptual framework of entrepreneurship. Equally important, these common aspects of entrepreneurship create the criteria for measurement.

¹³ William Baumol has furthered our understanding of entrepreneurship with respect to the hierarchy of entrepreneurial action (Baumol, 2002) and economic change (Baumol et al., 2007). Refer to Appendix B for a review of this work. For an empirical discussion, see Acs and Audretsch (1988).

2 Current measures of entrepreneurship

This section explores the most widely cited measures of entrepreneurship. The attempts to empirically measure entrepreneurship are highly scattered and focus (often purposefully) on only one aspect, largely because there are numerous definitions of entrepreneurship. As a result, most empirical measures are not well connected to the aspects of entrepreneurship discussed in the first section of this study. In addition, some focus on international comparison while others focus on comparisons of sub-national jurisdictions. In addition, many others have methodological problems.^[14] Overall, the current stock of measures fails to provide a comprehensive measure of entrepreneurship that is applicable across regions. Most importantly, a lack of comprehensive measurement means that there is no way to determine where and why entrepreneurship flourishes.

Global Entrepreneurship Monitor

One of the most widely cited measures of entrepreneurship is the Global Entrepreneurship Monitor (GEM). The GEM is an international consortium of researchers who analyze responses of surveys and expert interviews to measure entrepreneurial activity in about 40 countries. For example, in their national report for Canada, they conducted a nation-wide survey of 1,664 Canadians, asking them up to 40 questions, to measure entrepreneurial activities and attitudes (Riverin et al., 2003). The authors also collected data from in-depth interviews with 18 national experts on entrepreneurship, and a survey of 36 experts in each country that participated in the GEM project. The main outcome of these national reports is a measure called the Total Entrepreneurial Activity (TEA) Index, a calculation of the adult population engaged in entrepreneurial activity (defined as starting or running a business that is less than 3.5 years old).

GEM's TEA Index has its advantages as a measure of entrepreneurship. As evidenced by being widely cited, it offers an easy to understand measure of new firm formation, an important element of entrepreneurship. In addition, the GEM index covers a number of countries. However, it also has a number of disadvantages. First, it is a narrow measure. As David Audretsch explains, an "obvious limitation of this approach is that it restricts entrepreneurial activity to the process of the firm startup" (2002: 4–5). The implication of this is that the GEM fails to capture entrepreneurship that occurs within existing firms. The Organisation for Economic Co-operation and Development (OECD) has a similar view: "there is not universal agreement that new firm formation is the best measure of entrepreneurship but it is certainly widely used and oft-quoted" (2006: 21). Moreover, even for this narrow measure, there is more accurate data available (OECD, 2006).^[15]

Another disadvantage of GEM's index is that its imprecise definition of entrepreneurship allows for too much interpretation among survey respondents. One specific issue is that the GEM

14 See Parker (2008) for a more in-depth review of some methodological problems, particularly for international measurement of entrepreneurship.

15 The OECD explains that the "GEM estimates of nascent entrepreneurship ... serve as a proxy for new firm creation as they measure new entrepreneurs rather than new firms ... virtually all OECD countries, however, maintain complete registers of all businesses that can be used to produce a wide variety of accurate measures on firm entry, exit, and growth, by industry and region" (2006: 21).

measure of entrepreneurship includes both actions taken by individuals to create a business and their intentions to act entrepreneurially. William Baumol and his colleagues argue that the inconsistent results from year-to-year and methodological problems with the GEM make the results difficult to interpret: “it is not clear that GEM’s definition of entrepreneurial activity is sufficiently nuanced for scientific inquiry, and it is possible that interpretations of this definition may vary significantly across countries” (2007: 283).

Kauffman Index of Entrepreneurial Activity

Another important measure of entrepreneurship is the Kauffman Index of Entrepreneurial Activity (Fairlie, 2006). This index, which focuses on the US states, uses one measure: the rate of business creation at the individual owner level. Specifically, it measures the proportion of adult non-business owners per 100,000 population who create a new business each month, including employer and non-employer businesses, incorporated and unincorporated businesses, across all industries.

The Kauffman index marks an improvement over the GEM index in that it focuses exclusively on actions taken by individuals and excludes people who are only intending to act entrepreneurially. The exclusion of intent to act entrepreneurially removes any difference in interpretation across respondents that could bias results. Another positive aspect of this measure is that it relies on quantitative data of new business start-ups rather than survey responses, which makes comparisons among regions more accurate. Indeed, the Kauffman index is one of the few current measures that enables comparisons among subnational jurisdictions.

The major disadvantage of the Kauffman index, however, is that it consists of only one measure. Consequently, similar to the GEM, it misses all the other important elements of entrepreneurship.

Denmark’s Entrepreneurship Index series

In 2005, Denmark’s National Agency for Enterprise and Construction published a study titled *Entrepreneurship Index 2005: Entrepreneurship Conditions in Denmark*. Their index of entrepreneurship for Denmark is comprised of two indicators, each with two measures. The first indicator is start-up activity, which measures the registration of new businesses as a percentage of total businesses, and includes the GEM’s TEA Index. The second indicator is new firm growth, which measures the percentage of new businesses with revenue growth of more than 60.0% and the percentage of businesses with employee growth of more than 60.0%.

One of the advantages of the Denmark index is that, to our knowledge, it is currently the only index of entrepreneurship that consists of multiple indicators. As such, it is a positive step towards capturing a broader view of entrepreneurship. Another advantage of this index is that it relies mainly on quantitative data, which may make their model useful for comparison across regions.

One disadvantage of the 2005 Denmark index was the inclusion of GEM’s TEA Index. However, the GEM TEA Index was not included as a component of the 2006 index, which instead relied

exclusively on business start-up and growth measures.^[16] Another problem with the Denmark index, however, is the inclusion of a firm growth subindex. It is unclear, particularly in the context of the key conceptual frameworks discussed above, to what extent firm growth is an important measure of entrepreneurship. In fact, firm growth does not seem to be clearly linked to any of the conceptual frameworks discussed in the previous section.

World Bank Entrepreneurship Survey

The World Bank Group's Entrepreneurship Database (2008) measures entrepreneurship using business start-up rates in 84 countries. The survey also measures business density and the distribution of businesses by industrial sector.

The primary advantage of the World Bank survey is its breadth of measurement. It measures business start-up rates across a large number of countries in many different global regions with a number of different policy regimes. Another practical advantage of the survey is that it is easily available, and the data of the survey can be downloaded from the internet.

The major disadvantage of the World Bank survey is that the definitions and measures of business start-up rates used are not consistent across the countries surveyed.^[17] Consequently, little can be concluded about the start-up rates in different countries. Another disadvantage of the World Bank survey is that it only includes one aspect of entrepreneurship.

Other measures

Academic research has also contributed to the measurement of entrepreneurship. Most of the academic research on entrepreneurship focuses on one of two proxies: self-employment rates or business start-ups.^[18] For example, in an article in the *American Economic Review*, David Evans and Linda Leighton (1989) looked at how a number of factors influence workers to stay as employees or become self-employed or, as the authors refer to them, entrepreneurs. This type of methodology—using self-employment rates as a proxy for entrepreneurship and investigating the impact of a number of factors on “entrepreneurship” across jurisdictions—is a common approach found in academic research.^[19]

16 The 2007 version of the index also did not include the GEM TEA Index. At the time of the publication of this study, the 2007 Denmark index was being translated into English.

17 Thank you to an anonymous reviewer for this analysis of the World Bank survey.

18 See Gartner and Shane (1995) for a review of the literature.

19 A review of the most up-to-date research demonstrates that the use of self-employment as a proxy for entrepreneurship is still widely used. For example, in two recent articles in *Small Business Economics*, Grilo and Irigoyen (2006) and Bosma et al. (2005) examined self-employment rates in Europe (see also Fairlie and Woodruff, 2005, and Georgellis and Wall, 2000). Another subset of this research uses survey data to determine people's preferences towards being self-employed (for example, see Blanchflower and Oswald, 2001).

The rate of business start-ups is another proxy for entrepreneurship that is used in academic research. Similar to the approach of the self-employment studies, these studies tend to look at how a number of economic factors impact business start-up rates.^[20]

Other less often used proxies for entrepreneurship found in the literature include the number of business owners compared to the total number of workers (Audretsch et al., 2002; Carree et al., 2002), R&D spending, patents, and innovations brought to the market (Audretsch, 1995), as well as the number of high-growth firms, or “gazelles” (Birch, 1999). However, there is no comprehensive measure of entrepreneurship that incorporates a number of different measures across jurisdictions.

Conclusion

Overall, the most widely used measures of entrepreneurship fail to capture the common aspects of entrepreneurship specified in the first section: enterprise, innovation, process, spectrum of entrepreneurial action, and economic change. In fact, what is consistent among the various attempts to measure entrepreneurship is the focus on just one or two indicators. The OECD summarized the situation by stating that “while there is considerable interest in entrepreneurship ... there is, as yet, neither an overall entrepreneurship statistical framework, including concepts and definitions, nor an agreed-to list of the key indicators that are required to improve the collective understanding of entrepreneurship and its impacts” (2006: 4).^[21] Essentially, there is a need for a comprehensive measure of entrepreneurship, one that attempts to capture the various aspects of entrepreneurial activity and is well connected to entrepreneurship theory.

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- 20 Examples include a study by Paul Reynolds and his colleagues (1994) who examined the rate of firm births in five European countries, and, more recently, a study by Christine Tamasy (2006) who examined business start-ups rates in various regions in Germany. Another subset of studies within this approach focuses on the stock of businesses, rather than the change over time. For example, in two studies Scott Shane (1996; with William Gartner, 1995) measured the effects of 17 economic factors on his proxy for entrepreneurship: the number of businesses per capita in the United States.
- 21 Research on improving the measurement of entrepreneurship, particularly on developing sound methodology for international comparison, has blossomed in recent years. For examples, see Congregado et al. (2008), Parker (2008), and Davis (2008).

3 Measuring entrepreneurship: empirical indicators

This section explores empirical indicators that could be used to create a comprehensive measure of entrepreneurship. The section aims to identify empirical indicators that are well connected to the aspects of entrepreneurship discussed in section one: enterprise, innovation, process, risk-taking, spectrum of entrepreneurial action, and economic change.^[22]

This section is made up of three parts. The first part presents six potential measures of entrepreneurship for which data is readily available: business creation, self-employment, small businesses, venture capital, R&D spending, and patents. This part defines each indicator, explains why it is an indicator of entrepreneurship, and discusses the advantages and disadvantages of each indicator, as well as values and rankings for the 10 Canadian provinces and 50 US states. The second part discusses five other measures that may be useful, though current data is not comparable or available: business expansion, business ownership, innovation, initial public offerings, and business losses. Each indicator is defined, and then a short discussion of measurement problems follows. A summary of the potential measures and some of the current outstanding issues with the measurement of entrepreneurship concludes this section.

Business creation

Business creation is the process of starting a new enterprise. A new enterprise is defined as a business that has a payroll above zero in any given year and did not exist in the previous year. Business creation is a critical measure of entrepreneurship as starting a new business represents one of the primary ways in which entrepreneurs bring new ideas to the market. In other words, business creation can represent the commercialization of ideas (Acs, 2006). Thus, business creation rates measure the extent to which people perceive an entrepreneurial opportunity and act to bring that opportunity to fruition.

Another reason business creation is an important measure is because it captures, in part, the dynamic element of entrepreneurship that is critical to economic change. The process of new business formation serves to increase competition, destroying businesses that are no longer competitive and putting competitive pressure on existing firms. Joseph Schumpeter (1942) famously described this process of new business creation as “creative destruction,” whereby new businesses replace (or destroy) existing firms that are no longer competitive.^[23] He argues that

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- 22 This selection of indicators has been filtered from a larger list which has survived through numerous rounds of consultation with the Centre for Entrepreneurship and Markets’ Panel of Advisors. The Panel includes a mix of university professors, successful entrepreneurs, and policy professionals.
- 23 Enrico Santarelli and Marco Vivarelli (2006) note that new firm formation is not a “pure” measure of creative destruction in the context Schumpeter described. In addition to the innovative entrepreneurs to which Schumpeter was referring, the authors report that other new firms that do not match Schumpeter’s description are also created. For example, new entrants, which the authors refer to as “passive followers,” and entrants who merely copy the original innovator do not match Schumpeter’s description. Put differently, it should be recognized that a small percentage of new firms are created as a response to some factor other than entrepreneurial impulse.

new firms are able to replace existing firms because they bring new ideas, innovations, products, or processes to consumers. By increasing competition, innovation, and productivity, the process of business creation helps to increase economic growth.[24]

Advantages and disadvantages

The major advantage of business creation as an indicator of entrepreneurship is that it represents the primary way in which people bring ideas to the market. Put differently, the creation of a new business represents a mechanism by which entrepreneurs can gather resources (ideas, employees, and financing) and combine them to commercialize their idea. Combining business creation with the number of firms that go out of business to determine “net” business creation provides a measure of the dynamic element of the entrepreneurship process emphasized by Joseph Schumpeter.

The primary disadvantage of using business creation as a measure of entrepreneurship is that the most appropriate firm size to measure is unknown. Data availability in this study has limited the measure of business creation to firms with 1-9 employees. While most business creation occurs within this group, debate over the optimal measure is still open. In addition, William Baumol and his colleagues (2007) suggest that including the smallest firms (i.e., receipts of \$1,000 or less) may overstate entrepreneurial activity as it may include side or casual businesses. Thus, including very small operations—where the so-called entrepreneur still generates most of his or her income from paid employment—in a measure of business creation may not lead to an accurate reflection of the level of entrepreneurship occurring in a jurisdiction.

Observations

To compare business creation in Canada’s provinces and the US states, the number of firms will be limited to those having 1-9 employees. There are three reasons for using this definition. First, and most importantly, most of the entrepreneurial activity in this context—business creation—occurs in firms with less than 10 employees (Godin and Clemens, 2007). Including larger firms generally will not change the rankings. Second, the US data defines a business as an “establishment,” whereas Canadian data defines a business as a “firm.” An establishment is a single physical location of a business whereas a firm consists of one or more establishments under common ownership. As there are very few multiple-establishment firms with less than 10 employees—less than 1.0% (Godin and Clemens, 2007)—firms and establishments can be used interchangeably for smaller-sized firms, thus limiting any difficulties with definition differences. Third, including firms that have more than 10 employees can generate wide swings in business start-up rates, given that the base measure—total businesses—varies considerably between Canadian provinces and US states. For example, the difference between the number of firms with 1-9 employees and 1-19 employees was 7.4% in Canada and 17.4% in the United States on average from 2002 to 2003, the latest year for which data for the United States is available. This means that using the total number of firms with 1-19 employees as a way to compare business births across regions would make it seem as though the United States had lower birth rates, when the difference could actually be driven by the fact that the United States has more firms that are surviving into the larger

24 Nobel Laureate Edmund Phelps and Gylfi Zoega (2007) argue that this dynamic element of new business creation is a key explanation of differences in economic prosperity between nations.

group size. To keep the comparison between US states and Canadian provinces as accurate as possible, this potential bias towards Canadian provinces was removed by focusing only on businesses with 1-9 employees.[25]

Business start-ups

Figure 1 shows average business start-ups as a percentage of all small businesses (1-9 employees) in the 10 Canadian provinces and 50 US states for 2002-2003.[26]

Nevada has the highest rate of business start-ups out of all 60 jurisdictions (22.85%). Utah (20.38%) and Florida (20.07%) ranked second and third overall. Nine of the top 10 jurisdictions were US states. North Dakota ranked last with a business start-up rate of 11.42%.

The highest ranked Canadian province, Newfoundland (ninth), had an average business creation rate of 16.56%. The remaining nine Canadian provinces were distributed throughout the rankings. In addition to Newfoundland, there were five provinces (Alberta, British Columbia, Prince Edward Island, Ontario, and Manitoba) in the top half of the rankings and four in the bottom half (New Brunswick, Saskatchewan, Nova Scotia, and Quebec). Quebec (54th) was the lowest ranked province with a rate of 11.93%.

On average, US states had a slightly higher rate of business births than Canadian provinces.[27] The US national average of business births from 2002 to 2003 was 14.9%, while in Canada it was 13.3%.

Net business creation

Figure 2 shows the average net business creation of these firms for 2002 to 2003. This measure indicates the extent to which more businesses are being created than destroyed.

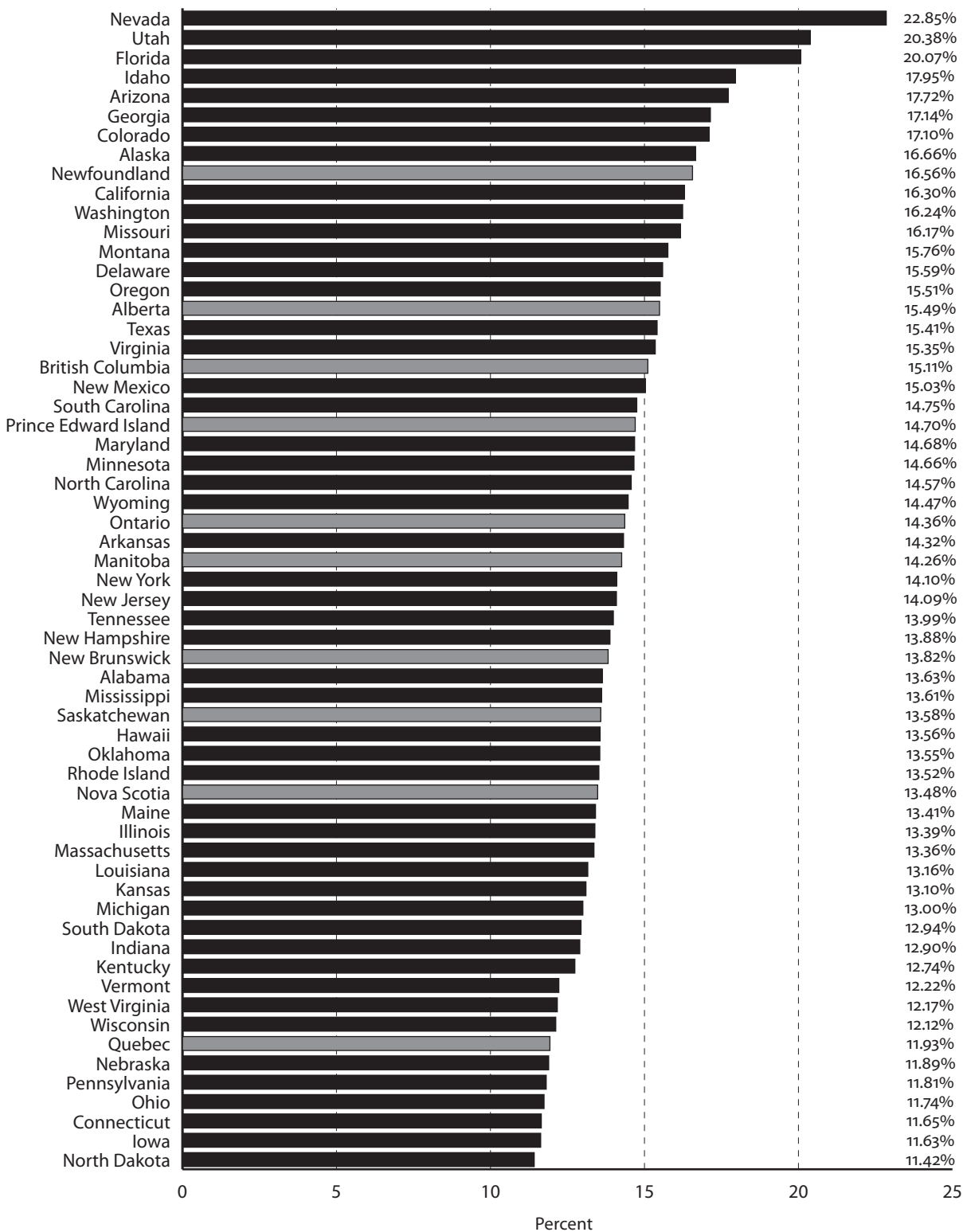
With a rate of 5.21%, Nevada had the highest rate of average net business creation out of all 60 jurisdictions. Florida (4.67%) and Utah (4.46%) ranked second and third overall. All of

25 Thank you to the anonymous reviewer who pointed out this potential problem with measuring start-ups (and net business creation) in relation to the total number of businesses—namely, that the start-up rate could be sensitive to swings in the number of businesses from year to year. We have addressed this, at least in part, by using an average over 2002 and 2003 (when newer data becomes available, this measure can be further improved). In addition, start-ups as a percentage of total businesses is a commonly used measure in the literature and, for this study, has been through numerous rounds of consultation and review by measurement experts. Nonetheless, another way to measure business start-ups across jurisdictions is to compare start-ups to population. The results using this measure do change, however. As this measure has not been developed in the literature, it is unclear to what extent industrial structure or other demographic factors are driving these results. Future research is required.

26 There is a difference between how Canadian and US business birth and death data is collected. For Canada, the number of firms and the number of business births and deaths are organized by calendar year. For the United States, the number of establishments and the number of business births and deaths are measured from the end of the first quarter of the base year to the end of the first quarter of the following year.

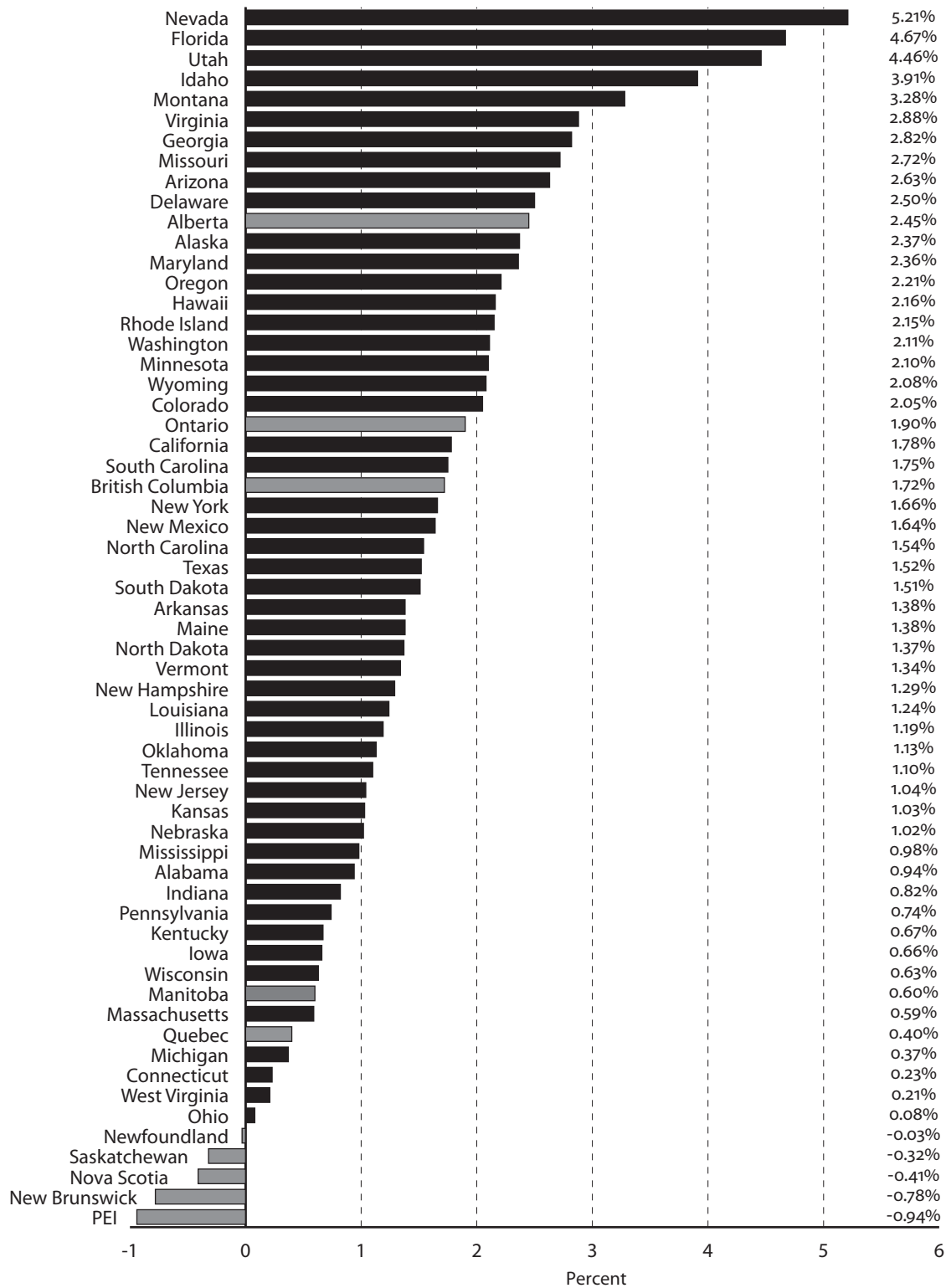
27 Data from 2002 and 2003 was the latest available from US sources; there is Canadian data for 2004. Examining the Canadian data for 2004 reveals that most provinces had a significant positive increase in business births from 2003 to 2004, meaning that their average rate of business births (using a three-year 2002-2004 average, for example) would increase. For example, the three provinces with the highest average birth rates in 2002 and 2003—Newfoundland, Alberta, and British Columbia—experienced birth rates of 18.2%, 16.9%, and 17.1%, respectively, in 2004.

Figure 1: Average business start-ups as a percentage of total firms with 1-9 employees, 2002-2003



Sources: Statistics Canada (2007g); United States Census Bureau (2007b); calculations by authors.

Figure 2: Average net business creation as a percentage of total firms with 1-9 employees, 2002-2003



Sources: Statistics Canada (2007g); United States Census Bureau (2007b); calculations by authors.

the top 10 jurisdictions were US states, six of which (Nevada, Florida, Utah, Idaho, Georgia, and Arizona) were also in the top 10 for business births.

The highest ranked Canadian province, Alberta (11th), had an average net business creation rate of 2.45%. Among the remaining Canadian provinces, only Ontario (21st) and British Columbia (24th) ranked in the top half of all jurisdictions. Manitoba ranked 49th, while the remaining six provinces ranked 51st or lower. In fact, Canada's Atlantic provinces (Newfoundland, Nova Scotia, New Brunswick, and Prince Edward Island) and Saskatchewan occupied the bottom five rankings, all having a negative average rates of net business creation. This means that more firms went out of business than were created in these provinces. As Schumpeter would note, this situation is critical because a jurisdiction that fails to generate more new business formation relative to business failure does not create the dynamic element of the entrepreneurship process—the element that drives innovation, competition, and economic change. Overall, the US states far outperformed Canadian provinces in terms of net business creation.

Self-employment

Self-employment as a measure of entrepreneurship looks at those individuals who make an occupational choice to work on their own rather than for an employer. This occupational choice is “enterprising” in that it involves a greater degree of risk in terms of future earnings than that involved in paid employment. It also offers the potential for higher rewards. The combination of greater risk and potentially higher rewards drives certain people to act entrepreneurially, by developing their own businesses and working for themselves. As a result, many researchers rely on self-employment rates as a proxy for entrepreneurs. In fact, along with business start-ups, self-employment rates are one of the most widely used indicators of entrepreneurship.

Self-employment is measured as the number of non-agricultural self-employed persons as a percentage of total non-agricultural employment.[28] As with most of the literature, the agricultural self-employed are excluded because the decision to become self-employed in the agricultural sector depends on factors that are different from those that affect the decision to become self-employed in all other industries (Georgellis and Wall, 2006). For example, many agricultural businesses are family operations. Including the agricultural sector, therefore, would make it seem as though jurisdictions with large agricultural sectors are more entrepreneurial when in fact many residents have not brought a new idea or innovation to the market.[29]

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- 28 The US Bureau of Labor Statistics collects self-employment data for unincorporated persons only. Incorporated self-employed individuals are treated as employees of the corporation and thus are not included in the overall number of self-employed. For this reason, incorporated self-employed individuals in Canada (who are recorded as a separate category) were removed, enabling a comparison of the same groups of people across the Canadian provinces and US states. As this is a minor adjustment, it did not significantly change the rankings or the interpretation of the results. Also, there is a small difference between Canada's definition of “employable” and that of the United States: Canada tabulates employment data for those over the age of 15, while the United States uses a threshold of 16 years of age. See Appendix A for more details.
- 29 Another, more practical reason for excluding agricultural self-employed is that the figures for the US states are rounded to 1,000 workers, which could result in dramatic swings in self-employment rates. For example, if a small jurisdiction had fewer than 1,000 workers employed in the agricultural sector or self-employed in

Advantages and disadvantages

The primary advantage of using self-employment as an indicator of entrepreneurship is that it captures, at least in part, the number of people who have made an occupational choice to work on their own rather than for an employer. While there is a lag with the availability of US data, another practical advantage of using self-employment is that the data is comparable and readily available.

However, there are several disadvantages associated with using self-employment rates as indicators of entrepreneurship. First, self-employment rates can be driven by other factors that influence people to move from paid employment to self-employment. As Robin Douhan and Magnus Henrekson explain, “self-employment due to the lack of other opportunities (often called necessity entrepreneurship) does not qualify as entrepreneurship. Nor does self-employment induced by artificially high returns stemming from subsidies and tax breaks” (2007: 3). Moreover, there is no way to know which self-employed individuals are bringing truly innovative ideas to the market (with the intention of growth) or are merely wishing to maintain their market share (Baumol et al., 2007).

Second, there are statistical problems with self-employment rates. Specifically, self-employment rates are highly influenced by the industrial structure and demographic composition of each jurisdiction. In fact, Edward Glaeser (2007) found that half of the variation in self-employment rates can be explained by demographics and industrial structure. For example, a jurisdiction with a larger portion of the economy made up by an industry with higher self-employment rates will rank higher than another jurisdiction that has a smaller portion of its economy made up by that same industry.^[30]

Observations

In 2002, British Columbia had the highest percentage of self-employed in the non-agricultural sectors (11.91%) (figure 3).^[31] Prince Edward Island and Montana followed close behind with 11.00% and 10.95%, respectively. Delaware ranked last with a non-agricultural self-employment rate of 3.77%.

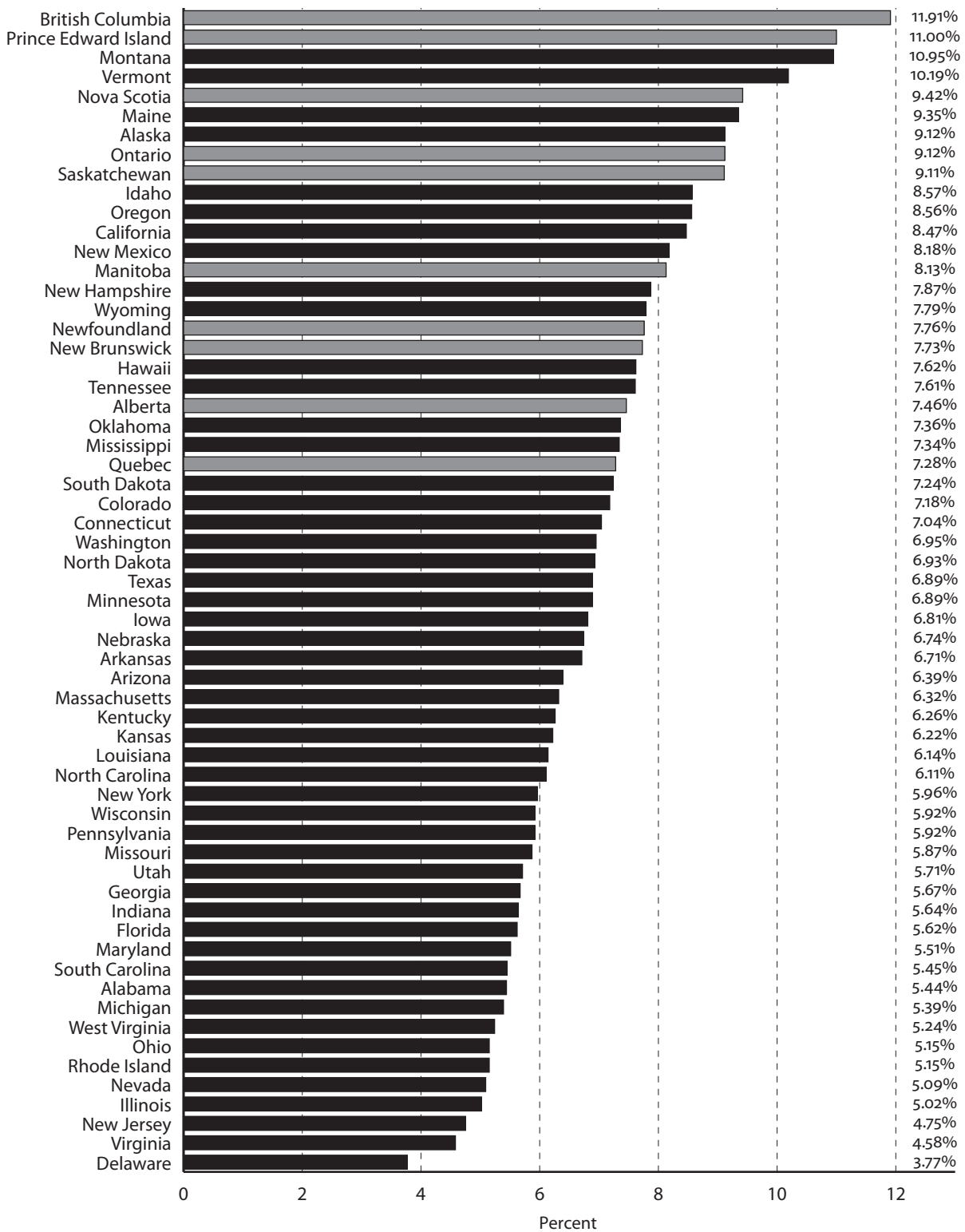
The Canadian provinces generally had high rates of self-employment and, as a result, all were in the top half of the 60 jurisdictions. British Columbia, Prince Edward Island, Nova Scotia, Ontario, and Saskatchewan were in the top 10, while the remaining provinces ranked no lower than 24th. Overall, Canadian provinces ranked high on this indicator relative to the US states.

that sector, then it would appear that that jurisdiction had a 100% self-employment rate (which is the case for Alaska).

30 Unfortunately, self-employment rates based on industrial classification codes are not available for the United States. This is an area where future research may be pursued.

31 At the time of publication, 2002 was the latest year for which data was available for the United States.

Figure 3: Unincorporated non-agricultural self-employment as a percentage of total non-agricultural employment, 2002*



*Note: The latest year for which self-employment data by state is available from US sources is 2002.
 Sources: Statistics Canada (2006b); United States Department of Labor, Bureau of Labor Statistics (2007);
 calculations by authors.

Small businesses

Small businesses are often considered to be the same as entrepreneurial businesses.^[32] Research shows that many but not all small businesses tend to be innovators in the context Schumpeter uses when describing the entrepreneurial process as essentially innovative. In a large review of the empirical research on entrepreneurship, Simon Parker (2005) found that small firms have above average rates of innovation—that is, in relation to all other sizes of firms, the smallest firms tend to generate more innovations. Parker’s review of the research also revealed that small firms tend to grow faster (in terms of employees and revenue) and have higher productivity compared to other sizes of firms.

However, as Schumpeter and Kirzner emphasize, innovation in this context does not necessarily mean the creation of knowledge. For example, small firms do not need to create inventions and secure patents or trademarks to be considered innovative. Small firms are considered entrepreneurial if they bring those inventions, patents, or some other combination of resources to the market for a potential profit. As Kirzner explains, entrepreneurs may only need to exploit a business opportunity that no one else has noticed to be considered entrepreneurial. The implication of this is that the measure of small businesses in the context of entrepreneurship should be as broad as possible, and should not focus on what have traditionally been considered innovative small businesses (i.e., its focus should not be limited to small businesses in certain industrial sectors).

Advantages and disadvantages

The primary advantage of using small businesses as an indicator of entrepreneurship is that they are the primary vehicle through which radical innovations are brought to the market. Larger firms tend to be associated with replicative or incremental kinds of innovations.

However, there are some important disadvantages of this indicator. First, an examination of both small business measures used in this study—firms with 1-9 employees and firms with 10-49 employees—reveals that little can be concluded about the level of entrepreneurship when this indicator is considered on its own. Not only is there little variation among jurisdictions, but there are also few, if any, discernible patterns in terms of groups of jurisdictions. Moreover, it could be the case that the number of small businesses is not necessarily driven by entrepreneurial activity, but, similar to self-employment, may be driven by industrial structure and demographics. In addition, this measure does not reveal which small businesses are innovative and which ones are entrepreneurial.

Second, a practical disadvantage of this measure is the lack of consistent definitions of small businesses across jurisdictions. The definitions of terms such as “firm” and “establishment” vary, as does the definition of a small business based on the number of workers employed by a business or the amount of revenue generated by a business. Furthermore, some measures include businesses that are operated by one individual, while others only focus on firms that employ at least one individual (in addition to the owner or operator).

32 While the two types of businesses may overlap, a small business is conceptually different from an entrepreneurial business (Carland et al., 1984). A small business does not need to be entrepreneurial and vice versa.

Observations

There are several practical issues associated with the measurement of small businesses. First, there are different ways in which “small” can be defined. Some researchers use amount of revenue to create a definition, but the most widely used determinant—and the measure used in this study—is firm size, measured in terms of the number of workers employed by a firm. The second issue is determining what firm size will define a small business. In this study, a small business will be defined as a business with less than 50 employees. This definition of a small business will be divided into two subcategories: those with 1-9 employees and those with 10-49 employees. The reason for this division is that there is little difference between the Canadian provinces and US states when firms with 1-49 employees are considered.^[33] However, when this group is organized into the two groups noted above, there is a difference. To compare small businesses across all jurisdictions, the number of small businesses is measured as a percentage of the total number of businesses within a particular jurisdiction (see Appendix A for a more detailed description of the data). To minimize the effects of dramatic swings from year to year, an average of two years is used.^[34]

Firms with 1-9 employees

Figure 4 shows the average number of businesses with 1-9 employees as a percentage of the total number of businesses in each of the 10 Canadian provinces and 50 US states in 2003 and 2004.

Montana had the highest number of businesses with 1-9 employees as a percentage of total businesses (79.2%). Two Canadian provinces, Quebec and Newfoundland, ranked second and third with 78.9% and 78.6% of their businesses having 1-9 employees, respectively. The lowest ranked jurisdiction was Ohio, where 69.9% of businesses had 1-9 employees.

The remaining Canadian provinces were distributed throughout the rankings, ranging from 13th to 59th. The lowest ranked Canadian province was Manitoba, where 70.1% of businesses had 1-9 employees.

Overall, there was little variation in terms of the concentration of businesses with 1-9 employees in the Canadian provinces and in all 60 jurisdictions. Among the Canadian provinces, the concentration of businesses with 1-9 employees ranged from 70.1% in Manitoba to 78.9% in Quebec. Among all 60 jurisdictions, the concentration of these businesses ranged from 69.9% in Ohio to 79.2% in Montana.

Firms with 10-49 employees

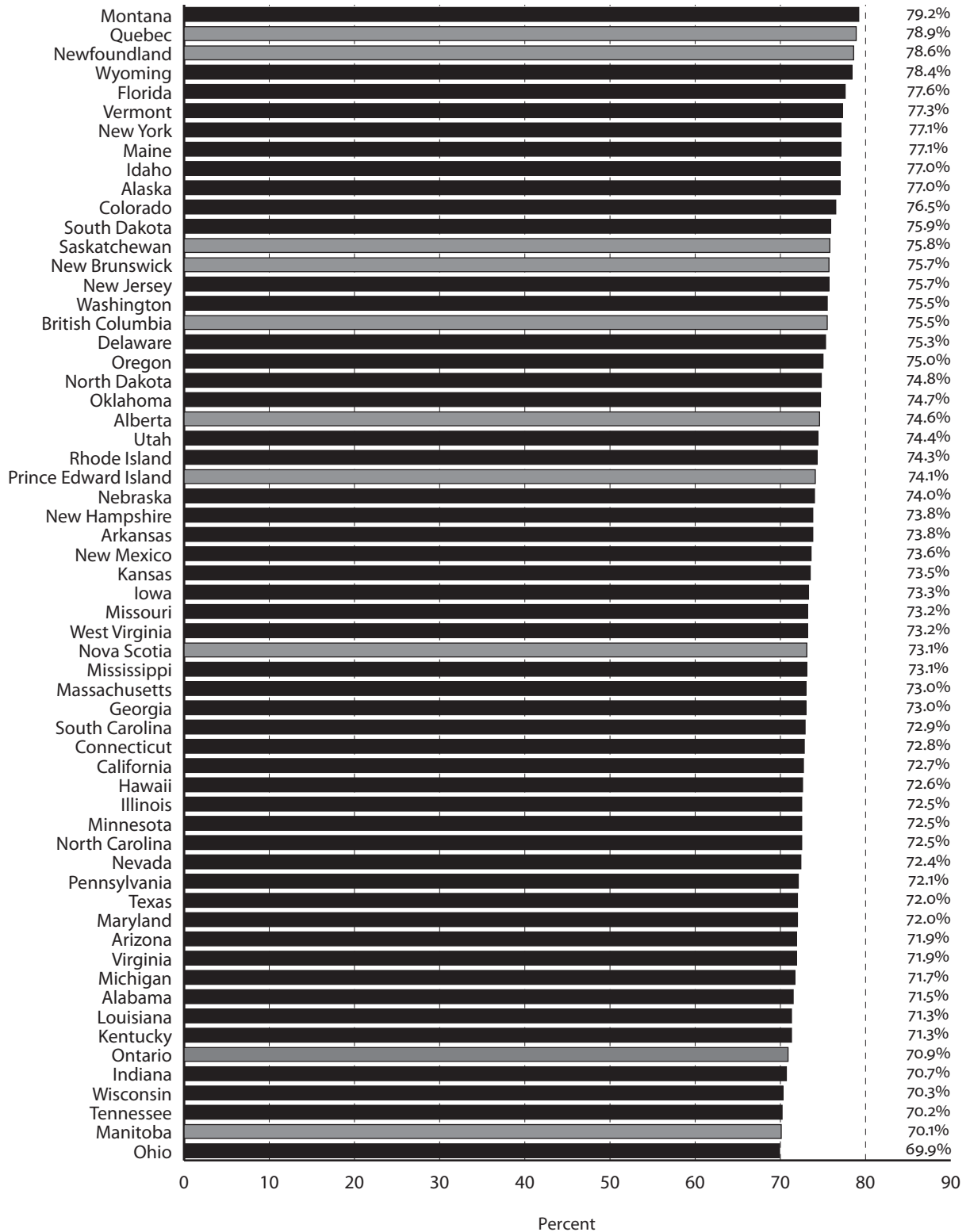
Figure 5 shows the average number of businesses with 10-49 employees as a percentage of the total number of businesses in Canada’s provinces and the US states in 2003 and 2004.

Manitoba had the highest average number of businesses with 10-49 employees as a percentage of the total number of businesses (23.9%). The lowest ranked jurisdiction was Quebec,

33 Another way to measure small businesses is to compare the number of small businesses to population. For both the 1-9 and 10-49 sizes of firms, Canadian provinces generally rank higher on this measure. However, the range between the highest and lowest ranked jurisdictions is similar in magnitude as the small business “intensity” measure presented in the study. For example, in 2004 the number of businesses with 1-9 employees per 100 people was 3.5 in the highest ranked jurisdiction and 1.5 in the lowest.

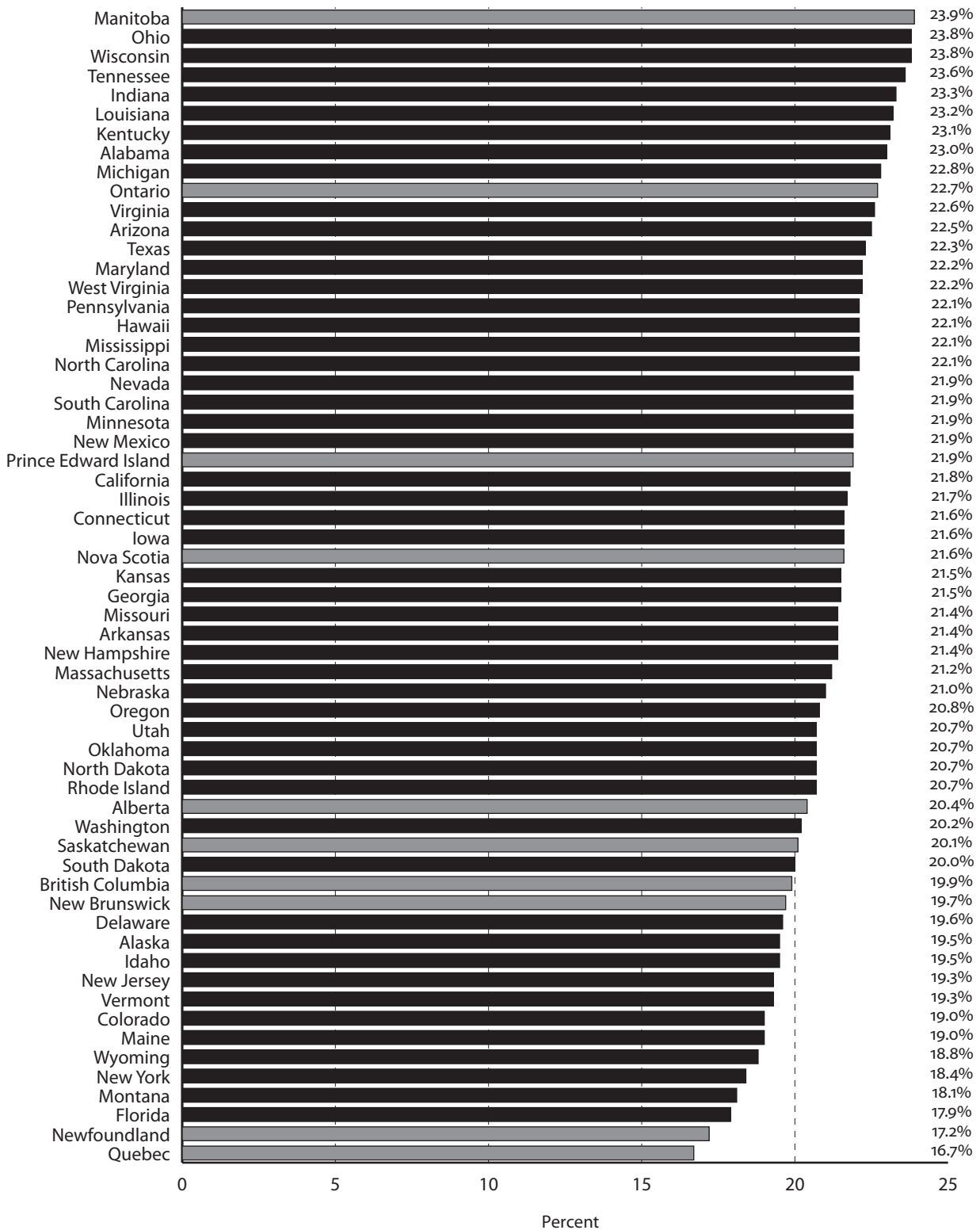
34 At the time of publication, small business data for 2003 and 2004 was the latest available for the United States. Adding 2002 data for the United States did not substantially change the rankings.

Figure 4: Average number of small businesses with 1-9 employees as a percentage of total businesses, 2003-2004



Sources: Statistics Canada (2007h); United States Census Bureau (2007b); calculations by authors.

Figure 5: Average number of small businesses with 10-49 employees as a percentage of total businesses, 2003-2004



Sources: Statistics Canada (2007h); United States Census Bureau (2007b); calculations by authors.

where 16.7% of businesses had 10-49 employees—a difference of 7.2 percentage points. Again, the Canadian provinces were distributed throughout the rankings. Not including Manitoba (first) and Quebec (60th), the Canadian provinces had ranks ranging from 10th to 59th.

Overall, similar to the concentration of businesses with 1-9 employees, there was little variation among all 60 jurisdictions in terms of the concentration of businesses with 10-49 employees. In fact, the difference between the highest and lowest ranked jurisdiction was smaller for businesses with 10-49 employees (7.2%) than for businesses with 1-9 employees (9.3%).

Venture capital

Often referred to as “high-risk, high-return” capital, venture capital denotes the resources raised with the purpose of investing in potentially high-growth businesses. Venture capital is a unique kind of investment as the investors often take an active role in the operation of the company. The relationship between the entrepreneur and the venture capitalist can also exist at various stages of business development, from the initial stages (start-up) to later stages such as expansion.

Venture capital investment is included as a measure of entrepreneurship because it captures, at least in part, the process of bringing a new innovation or business idea to market. As economists Josh Lerner and Samuel Kortum explain, venture capitalists not only supply funds, but they also provide the expertise necessary for entrepreneurs to create businesses, innovate, bring new products or processes to market, and hire workers (Lerner, 2002; Kortum and Lerner, 1998).[35] In addition to supplying funds, they also work closely with the entrepreneur to successfully bring the idea to the market.[36] In this sense, venture capitalists may become entrepreneurs themselves while simultaneously fulfilling the capitalist function described by Schumpeter and Kirzner.

Advantages and disadvantages

One advantage of venture capital as an indicator of entrepreneurship is that it is well connected to the key conceptual frameworks discussed in the first section of this study. Private venture capital, in particular, can be considered enterprising because it is focused on bringing new innovations to the market, in the face of uncertain outcomes. Furthermore, in terms of economic change, it is associated with job creation, wealth generation, and economic growth. However, it is important to note that the strength of venture capital as a measure entrepreneurship is reflected in its ability to capture the *process*, and not strictly the *function*, to use Schumpeter’s terms.

One disadvantage of venture capital as an indicator of entrepreneurship is that it only involves a small percentage of people and businesses and may not, by itself, be a broad measure of entrepreneurship. Indeed, venture capital may only capture the radical end of the spectrum of entrepreneurial action and not measure replicative or incremental kinds of entrepreneurship. A current practical disadvantage of venture capital as a measure of entrepreneurship is the lim-

35 Hellmann and Puri (2002) explain that venture capitalists provide value-added services, help professionalize the companies they finance, and help firms establish themselves in the marketplace.

36 Paul Gompers and his colleagues (2006) found that entrepreneurial skill, more than luck, explains the success of firms backed by venture capital.

ited availability of data, organized by various types of venture capital, for the United States (see Appendix A for a more detailed description of the data).

Observations

Venture capital is measured in terms of the total amount of venture capital investment per capita in each Canadian province and US state.^[37] Population is used to determine the relative degree of entrepreneurship in different sized jurisdictions so that the size of a particular jurisdiction does not bias the results.^[38] Venture capital is also measured in terms of the amount spent on projects within each jurisdiction, regardless of the origin of those funds. Focusing on where money is spent rather than raised is an important characteristic of this form of measurement.

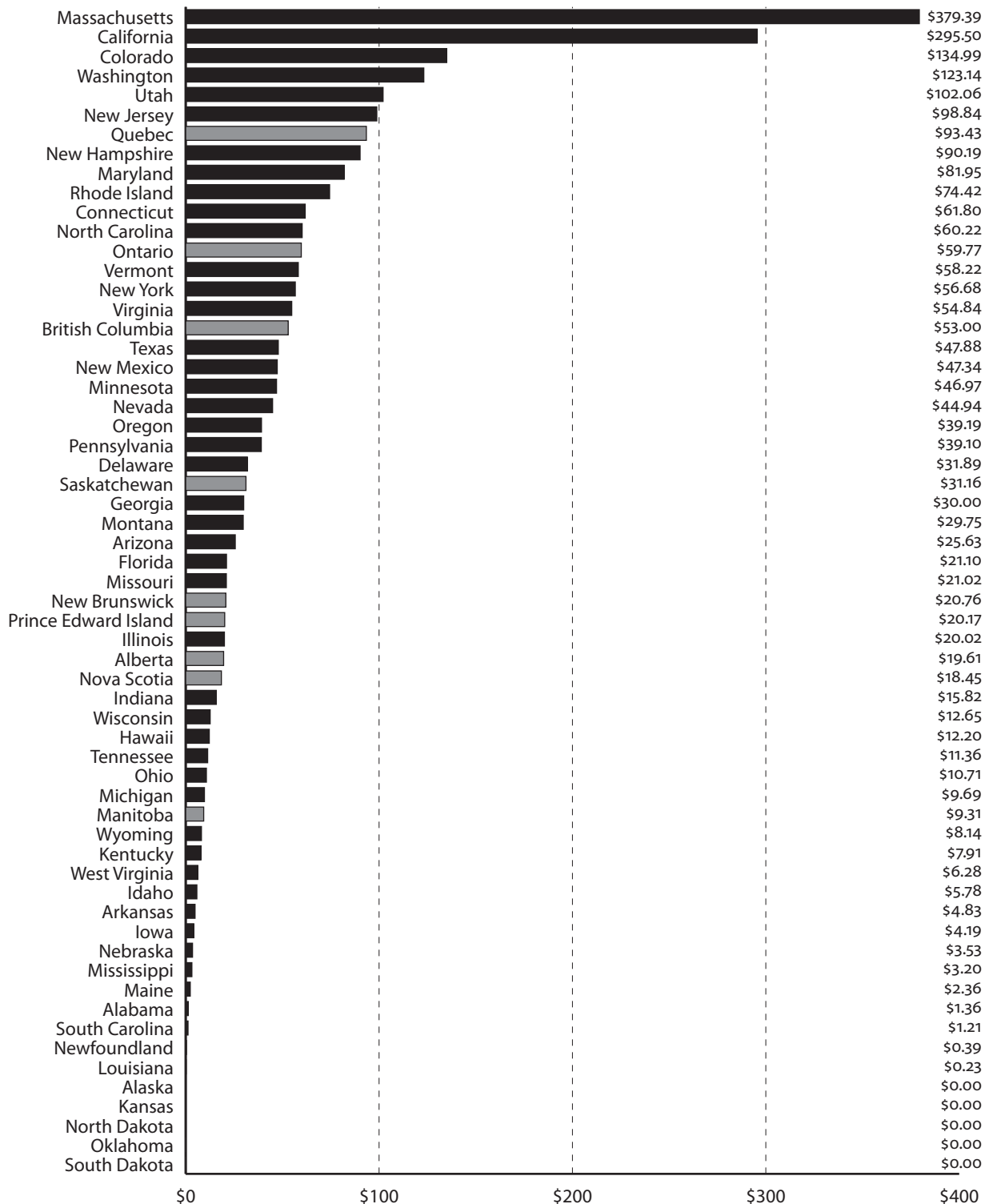
One way in which venture capital data is collected is by the location of the investor, or the venture capital fund, regardless of where the capital is invested. While it could be argued that the act of investing in a venture capital fund is part of the larger entrepreneurial process, it is not an entrepreneurial function. The process of actively participating in the launch or development of a business better reflects the entrepreneurial function. As such, the other way in which venture capital data is collected—measuring where venture capital is spent, regardless of its origin—is a better measure of the entrepreneurial process as it includes both the entrepreneurial and the capitalist function.

Of all the Canadian provinces and US states, Massachusetts had the highest venture capital per person in 2005 (\$379.39) (figure 6).^[39] This means that, on a per person basis, Massachusetts attracted the most venture capital—from both internal and external sources—and invested these funds in entrepreneurial businesses. California followed Massachusetts, attracting \$295.50 per person. These two states were well ahead of the third highest ranked jurisdiction, Colorado, which brought in \$134.99 of venture capital per person. The lowest rank was shared by South Dakota, Oklahoma, North Dakota, Kansas, and Alaska, all of which did not record any venture capital in 2005.

Quebec, which was seventh in the rankings, was the only Canadian province in the top 10, recording \$93.43 per person. The other nine provinces were distributed throughout the rankings. Only three provinces (Ontario, British Columbia, and Saskatchewan) other than Quebec ranked in the top half. Newfoundland (54th) was the lowest ranked Canadian province, recording only \$0.39 per person. Overall, though Quebec and Ontario performed moderately well, the Canadian

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- 37 Thank you to an anonymous reviewer for pointing out that the measure of venture capital supply by venture capital funds, labour sponsored venture capital corporations (LSVCCs), government, and other providers can be influenced by the demand for venture capital by entrepreneurs. That is, in a situation where demand exceeds the supply of venture capital, the level of venture capital (and thus entrepreneurship based on this measure) would be lower than it would be otherwise. While this effect is somewhat mitigated by the relative ease of capital mobility across subnational jurisdictions, it could potentially have a more important impact if there are barriers to venture capital mobility across international lines.
- 38 There are other ways to make venture capital data comparable across jurisdictions, the most notable of which is measuring venture capital as a percentage of GDP. When the authors measured venture capital in this way, neither the rankings nor the interpretation of the results changed.
- 39 This measure only includes data from 2005. For smaller jurisdictions, which experience more fluctuations in their level of venture capital from year to year than larger jurisdictions, results that are based on one year of data may be misleading. For this publication, there was a practical cost barrier which prevented the collection of multiple years of data. The eventual index will include an average of multiple years' worth of data to mitigate the impact of highly variant years in some jurisdictions.

Figure 6: Venture capital invested (by destination) per capita, 2005*



*Note: Venture capital is defined as the amount of venture capital invested in each jurisdiction. All US figures have been converted to 2005 Canadian dollars.

Sources: Thomson Financial (2006); National Venture Capital Association (2006); Statistics Canada (2007c); United States Census Bureau (2007a); Statistics Canada (2007d); calculations by authors.

provinces were well behind the US states in terms of venture capital. The difference between the Canadian provinces and US states was particularly evident in the dramatically larger California and Massachusetts venture capital markets.

However, the measures of total venture capital investment, from which the above data was calculated, may be misleading. Total venture capital spending consists of a number of sources, two of which are retail funds and government funds.^[40] Retail funds in Canada are largely made up of labour sponsored venture capital corporations (LSVCCs). LSVCCs and government funds should be excluded from the calculation of venture capital investment because they do not represent entrepreneurial decision making in the context of the concepts of entrepreneurship put forth by Schumpeter, Knight, or Kirzner. These two types of venture capital are not invested by enterprising individuals who are using their own money to invest in the face of an uncertain outcome. Rather, they are created by the government and would not exist otherwise. For example, research shows that people invest in LSVCCs for the purpose of gaining generous tax benefits, and not for the sake of investing in entrepreneurial firms (Cumming and MacIntosh, 2006).^[41]

For the above-noted reasons, this study presents another measure of venture capital, one that excludes retail and government venture capital funds and focuses on private venture capital (table 1). Currently, these data are only available for Canadian provinces.^[42] When LSVCCs and government venture capital funds are excluded from the measurement of venture capital, the values and rankings for the Canadian provinces change. As with the previous measurement, venture capital was measured in relation to population so that venture capital could be compared across different sized jurisdictions. When only private venture capital is measured, Ontario becomes the highest ranked province with \$43.54 per person, while Quebec is a close second with \$43.45 per person. British Columbia remains the third highest ranked province with \$32.83 per person. Manitoba and Newfoundland are still the lowest ranked jurisdictions, but Alberta and Prince Edward Island move up past Saskatchewan.

These results provide some indication as to which provinces rely more on government intervention to increase venture capital activity, and which ones rely more on private initiative. A greater reliance on private venture capital relative to government and retail venture capital is considered more entrepreneurial because the former involves enterprising and risk-taking while the latter involves the allocation of capital by government. Put differently, private venture capital reflects the various aspects of entrepreneurship—enterprising, risk-taking, process, innovation, hierarchy of entrepreneurial action, and economic change—better than government investment, which does not involve individuals making entrepreneurial decisions.

40 Venture capital investment is generally organized into seven types of investors: corporate, government, institutional, retail, private independent, foreign, and other.

41 A series of studies by professors Douglas Cumming and Jeffrey MacIntosh (2004; 2006) show that people invest in LSVCCs for the generous tax benefits and not necessarily for the sake of investing in entrepreneurial endeavours. These studies also show that LSVCC performance continues to lag behind private funds, and that LSVCCs maintain a large portion of their portfolio in cash, which is not being invested in firms. In their 2006 study, Cumming and MacIntosh found evidence “not merely that LSVCCs have crowded out other Canadian funds, but that they have led to a reduction in the overall size of the venture capital pool” (2006: 574). For a non-technical review of this research, see Cumming et al. (2007).

42 The National Venture Capital Association in the United States has a breakdown of private investment by type of investor for the United States as whole, but not for individual states.

**Table 1: Private venture capital invested (by destination)
per capita, Canadian provinces, 2005**

	Venture capital, less LSVCCs and government venture capital funds, per capita	Rank
Ontario	\$43.54	1
Quebec	\$43.45	2
British Columbia	\$32.83	3
Alberta	\$13.76	4
Prince Edward Island	\$13.15	5
Saskatchewan	\$10.73	6
Nova Scotia	\$9.67	7
New Brunswick	\$8.47	8
Manitoba	\$0.51	9
Newfoundland and Labrador	\$0.39	10

Sources: Thomson Financial (2006); Statistics Canada (2007c); calculations by authors.

Research and development expenditure

Research and development (R&D) expenditure represents an important aspect of entrepreneurship for several reasons. First, the decision to spend money on the R&D of a new product or process involves risk. In fact, by definition, R&D is the pursuit of a new product or process in the face of an unknown outcome (see Appendix A for more precise definitions of the R&D measurements used in this study).

Second, R&D is part of the entrepreneurship that occurs within firms. According to Baumol et al. (2007), the most innovation-related economic growth is generated when small entrepreneurial firms make radical, important innovations, and the large, corporate firms take those innovations and improve them to make them marketable. Since research shows that larger firms tend to engage in more R&D spending than small firms do,⁴³ R&D spending, at least in part, could be an important measure of the entrepreneurship that occurs within existing firms.

Finally, while industrial R&D is widely considered enterprising because the drive to invest in it is based on the pursuit of profit, recent research shows that academic R&D is also enterprising. A study by David Audretsch and his colleagues (2006) examined the prevalence and determinants of the commercialization of university scientists' research. The authors found that the number of scientists bringing ideas to the market themselves was much higher than previously thought. Calling them the "sleeping giant" of university research commercialization, the authors reported that about one in four scientists have started their own firms to bring their research to the market.

43 For example, see Cohen et al. (1987), Acs and Audretsch (1988), Cohen and Klepper (1996), Baldwin (1997), and Kleinknecht (2004).

Advantages and disadvantages

An important advantage of R&D as an indicator of entrepreneurship is that it is a measure of risk-taking and enterprise. Another important advantage of R&D is that it measures, in part, the entrepreneurship that occurs within (larger) existing businesses. However, since R&D is concentrated in larger firms, it is likely that R&D spending is associated more with incremental innovations, rather than with the more radical innovations that stem from independent entrepreneurs or small entrepreneurial businesses.

A potential disadvantage associated with using R&D as an indicator of entrepreneurship is that it may reflect the number of innovations (or inventions) produced in a jurisdiction, but not the extent to which the jurisdiction is entrepreneurial (Baumol et al., 2007). For example, in the former USSR, significant amounts of money and effort were put towards R&D (primarily by the government); however, virtually none of the ideas produced by this research were brought to the market. While this example may be less applicable to Canada and the United States, it is important to consider the institutional context in which R&D is occurring. Another potential problem, particularly with academic R&D, is that a significant portion of this “spending” is funded by the government. Similar to venture capital, the inclusion of government funding may bias the results in favour of jurisdictions that receive more government funding, and thus the results may not accurately reflect levels of entrepreneurship. Finally, a unique challenge associated with using R&D as an indicator is that it is not a measure of the entrepreneurship function per se, but is a measure of the larger entrepreneurial process.

Observations

R&D as an indicator of entrepreneurship measures the amount of R&D spending in a particular jurisdiction relative to the size of the economy in that jurisdiction.^[44] The size of the economy (GDP) is used to capture the intensity of R&D spending and to provide a relative measure that enables comparison across jurisdictions. Two measures of R&D spending are used: 1) industry R&D spending; and 2) academic R&D spending (see Appendix A for a more detailed description of the data).

Industrial R&D

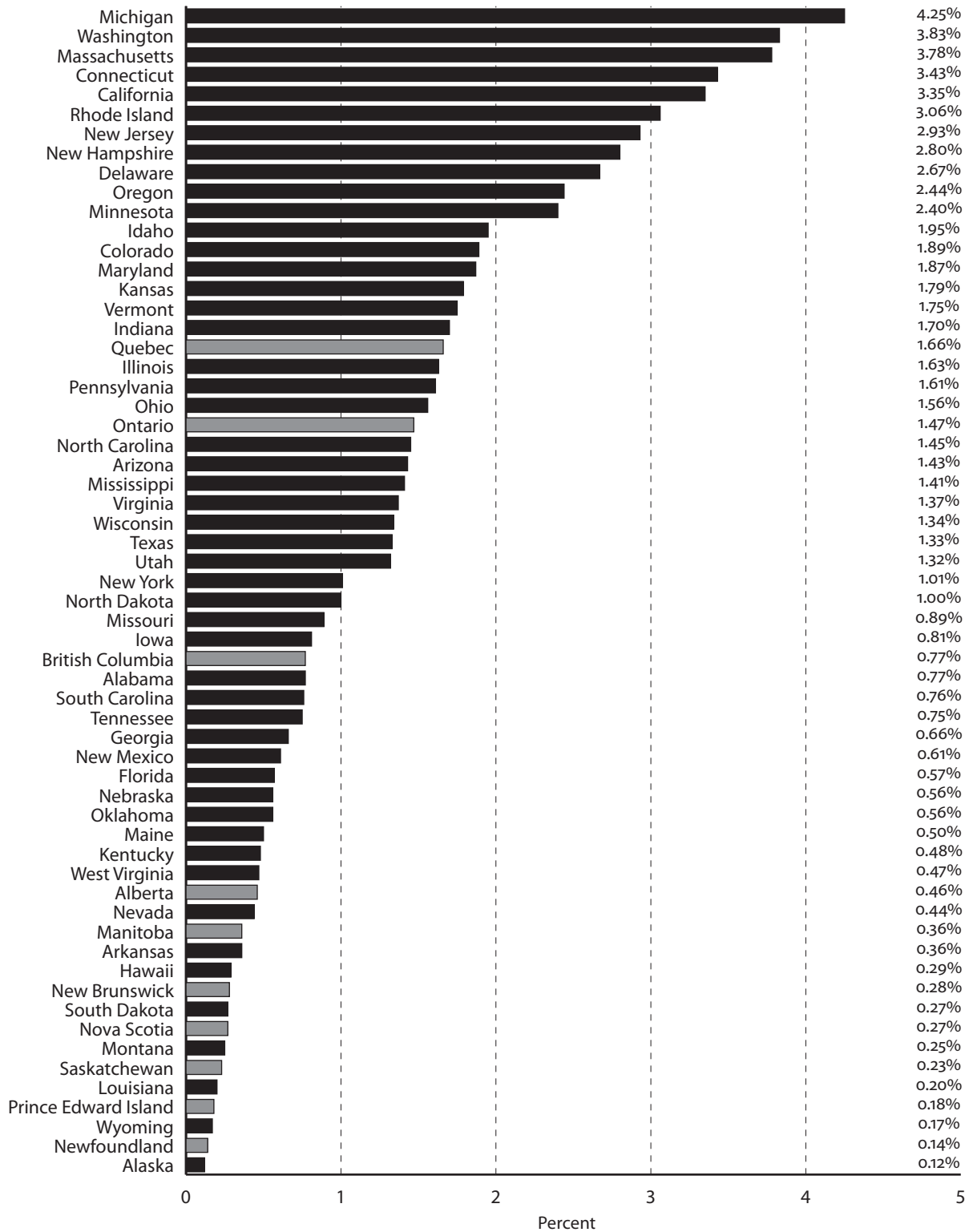
Industrial R&D refers to the R&D spending undertaken by businesses for which the primary purpose of R&D investment is making a profit.^[45] Figure 7 shows that Michigan had the highest level of industrial R&D spending out of the 10 Canadian provinces and 50 US states (4.25% of its GDP) in 2003.^[46] Washington and Massachusetts followed close behind with industrial R&D spending that amounted to 3.83% and 3.78%, respectively. The lowest ranked jurisdiction, Alaska, recorded industrial R&D spending of 0.12% of its GDP.

44 All figures are presented in 2003 Canadian dollars. US figures were converted to Canadian dollars using *Purchasing Power Parity and Real Expenditures, United States and Canada, 1992 to 2005*, a report by Statistics Canada (2007c).

45 Canadian industrial R&D data includes government owned enterprises and public utilities. While many of these organizations have profit as an objective, it is still a matter of debate as to whether they are entrepreneurial in the way specified by the key theorists.

46 The latest year for which R&D data is available for the United States is 2003. The latest year for which Canadian R&D data is available is 2006. See Appendix A for more details.

Figure 7: Total industrial R&D expenditure (performing) as a percentage of GDP, 2003



Sources: Statistics Canada (2006a); National Science Foundation, Division of Science Resources Statistics (2006); Statistics Canada (2007b); United States Department of Commerce, Bureau of Economic Analysis (2007); calculations by authors.

The top-ranked Canadian province was Quebec where industrial R&D spending amounted to 1.66% of its GDP. The rest of the Canadian provinces, except Ontario, were in the lower half of the rankings. Newfoundland (59th), the lowest ranked Canadian province, recorded industrial R&D spending amounting to 0.14% of its GDP.

Overall, apart from Quebec and Ontario, which spent moderate amounts on R&D, the Canadian provinces generally lagged behind the US states in terms of industrial R&D spending.[47]

Academic R&D

Academic R&D refers to R&D spending undertaken by all post-secondary institutions, including research institutes and clinics operating under post-secondary institutions. Of the Canadian provinces and US states, Maryland recorded the highest amount spent on academic R&D (0.95% of its GDP) (figure 8). Two Canadian provinces, Quebec and Nova Scotia, followed close behind with 0.94% and 0.90%, respectively. The lowest ranked jurisdiction, Nevada, recorded academic R&D spending amounting to 0.18% of its GDP.

The Canadian provinces occupied seven positions in the top 10 and all of the provinces fell within the top twenty jurisdictions. Apart from Quebec and Nova Scotia, the Canadian provinces performed relatively similarly, spending between 0.67% (Saskatchewan) and 0.49% (Alberta) on academic R&D.

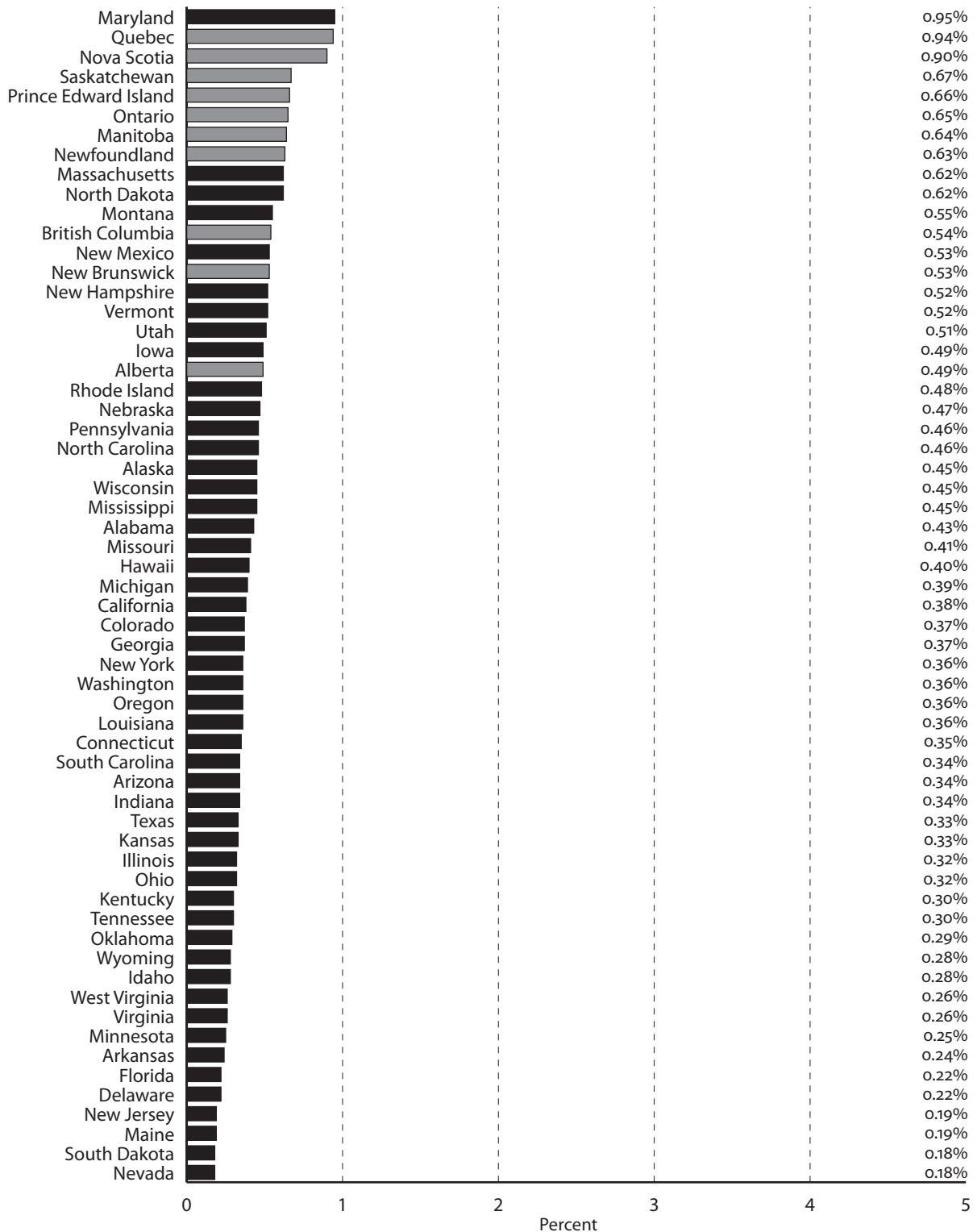
Overall, Canadian provinces performed well in terms of spending on academic R&D, but poorly with respect to industrial R&D spending relative to the US states. Unfortunately, in terms of total spending, industry R&D far outweighs academic R&D.[48] Thus, while Canada appears to rank well in terms of academic R&D spending relative to the US states, these rankings should be viewed in the context of the provinces' relatively poor performance in terms of industrial R&D spending, the larger area of spending.

Patents

The number of patents in a jurisdiction, similar to R&D, is a proxy for the innovative aspect of the entrepreneurial process. But unlike R&D, a patent is a property right entitling the holder to the use of a new product or process; it does not measure the act of innovating itself. While empirical research shows R&D and patents are highly correlated (Crepon and Dugeut, 1997; Griliches, 1990)[49], it is important to measure the two separately to understand, at least in part, how entrepreneurial a jurisdiction is despite how much it spends on developing new innovations.

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- 47 To test for any changes, the authors of this study also compared R&D spending relative to population across jurisdictions. There were a few minor changes in the industrial R&D rankings, which represent over four-fifths of R&D activity. However, there were considerable changes in academic R&D rankings—namely, the Canadian provinces generally ranked much lower.
- 48 When Statistics Canada (2006a) data is used, academic R&D represented 37.3% of the total R&D spending in Canada in 2003. When National Science Foundation (2006) data is used, academic R&D represented only 16.7% of the total for the same year.
- 49 Griliches (1990) reports the median R-square between R&D and patents is 0.9. The R-square measures the proportion of the variation of the independent variable (R&D) that can be attributed to the variation in the dependent variable (patents). R-square values vary from 0 to 1, with 1 indicating a perfect correlation.

Figure 8: Total academic R&D expenditure (performing) as a percentage of GDP, 2003



Sources: Statistics Canada (2006a); National Science Foundation, Division of Science Resources Statistics (2006); Statistics Canada (2007b); United States Department of Commerce, Bureau of Economic Analysis (2007); calculations by authors.

Patents also indicate other aspects of entrepreneurship. For instance, testing whether a patent will be successful in the market involves risk. In terms of measurement, more patents in a jurisdiction may indicate that more people are taking (or attempting) a risk in order to bring a new product or process to the market. The number of patents may also provide some indication of the types of innovation present in a jurisdiction, in terms of the spectrum of entrepreneurial action. That is, patents may provide information on whether a jurisdiction's innovations tend to be radical or incremental.

Advantages and disadvantages

The advantage of the number of patents as an indicator of entrepreneurship, much like R&D, is that it measures the innovative aspect of entrepreneurship. In particular, it provides a proxy for people who are engaging in risk-taking by trying to develop a marketable product.

A potential disadvantage of this measure is that it includes the total number of patents rather than just patents that come to the market. A region could be producing a high number of patents but transforming only a few of them into business opportunities.^[50] As was the case with R&D, a challenge of this indicator is that it is not a measure of the entrepreneurship function per se, but is a measure of the larger entrepreneurship process.

Observations

This indicator is measured in terms of the total number patents granted (all types) per 1,000 persons in a particular jurisdiction. This number is measured relative to population to adjust for different sized jurisdictions and enable comparison (see Appendix A for a more detailed description of the data).

Of the Canadian provinces and US states, Idaho was the highest ranked jurisdiction with 1.086 patents per 1,000 persons (figure 9). Following Idaho, Vermont generated 0.663 patents per 1,000 persons. Newfoundland was the lowest ranked jurisdiction, recording only 0.004 patents per 1,000 persons. The highest ranked Canadian province, Alberta (42nd), had 0.091 patents per 1,000 people. The other Canadian provinces had 0.062 or fewer patents relative to 1,000 people, falling between 47th and 60th in the rankings. British Columbia, Nova Scotia, New Brunswick, Prince Edward Island, and Newfoundland occupied the bottom five rankings .

Overall, the US states far outperformed the Canadian provinces in terms of their numbers of patents relative to population. The top six states—Idaho, Vermont, California, Massachusetts, Oregon, and Minnesota—generated more than five times the number of patents, relative to population, than Alberta, the highest ranked Canadian province.

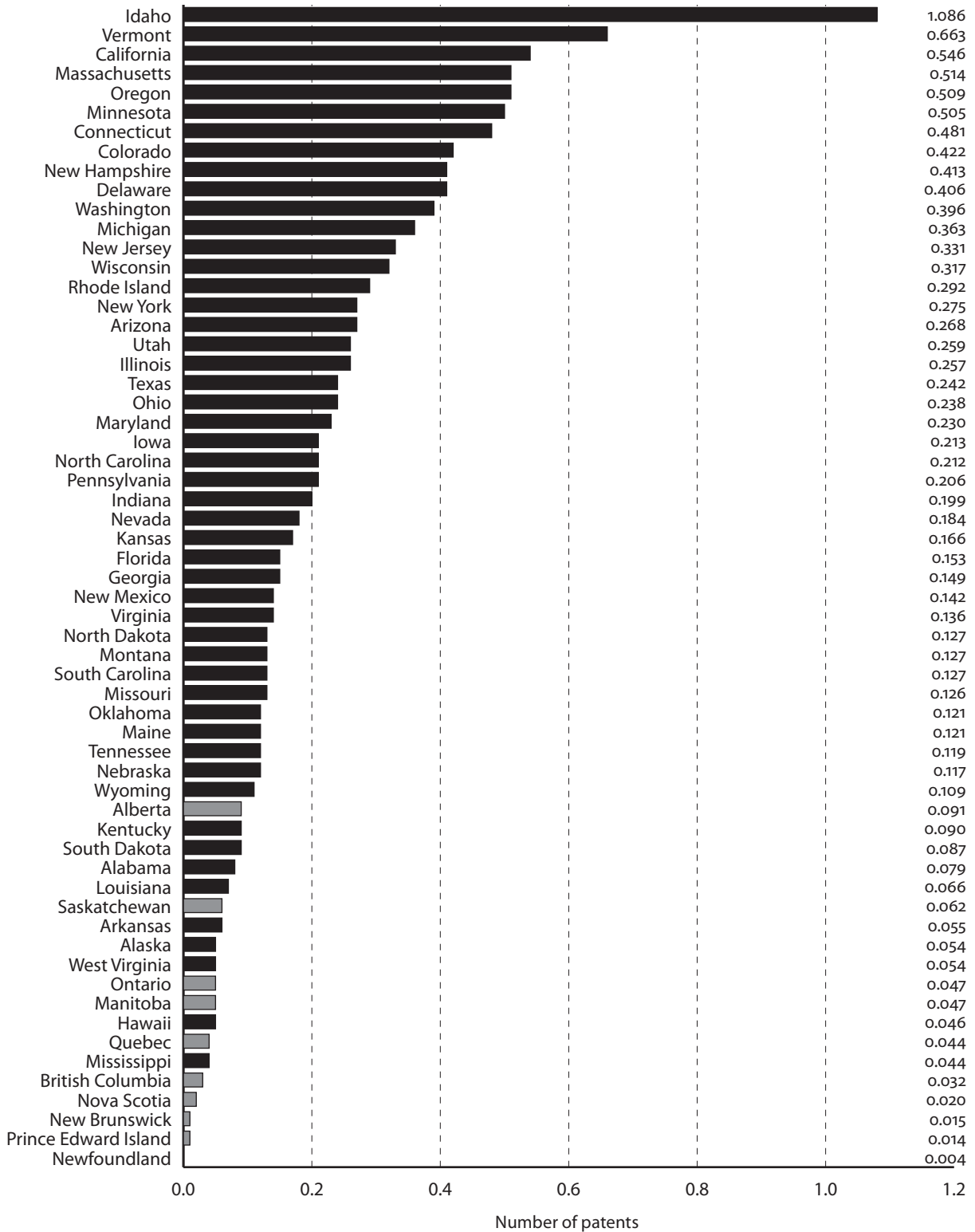
Other potential indicators

Business expansion

Business expansion measures the rate at which firms grow, the expectation being that a higher rate indicates a more entrepreneurial region. Rates of growth can be based on the number of

50 This could mean that firms are filing patents to thwart the innovation of their competitors, rather than acting entrepreneurially.

Figure 9: Number of patents granted (all types) per 1000 people, 2005



Sources: Canadian Intellectual Property Office (2007); United States Patent and Trademark Office (2007); Statistics Canada (2007c); United States Census Bureau (2007a); calculations by authors.

new jobs created or the amount of revenue generated relative to a starting point. It may be worthwhile to use this measure to focus on certain firms based on size or industry such as small innovative businesses.

There is a practical problem associated with measuring business expansion in Canada and the United States. Data sources for the two countries use different definitions of a business when generating these statistics. The US data source uses a business establishment—one physical location of business activity—as its definition, while the Canadian source uses a firm—one organization under common ownership which could include multiple establishments. While some comparisons can be done at the small firm level because the number of firms and establishments are virtually the same, comparisons involving medium- and large-sized firms would not be accurate.

Business ownership

Business ownership measures the number or rate of employer-owned businesses. Similar to the small business measure, this indicator is designed to measure the number of people who have left wage-based employment and taken the risk of starting their own businesses. The expectation when this indicator is used is that a higher level of business ownership indicates a more entrepreneurial region. After reviewing a number of measures of entrepreneurship, Gartner and Shane (1995) concluded that business ownership is an ideal measure because it removes the need to measure firms by size.

Business ownership could be a valuable indicator. However, it is unclear how different ownership structures and arrangements would be measured. For example, it is not clear whether only sole proprietors would be included, or whether organizations where ownership is divided, such as partnerships and corporations, would be included as well. Other conceptual issues include determining how solely owned subsidiaries or franchises would be measured, and whether enterprises would be measured as an establishment or a firm.

Innovation

If entrepreneurship can broadly be defined as the process of commercializing ideas, then the act of creating new and different combinations of resources to generate innovations is a key aspect of that process. As discussed in the R&D and patents sections above, innovation is unique in that the combination of ideas that are commercialized and those that are not can be considered to be enterprising and risk-taking. In other words, innovation is considered entrepreneurial because it is an attempt to market an idea and not to generate an idea for its own sake.

Both Canada and the United States have measures of innovation. In Canada, Statistics Canada conducts a report every three to four years titled, *Survey of Innovation*. This report surveys over 17,000 businesses across Canada, asking questions about their innovative activity. In the United States, the Council on Competitiveness, as well as Innovate America, conducts a number of surveys and reports measuring the level of innovative activity in the United States. However, because the Canadian and American surveys are often conducted at different times and ask different questions, they are not comparable.

Initial public offerings (IPOs)

An initial public offering (IPO) is a legal declaration whereby ownership of a business is changed from being exclusively private to openly public. Public ownership means that ownership of the

company is divided into numerous shares which are available for purchase. IPOs typically occur when an entrepreneur has developed their business to the point where expansion is not possible without an influx of money from new part owners. Similar to venture capital, the number of IPOs is a potential measure of entrepreneurship because it indicates how many businesses that have a high potential for success are being created or, more accurately, expanded.

One problem with IPOs, however, is that the decision regarding where to physically issue the IPO may be driven by policy factors and not by entrepreneurial activity.^[51] For example, a number of companies choose to incorporate and issue their IPO in Delaware, which has more favourable liability laws and other legal requirements than other jurisdictions.

Business losses

A recent study by Julie Berry Cullen and Roger Gordon (2007) measured entrepreneurial risk-taking in terms of business losses. Business losses occur if an entrepreneur's business has expenses that exceed its revenues (on a yearly basis). Higher business losses indicate that entrepreneurs are taking more risks to bring new ideas (i.e., goods and services) to the market.

A potential problem associated with using business losses as a measure of entrepreneurship is that it only measures unsuccessful attempts to bring new ideas or innovations to the market.^[52] This raises the question of whether it is best to measure only "successful" entrepreneurship (i.e., new businesses or ideas that are brought to the market), or to measure the combination of successes and failures. The research indicates that this issue is certainly still a matter of debate, but a review of the key conceptual frameworks in the first section of this study suggests that it may be worthwhile to measure both successes and failures.

A practical problem associated with the measurement of businesses losses is the different policy treatment (i.e., with respect to taxes) of business losses across jurisdictions, particularly between Canada and the United States. Future research could focus on how this issue may be reconciled.

Conclusion

A review of the research on entrepreneurship reveals that there is no consensus as to the meaning of entrepreneurship. As a result, current measures of entrepreneurship are highly scattered, either providing narrow measures of just one aspect of entrepreneurship or providing measures that are only loosely connected to the conceptual frameworks. This section aimed to present and discuss a number of empirical indicators that could be used to create a comprehensive measure of entrepreneurship. While these indicators have survived numerous rounds of consultation by entrepreneurship experts, this does not mean that they comprise the optimal list. The authors would like to encourage feedback regarding the conceptual frameworks, the selection of indicators, and any practical measurement issues discussed in this paper.

51 There are other issues with IPO statistics. See Carpentier et al. (2003).

52 Thank you to an anonymous reviewer for this point.

4 Conclusions and recommendations

This study is the first installment in a long-term research project aimed at measuring entrepreneurship across geographical jurisdictions. This study explored existing research to develop a comprehensive understanding of entrepreneurship on which the measurement of entrepreneurship can be based. A comprehensive approach is important because existing research is highly scattered and thus fails to provide a readily available and easy to understand tool for comparing entrepreneurship across regions.

A major barrier to measuring entrepreneurship is the lack of consensus as to its meaning. To help fill the void in this area, this study presented the most important conceptual frameworks of entrepreneurship and examined their common themes and important differences. One of the most important findings was that, despite their unique characteristics, the German, Chicago, and Austrian schools of thought have six common aspects: enterprise, innovation, process, risk-taking, spectrum of entrepreneurial action, and economic change. As we move forward, using these common areas of agreement and understanding the differences may be the key to being able to measure entrepreneurship.

A key recommendation of this study is that these aspects should be openly and carefully reviewed and discussed in terms of relevance and priority, so as to determine how a unified conceptual framework for measurement could be constructed.

An equally important aspect of measuring entrepreneurship is the choice of empirical indicators. This study showed that the current measures of entrepreneurship remain scattered and rely on different definitions. In addition, much of the current stock of measures is narrowly focused and suffers from statistical problems. While some measures may be applicable to certain aspects of entrepreneurship or specific geographic regions, the current stock of measures fails to provide a comprehensive picture of entrepreneurship.

Accordingly, this study presented and analyzed a number of empirical indicators of entrepreneurship that could be used to create a comprehensive measure. In particular, the study explored six indicators that have readily available and comparable data: business creation, self-employment, small businesses, venture capital, R&D, and patents. Most of these empirical indicators had a fairly wide distribution, which suggests that there are important differences in the structure and level of entrepreneurial activity across jurisdictions. However, the self-employment and small businesses indicators seemed to suffer from important measurement problems. In addition to having little variation across jurisdictions, other factors, such as industrial structure, were driving the results of those measures.

This study also briefly discussed other potential measures which, unfortunately, are not currently comparable across jurisdictions. These measures included business expansion, business ownership, innovation, initial public offerings, and business losses. As well, one question that must be considered as we move forward is whether a comprehensive measure of entrepreneurship should be based on the entrepreneurship function or the entrepreneurship process.

Another key recommendation of this study is that the potential measures presented should be further scrutinized and discussed to determine whether they should be included in a comprehensive measure of entrepreneurship, and how they might best be measured.

Having a sound concept of entrepreneurship and knowing where it flourishes will have profound effects on the discussion of public policy. Once we can measure entrepreneurship, we can investigate the reasons why some regions have more than others, and then we can begin to understand and promote policies that will create an environment that is conducive to entrepreneurship.

Appendix A: Data sources and comparability

Included below is a more detailed description of the measurement and data sources for each potential indicator. It is designed to provide a description of the comparability issues for interested readers and other researchers.

Business creation

Measurements

- Average business births as a percentage of total businesses with 1-9 employees, 2002-2003 (figure 1);
- Average net business creation as a percentage of total businesses with 1-9 employees, 2002-2003 (figure 2).

Data sources and comparability

Canada

The source of the Canadian data is a custom tabulation done by the Small Business and Special Surveys Division of Statistics Canada. It includes the number of business births, number of business deaths, total number of businesses, and the total employment by province and by industry for 2002, 2003, and 2004.

The original data used is from the Longitudinal Employment Analysis Program (LEAP) of Statistics Canada. LEAP is a company-level database that includes all employers in Canada, both incorporated and unincorporated. LEAP defines a company as a firm—one business under common ownership that consists of one or more business establishments (see “Small Businesses,” pg. 27, for further discussion). The LEAP database tracks the employment and payroll characteristics of individual firms from their year of entry into the market to their year of exit. To collect payroll and employment information, LEAP relies on tax information submitted to the Canada Revenue Agency. For more information, see Godin and Clemens (2007).

United States

The source of data for the United States is the Company Statistics Division of the United States Census Bureau (<http://www.census.gov/csd/susb/susb.htm>). The main source of original data is the County Business Patterns database (see “Small Businesses,” pg. 27). This includes information regarding business establishments, employment, and annual payroll. This division produces a unique data set called “dynamic data” which includes business births, deaths, expansions, and contractions organized by the size of a business establishment (in terms of employees), as well as by state and industry.

Self-employment

Measurements

- Unincorporated non-agricultural self-employment as a percentage of total non-agricultural employment, 2002 (figure 3).

Data source and comparability

Canada

The source of self-employment data for Canada is the Labour Force Survey (LFS), an annual database of Canada's labour market produced by Statistics Canada. Self-employment is organized by industry and business incorporation status. An "employee" is defined as a person aged 15 years or older who:

- did any work at all at a job or business; that is, paid work in the context of an employer-employee relationship, or self-employment. Employment also includes unpaid family work, which is defined as unpaid work contributing directly to the operation of a farm, business, or professional practice owned and operated by a related member of the same household; or
- had a job but was not at work due to factors such as own illness or disability, personal or family responsibilities, vacation, labour dispute, or other reasons (excluding persons on layoff, between casual jobs, and those with a job to start at a future date) (Statistics Canada, 2006b).

United States

Employment data for the United States comes from the Bureau of Labor Statistics (BLS) of the United States Department of Labor. In particular, the self-employment and employment data are sourced from the *Geographic Profile of Employment and Unemployment* (United States Department of Labor, Bureau of Labor Statistics, 2007). The BLS defines "employees" as persons aged 16 years or older who:

- did any work at all (at least 1 hour) as paid employees, worked in their own business or profession or on their own farm, or worked 15 hours or more as unpaid workers in an enterprise operated by a member of the family; or,
- were not working but had jobs or businesses from which they were temporarily absent because of vacation, illness, bad weather, childcare problems, maternity or paternity leave, labor management dispute, job training, or other family or personal reasons, whether or not they were paid for the time off or were seeking other jobs.

The BLS collects self-employment data for unincorporated persons only. Incorporated self-employed individuals are treated as employees of the corporation, and thus are not included in the overall number of self-employed persons. For this reason, incorporated self-employed persons in Canada were not included so that the data would be comparable.

Small businesses

Measurements

- Average number of small businesses with 1-9 employees as a percentage of total businesses, 2003-2004 (figure 4);
- Average number of small businesses with 10-49 employees as a percentage of total businesses, 2003-2004 (figure 5).

Data source and comparability

Canada

A custom tabulation from the Business Register of Statistics Canada (2007h) provided the figures for the number of businesses in Canada. There are several definitions or “statistical units” of businesses. The unit used for this measure is “business establishment.” Statistics Canada defines a business establishment as the level at which the accounting data required to measure production is available (principal inputs, revenues, salaries and wages): “the establishment, as a statistical unit, is defined as the most homogeneous unit of production for which the business maintains accounting records from which it is possible to assemble all the data elements required to compile the full structure of the gross value of production (total sales or shipments, and inventories), the cost of materials and services, and labour and capital used in production” (Statistics Canada, 2006c).

This is different from another commonly used definition of a business—the “enterprise.” According to the definition used by Statistics Canada, the enterprise is associated with a complete set of financial statements: “the enterprise, as a statistical unit, is defined as the organizational unit of a business that directs and controls the allocation of resources relating to its domestic operations, and for which consolidated financial and balance sheet accounts are maintained from which international transactions, an international investment position, and a consolidated financial position for the unit can be derived. It corresponds to the institutional unit as defined for the System of National Accounts” (Statistics Canada, 2006c).

The Business Register Division of Statistics Canada collects business data for all active businesses in Canada that have a corporate income tax account (T2), have employees, or have a GST account with an annual gross income of over \$30,000. Data are collected from survey respondents, extracted from administrative files, and derived from other Statistics Canada surveys and/or other sources.

United States

US business statistics are sourced from the United States Census Bureau’s *Statistics of US Businesses* (2007b) and *County Business Patterns* (2008). For comparability, business establishments were also used as the base measure. The United States Census Bureau defines an establishment as a single physical location where business is conducted or where services or industrial operations are performed. Similar to the definition used by Statistics Canada, the United States Census Bureau defines an enterprise as a business organization consisting of one or more domestic establishments that were specified under common ownership or control. The enterprise and the

establishment are the same for single-establishment firms. Each multi-establishment company forms one enterprise, and the enterprise employment and annual payroll are summed from the associated establishments.

The *County Business Patterns* database is sourced from a number of United States Census Bureau files. The primary source is the Business Register, a collection of all establishments that have been issued an Employer Identification Number (EIN) by the Internal Revenue Service. The annual Company Organization Survey provides individual establishment data for multi-establishment businesses. Specifically, data for single-establishment businesses are obtained from various Census Bureau programs, such as the Annual Survey of Manufacturers and Current Business Surveys, as well as administrative records of the Internal Revenue Service, the Social Security Administration, and the Bureau of Labor Statistics (United States Census Bureau, 2007c). The geographic locations of business establishments are provided by various Census Bureau programs and are supplemented with information from the Internal Revenue Service.

Venture capital investment

Measurements

- Venture capital invested (by destination) per capita, 2005 (figure 6);
- Private venture capital invested (by destination) per capita, Canadian provinces, 2005 (table 1).

Data source and comparability

Canada

Canadian venture capital data is sourced from Thomson Financial. Thomson Financial defines venture capital as a specialized form of private equity, characterized chiefly by high-risk investment in new or young companies following a growth path in technology and other value-added sectors (Thomson Financial, 2007).

Thomson Financial collects quarterly survey information from members of the Canadian Venture Capital Association, the Réseau de capital risqué du Québec, other venture funds, market agents, institutional investors, and other sources. This information is supplemented by other information such as public announcements of financings and related industry events, and reports from foreign investors or portfolio companies. More information is available from Thomson Financial's web site: www.canadavc.com.

United States

US venture capital data is sourced from the National Venture Capital Association's (NVCA) *Yearbook 2006*. The report is produced by Thomson Financial but it utilizes the MoneyTree report by Price Waterhouse Coopers and other surveys by the NVCA. The NVCA defines venture capital as long-term, hands-on, equity investment in high-potential companies by professional investors. The primary use of venture capital funds is to grow a company's valuation (NVCA, 2006).

More specifically, venture capital investment includes investments made by “professional venture capital firms with or without a US office, venture arms of corporations, small business investment companies (SBICs), institutions, investment banks, and similar entities whose primary activity is financial investing” (NVCA, 2006: 28). Venture capital investment excludes “debt, buyouts, recapitalizations, secondary purchases, initial public offerings (IPOs), investments in public companies such as PIPES (private investments in public entities), investments for which the proceeds are primarily intended for acquisition such as roll-ups, change of ownership, and other forms of private equity that do not involve cash such as services-in-kind and venture leasing” (NVCA, 2006: 101).

Research and development (R&D) expenditure

Measurements

- Total industrial R&D expenditure (performing) as a percentage of GDP, 2003 (figure 7);
- Total academic R&D expenditure (performing) as a percentage of GDP, 2003 (figure 8).[53]

Data source and comparability

Canada

R&D data is sourced from Statistics Canada. Statistics Canada defines R&D as the “systematic investigation carried out in the natural and engineering sciences by means of experiment or analysis to achieve a scientific or commercial advance. Research is defined as original investigation undertaken on a systematic basis to gain new knowledge. Development is the application of research findings or other scientific knowledge for the creation of new or significantly improved products or processes. If successful, development will usually result in devices or processes which represent an improvement in the ‘state of the art’ and are likely to be patentable” (Statistics Canada, 2007e: 19).

Industrial R&D expenditure is defined as the R&D expenditure of Canadian business enterprises. Statistics Canada defines this sector as business and government enterprises, including public utilities and government owned firms (Statistics Canada, 2007f).

The methodology of Statistics Canada for collecting industrial R&D data involves a combination of survey data and administrative data collected from tax files. Companies that spend over \$1.0 million on R&D are sent a mandatory survey that details their R&D activity. Companies that spend less than \$1.0 million on R&D are not sent a survey; however, Statistics Canada records their R&D activity directly through data provided by the Canada Revenue Agency.

53 There are two measures of R&D expenditure: funding and performing. Funding refers to the amount of money earmarked for the eventual purpose of spending on R&D. Performing refers to the amount of money actually spent on R&D activities by organizations. The reason for the distinction is that some funding sources (i.e., governments) transfer money to other organizations such as private companies or academic institutions which actually conduct R&D activity.

Academic R&D expenditure is defined as the R&D expenditure in the higher education sector. Statistics Canada defines this sector as “all universities, colleges of technology and other institutes of post-secondary education, whatever the source of finance or legal status. It also includes all research institutes, experimental stations and clinics operating under the direct control of, or administered by, or associated with, the higher education establishments” (Statistics Canada, 2007f: 23).

United States

R&D data for the United States is published by the National Science Foundation (NSF). The NSF defines R&D as the “planned, systematic pursuit of new knowledge or understanding toward general application (basic research); the acquisition of knowledge or understanding to meet a specific, recognized need (applied research); or the application of knowledge or understanding toward the production or improvement of a product, service, process, or method (development)” (NSF, 2006: 260).

The NSF defines industry R&D as the pursuit of new scientific knowledge or understanding that does not have specific immediate commercial objectives, although it may be in fields of present or potential commercial interest. Specifically, “industrial applied research is investigation that may use findings of basic research toward discovering new scientific knowledge that has specific commercial objectives with respect to new products, services, processes, or methods; industrial development is the systematic use of the knowledge or understanding gained from research or practical experience directed toward the production or significant improvement of useful products, services, processes, or methods, including the design and development of prototypes, materials, devices, and systems” (NSF, 2006: 260).

The NSF survey that measures R&D in the United States covers industrial R&D performed by people trained, either formally or by experience, in engineering or in the physical, biological, mathematical, statistical, or computer sciences, and employed by a publicly or privately owned firm that is engaged in for-profit activity in the United States. Quality control, routine product testing, market research, sales promotion, sales service, and other non-technological activities; routine technical services; and research in the social sciences or psychology are excluded from the survey (see National Science Foundation, Division of Science Resources Statistics, 2006).

Academic R&D expenditures are sourced from the NSF’s *Survey of Research and Development Expenditures at Universities and Colleges* (NSF, 2006). This survey collects information from every university and college in the United States that grants a bachelor’s degree or higher in science and engineering and expends at least \$150,000 in separately budgeted R&D in science and technology. There were 630 organizations of this kind in 2003.

Patents

Measurement

- Number of patents granted (all types) per 1,000 people, 2005 (figure 9).

Data source and comparability

Canada

Patent data for Canada is sourced from the Canadian Intellectual Property Office (CIPO). Tabulations of patents were provided by e-mail correspondence from the CIPO on February 2, 2007. The CIPO defines a patent as a government document that gives an inventor the right to exclude others from making, using, or selling an invention from the day the patent is granted to a maximum of 20 years after the day on which the patent application is filed. An inventor can use a patent to make a profit by selling it, licensing it, or using it as an asset to negotiate funding (CIPO, 2007).

United States

The United States Patent and Trademark Office (USPTO) is the source of patent data for the United States. The USPTO defines a patent as the grant of a property right to the inventor, issued by the United States Patent and Trademark Office (USPTO, 2005). More specifically, it is the right to “exclude others from making, using, offering for sale, or selling the invention in the United States or ‘importing’ the invention into the United States” (USPTO, 2005). Patents are issued for 20 years from the date on which the application for the patent was filed and are effective only within the United States, US territories, and US possessions.

Appendix B: Supplement to key conceptual frameworks—William Baumol

While William Baumol did not provide a distinct, overarching concept of entrepreneurship as Schumpeter, Knight, or Kirzner did, he made a number of significant contributions to our understanding of the entrepreneurship process, particularly in the context of economic growth. First, Baumol was a leader among modern mainstream economists in pointing out that the entrepreneur was largely absent from economic analysis. Second, and more importantly with respect to measuring entrepreneurship, he advanced our understanding of two of the common themes found in the key conceptual frameworks: hierarchy of entrepreneurial action and economic change.

Economic theory is “entrepreneurless”

In 1968, William Baumol wrote an article in the *American Economic Review* titled “Entrepreneurship in Economic Theory.” Baumol took the view that the entrepreneur is “the apex of hierarchy that determines the behaviour of the firm and thereby bears a heavy responsibility for the vitality of the free enterprise society” (1968: 64). Building largely upon Schumpeter’s view, he made a distinction between the manager and the entrepreneur. He defined the manager as the individual who oversees the ongoing efficiency of continuing processes of the firm. The manager takes charge of the activities and decisions encompassed in the traditional economic models of the firm.^[54] The entrepreneur’s function (whether or not he or she is a manager as well) is to “locate new ideas and to put them into effect.”

One of Baumol’s key arguments, however, was that the current theory (current in 1968) of the firm was “entrepreneurless.” He noted that this was not a criticism of the model, or the way economists have analyzed the firm, explaining, “it does what it was designed to do and does it well.” In Baumol’s view, the current model was “essentially an instrument of optimality analysis of well-defined problems, and it is precisely such (very real and important) problems which need no entrepreneur for their solution” (1968: 67). Similar to Kirzner, he argued that the firm involves management where it becomes a “passive calculator that reacts mechanically to changes” to external events.

Foreshadowing the work that would take place nearly 30 years later, Baumol recognized that current research may not be able to analyze in detail the supply of entrepreneurship, the entrepreneurs’ strategy choices, their attitudes to risk, or the sources of their ideas. However, researchers today can examine what can be done to encourage entrepreneurial activity. Indeed,

54 While the focus of his article is entrepreneurship, Baumol argues that the managerial role within the firm is critical. Making reference to Massachusetts Institute of Technology economist Carl Kaysen, Baumol explains that, in practice, most firms are well inside their production possibility loci, and one of their most challenging tasks is to find ways of approaching those loci more closely.

Baumol argued that a central research focus should be the examination of the determinants of the payoff to entrepreneurial activity (see Baumol, 1993). A few examples of such research include analyzing how the marginal costs of risk bearing can be reduced, how to make it easier to undertake R&D, and how various tax arrangements impact their payoff. Overall, while Baumol noted that much more research is required in the field of entrepreneurship, he stated, “in a growth conscious world I remain convinced that encouragement of the entrepreneur is the key to the stimulation of growth” (1968: 71).

Hierarchy of entrepreneurial action and economic change

In 1968, Baumol argued that the entrepreneur is a vital component of the process of economic growth. Referring to Robert Solow’s work on economic growth theory, Baumol noted that the historical record of economic growth can largely be explained by advances in technological change and the increase in the use of capital, two factors that require entrepreneurial initiative to be introduced (see Solow, 1957). For this reason, he argued that entrepreneurship should be cited as an important factor in economic development.

In a 1990 article in the *Journal of Political Economy*, Baumol expanded his theory to include different types of entrepreneurship and specified how these types relate to economic growth. Essentially, Baumol adopted and expanded Schumpeter’s concept of the entrepreneurial process by dividing the entrepreneurial function into productive and unproductive actions. Productive entrepreneurship remains relatively unmodified in Baumol’s framework. Productive entrepreneurship refers to Schumpeter’s innovator: a person who creates a new combination of resources to bring a new idea to the market. Baumol emphasized that productive entrepreneurship is the type of entrepreneurship that drives economic change and creates wealth. Unproductive entrepreneurship, on the other hand, while entrepreneurial in the sense that these type of entrepreneurs identify a new way of doing things and generate profit from their actions, is merely a reaction to opportunities in institutional frameworks and does not create a new product or process, per se. An example of unproductive entrepreneurship is a law firm that develops contracts to help businesses circumvent burdensome labour laws. Put differently, while unproductive entrepreneurship is legal, it generally does not contribute to economic growth; it is largely a process of arbitrage.^[55] This type of entrepreneurship is considered unproductive because resources are used to redistribute wealth instead of creating wealth or economic change. The combination of productive and unproductive entrepreneurship makes up what Baumol refers to as the allocation of entrepreneurship in an economy.

Another key insight from Baumol’s 1990 study is that the allocation of entrepreneurship—the mix of productive or unproductive entrepreneurship—can be largely explained by the quality of institutions and laws that govern the economy. As Baumol explained,

55 Robin Douhan and Magnus Henrekson (2007) expand on Baumol’s and others’ theories to include “predatory” entrepreneurship as a type of entrepreneurship. Predatory entrepreneurship involves an outright attack on productive entrepreneurs, capturing some portion of the productive entrepreneurs’ profits. Illegal crime syndicates are an example of predatory entrepreneurs.

If entrepreneurship is the imaginative pursuit of position, with limited concern about the means used to achieve the purpose, then we can expect changes in the structure of rewards to modify the nature of the entrepreneur's activities, sometimes drastically. The rules of the game can then be a critical influence helping to determine whether entrepreneurship will be allocated predominantly to activities that are productive or unproductive and even destructive. (1990: 909)

In other words, society's "rules of the game" determine the relative payoffs to the different types of entrepreneurial activity. Changing the rules will channel entrepreneurs' efforts into productive or unproductive activities because their potential rewards and, therefore, incentives change. This insight has important implications for wealth creation and economic growth. A jurisdiction that has an institutional framework that does not provide sufficient incentives and rewards for productive entrepreneurship will have trouble creating wealth and fostering economic prosperity, and will find many of their entrepreneurs engaged in unproductive activities. On the other hand, a jurisdiction that creates an institutional and legal environment that provides sufficient incentives and rewards for productive entrepreneurship will likely see more wealth creation and higher economic growth.[56]

In his 2002 book, *The Free-Market Innovation Machine*, Baumol explained that productive entrepreneurship creates different types of innovations and that this process thrives in a capitalist economic system. He stressed that capitalism and the innovations that come with it (innovations in a Schumpeterian sense) are key factors when explaining the success of capitalism in terms of economic growth. In particular, Baumol argued that capitalism is successful because there is a combination of "routinized" innovations by large firms and strong financial incentives for independent or smaller firm entrepreneurs to innovate the next "big idea." Put differently, this was the first time Baumol explained what Schumpeter and Kirzner earlier theorized—that there is a hierarchy of entrepreneurial action which separates radical innovations and other incremental innovations.

Similar to Robert Litan and Carl Schramm, Baumol advanced his theory of entrepreneurship even further in 2007, explaining that the mix between productive and unproductive entrepreneurship, the mix of radical ideas and routinized innovation, and the mix of institutional frameworks not only differentiate capitalist systems around the world, but also help explain differences in their success (Baumol et al., 2007). Baumol and his colleagues explained that the most effective type of capitalism is that which includes a mix of strong incentives for entrepreneurs to make grand inventions, and for larger firms to invest and perform R&D to further develop innovations and bring them to the market. While not a unique addition to the common themes found in the key conceptual frameworks discussed in the first section of this study, Baumol's work furthers our understanding of what a hierarchy of entrepreneurial action looks like and how it relates to economic change.

56 Sobel (2006) empirically tested Baumol's claim by examining the relationship between measures of productive and unproductive entrepreneurship and measures of institutions. Overall, he found that jurisdictions that have institutions characterized by higher economic freedom tend to have higher rates of productive entrepreneurship and lower rates of unproductive entrepreneurship.

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