

CHAPTER 2

The Effect of Demographic Trends on Entrepreneurship Rates: Theory and Evidence

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Introduction

Entrepreneurship is the key source of the new ideas, goods, and services that continuously improve our standard of living. At a personal level, a quick comparison of life today for the average citizen with how it was, say, 50 or 100 years ago illustrates the vast changes that have occurred in the way we work, live, and play. From the invention of basic household appliances such as the clothes washer and dryer, to medical procedures such as heart transplants, and technology such as computers, the internet, and cell phones, virtually every aspect of our lives has been touched by the creativity of the multitudes of entrepreneurs that each day search for new profit opportunities. Entrepreneurs such as Willis Carrier, who invented modern air conditioning, and Italian-immigrant Candido Jacuzzi, who developed the first hydrotherapy pump for bathtubs to help his son who

suffered from juvenile rheumatoid arthritis, are among those who have fundamentally altered the way we live. The entrepreneurial advances in medicine alone have helped increase life expectancy by approximately 30 years in the United States over the past century.¹

Far beyond the micro-level impacts on our personal lives, entrepreneurship has also affected the macroeconomy on a much grander scale. Innovations in areas such as robotics and 3D printing have revolutionized the manufacturing processes of companies, and modern technology has reduced the costs of transacting in product and financial markets across physical distances. Thus, it shouldn't be surprising that the differing levels of entrepreneurial activity across countries help to explain a large share of the differences in the rates of economic growth and prosperity. For example, Zacharakis, Bygrave, and Sheperd (2000) find that differing levels of entrepreneurial activity explain approximately one-half of the difference in economic growth between countries, while Reynolds, Hay, and Camp (1999) find that one-third of the difference in economic growth rates across countries is explained by differing levels of entrepreneurship.

As is discussed in the other chapters in this volume, there is a clear and robust link between the quality of a country's economic policies and its economic performance. Simply stated, countries with policies that are consistent with more economic freedom show higher levels of prosperity and entrepreneurial activity (see Sobel, 2008a, 2008b; Kreft and Sobel, 2005; Sobel, Clark, and Lee, 2007; Hall and Sobel, 2008; and Hall, Sobel, and Crowley, 2010). Most importantly, these policies include institutions that provide secure property rights, a non-corrupt and independent judicial system, contract enforcement, and effective limits on government's ability to transfer wealth through taxation and regulation.

Economic policies, however, are not the only factors that affect the rate of entrepreneurship in an economy. Other factors, particularly demo-

¹ Life expectancy at birth was 78.7 years in 2010 and 47.3 years in 1900 (see United States Department of Health and Human Services, Centers for Disease Control and Prevention, 2014: table 19).

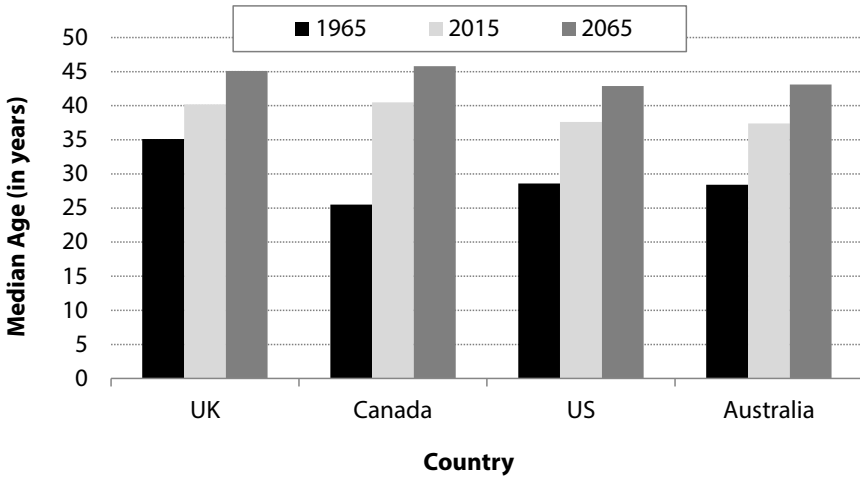
graphic factors, are the primary focus of this chapter. Each stage of the entrepreneurial process needs innovative thinking, a desire to profit and serve others, and the ability to implement ideas and run a business. All of these stages and steps are influenced by factors such as gender, age, religion, and education. To understand the influence of each on entrepreneurship requires an in-depth understanding of the entrepreneurial process, as well as an understanding of how each stage might be affected by demography. This chapter attempts to provide insight into these relationships. The focus will be on those demographic features—age distributions and educational levels—that are changing the most, with long-run trends that are evident even today in the data. We begin by discussing these demographic trends and then explain how these trends are affecting entrepreneurship. We focus on four main countries: Australia, Canada, the United Kingdom, and the United States.

The effect of age trends on entrepreneurship

One important measure of the age of a country's population is *median age*. The median age is the age for which exactly half the population is older and half is younger. Figure 1 shows how the median age has been changing over time in our four countries of interest: the United States, the United Kingdom, Canada, and Australia.

Figure 1 gives the median age for each country for three time periods. The middle bar for each country represents roughly the current situation as of 2015. The first bar shows the median age 50 years earlier, in 1965, and the third gives the projected value, from the United Nations Population Division, 50 years into the future, in 2065. The trend for all four countries is clear—the populations are aging. The median age over the past 50 years has risen by an average of 9.5 years in these four countries, and it is projected to rise by an average of 5.3 more years across these countries over the next 50 years. While the median age in three of these countries was less than 30 years in 1965, it is rapidly increasing. In 50 years, the median ages of all four countries will be greater than 40 years. What this means

Figure 1: Change in the Median Age of Selected Countries, 1965, 2015, and 2065 Projection



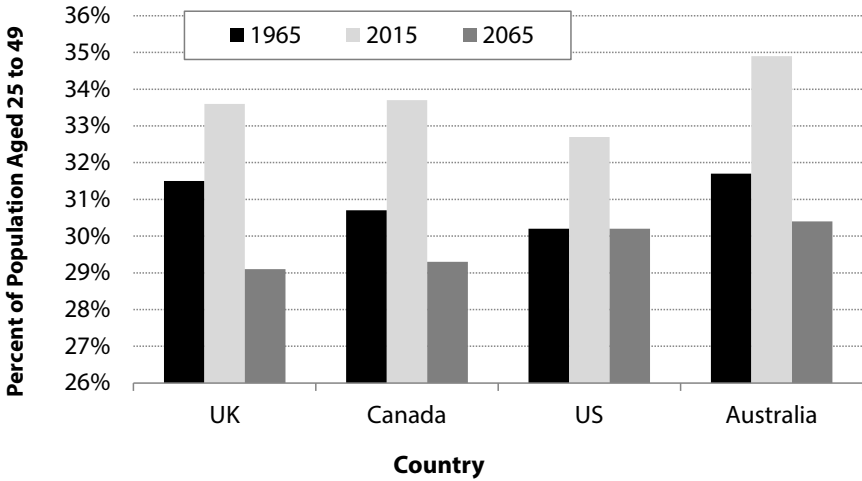
Source: United Nations, Department of Economic and Social Affairs, Population Division, 2017: custom data.

is that in 50 years, the average person in these four countries will be approximately 15 years older than they were just a century before. This is particularly striking given that the average age of a “generation” is defined as 20 years, as that was the average age of first childbearing. Thus, in 50 years, the average person will be almost a generation older than they were a century prior. We are currently in the middle of that trend.

Median age is not the only frequently cited indicator when discussing the aging populations of countries. Another frequently used indicator is the percentage of the population in specific age groups. These data provide more detail about demographic change than simple statistics such as median age. Figure 2 shows the percentage of the populations in these same four countries aged between 25 and 49 years.

While the median age data in figure 1 might lead one to conclude that the populations of these countries have been rising steadily, and that what will happen in the future is just an extension of the past, the data in figure

Figure 2: Percent of Population Aged 25 to 49 in Selected Countries, 1965, 2015, and 2065 Projection



Source: United Nations, Department of Economic and Social Affairs, Population Division, 2017: custom data.

2 paint a slightly different picture. In all four countries, the percentage of the population aged 25 to 49 rose over the 50 years between 1965 and 2015. In fact, on average, the percentage of the population in this age group rose by 2.7 percentage points over that time. The changes over the next 50 years, however, will be much different. The percentage aged 25 to 49 will fall by an average of 4 percentage points over the next five decades. By 2065, the percentage of the population in this age group will fall to between 29 and 30 percent in the selected countries, well down from today’s 33 to 35 per cent range.

From the data, it is clear that while the population of the four countries has been aging over the past few decades and will continue to do so, there is a fundamental difference between the past trend and what we expect to see in the future. Specifically, over the past 50 years, the proportion of the population in the younger to middle part of the age distribution was rising, whereas as we move to the future, it will be falling. As we will see, this

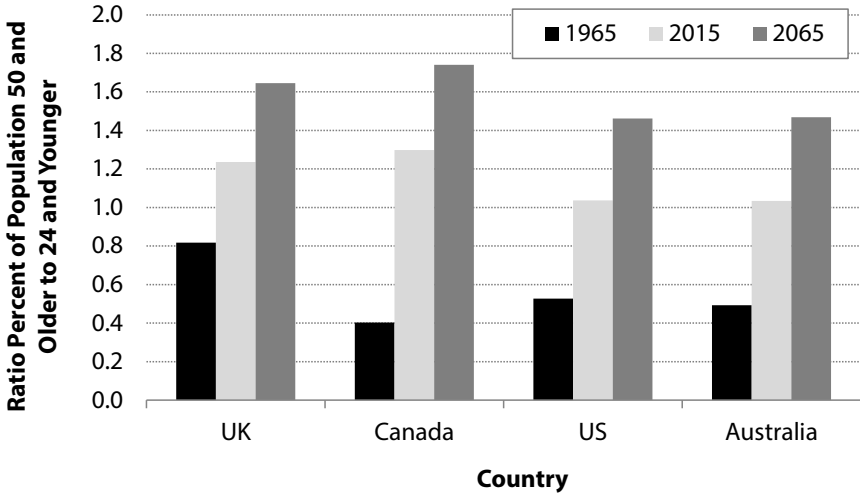
change is a key determinant of what experts believe will happen to entrepreneurship levels into the future—a trend that has already begun. There are complex reasons behind the demographic trend in aging that is shown in these figures, but they involve several factors including reduced fertility rates in wealthier countries and improved medicine and life expectancy. One factor, though, stands out above all the others among the countries in our sample: the larger than average population “bubble” of individuals born right after World War II—“baby boomers”—that has moved through the age distribution. As this bubble has progressed, countries have gone from being young to middle aged, and now they are becoming elderly.

An examination of the entire data series, available in five year intervals (which is the reason for using 2015 as the “current” year above), shows that it was in 1995 that the percentage of the population in the 25 to 49 age group was at its highest in all four countries. That year, 36.3 percent of the population was in this age group in the United Kingdom, 40.1 percent in Canada, 38.4 percent in the United States, and 38.0 percent in Australia. The research we will review later in this chapter tends to suggest that this age group contains the key source of entrepreneurial talent, which means that the age-related demographic factors encouraging increased entrepreneurship rates peaked in 1995 and are now on a downward trajectory which will continue for decades to come.

While those aged 25 to 49 are the primary source of entrepreneurial talent, as we discuss in the remainder of this chapter, it is also important to understand that the age distribution of the population also affects the marketplace of consumers, which in turn affects the opportunities for entrepreneurship. Obviously, older individuals demand a much different mix of goods and services than younger people. Therefore, we should also have demographic data in mind when we discuss marketplace opportunities.

Figure 3 gives the data for the two age groups (50 and older, and 24 and younger) that are excluded from figure 2. Specifically, figure 3 shows the ratio of the number of people aged 50 or older to the number aged 24 or younger for the same four countries and time periods. This ratio has a slightly different interpretation from the data presented earlier. A value of 1 would mean that the percentage aged 50 and older is equal to the per-

Figure 3: Ratio of Population Aged 50 and Older to 24 or Younger: 1965, 2015, and 2065 Projection



Source: United Nations, Department of Economic and Social Affairs, Population Division, 2017: custom data.

centage aged 24 and younger. A value of less than one would mean that the percentage aged 50 and older is smaller than the percentage aged 24 and younger. For example, a value of 0.5 would mean that for every person aged 50 or over, there are two aged 24 or under. Conversely, a value of greater than one would mean that the percentage aged 50 and older is greater than the percentage aged 24 and younger. For example, a value of 1.5 would mean that there are 1.5 people aged 50 or older to every person aged 24 or younger (or, perhaps more understandably, 3 persons aged 50 or older to every 2 persons aged 24 or younger).

Figure 3 shows that drastic changes have been happening, and will continue to happen, in the age distribution of consumers in the marketplace. While 50 years ago, on average, there were two consumers aged 24 or less for every one aged 50 or older, today there are roughly equal numbers of people aged 24 and younger, and aged 50 and older. In 50 years, however, there will be, on average, 50 percent more consumers in the older age

group than in the younger one. The changes in overall consumption patterns that accompany this age shift will affect entrepreneurial opportunities across industries, which is where we now turn our attention.

Consumption patterns by age and the opportunities for entrepreneurship

There are two primary avenues through which the demographic trends shown earlier can affect the rate of entrepreneurship. As we will discuss later, both the proclivity of an individual to want to become an entrepreneur and to have the skills necessary to be an entrepreneur varies by age group. This is the route by which the *supply* of entrepreneurs is affected by demographic trends. However, equally important are the opportunities present in the marketplace for individuals to become entrepreneurs.

Each and every day, new entrepreneurial opportunities arise in an economy. Continuously changing prices, consumer preferences, and technologies produce these opportunities. One of the most cited scholars in the area of entrepreneurship, Joseph Schumpeter (1911/1934, 1942), termed this ongoing process “creative destruction,” which he described as a process in which new goods and services replace old ones. Each innovation then in turn spurs other entrepreneurial opportunities. For example, the advent of the cell phone created (and continues to create) opportunities for entrepreneurs who want to make accessories such as headphones or apps, while the invention of the automobile created opportunities not only for the makers of automobile accessories such as tires, rims, and car stereos, but for the whole transportation sector. In this manner, even those entrepreneurs who simply copy others and enter existing profitable industries with incrementally better or different products can find opportunities (see Holcombe, 1998).²

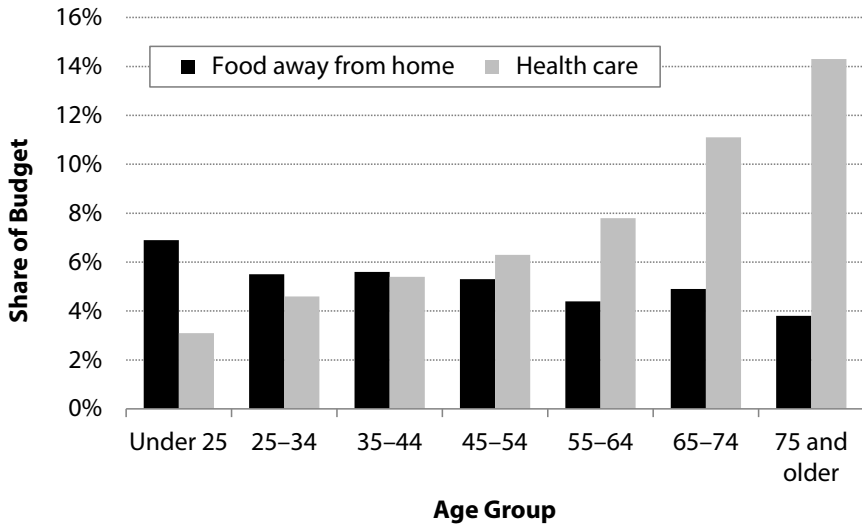
2 While beyond the scope of this chapter, the literature sometimes distinguishes between a ‘Schumpeterian’ entrepreneur, who is someone who innovates something entirely new (e.g., something “disruptive”) versus a “Kirznerian” entrepreneur, who exploits arbitrage or profit opportunities in existing industries by entering when profits

While it may seem obvious that for entrepreneurship to thrive in an economy there must be opportunities for entrepreneurship, we often give little thought to what creates those opportunities and under what conditions they are maximized. The visible presence of opportunities for individuals is a significant determinant of their likelihood of becoming entrepreneurs (see Khyareh and Mazhari, 2016 and Ucbasaran, Westhead, and Wright, 2008). Clearly, government policies that limit entry into business sectors or occupations, such as occupational licensing, reduce the number of opportunities and therefore reduce the rate of entrepreneurship (see Wiens and Jackson, 2015). The impact that various government policies have on the rate of entrepreneurship has been well studied in the literature and will be the topic of subsequent chapters in this volume. This chapter focuses on how changes in the age distribution influence the number of entrepreneurial opportunities.

Some industries tend to be dominated by larger, well-established firms. These industries tend to have fewer opportunities for entrepreneurship. There can be many reasons why specific industries are more heavily dominated by bigger, older firms, but according to Calcagno and Sobel (2014), the presence of significant regulations in the industry is one factor, as are economies of scale, network effects, and brand name (reputational) capital. In contrast, some industries have substantial “churn” of new small firms and individual business owners. As an example, consider the difference in the number of opportunities for entrepreneurship in the restaurant industry versus the hospital industry.

Hospitals consistently rank among the industries with the longest-surviving firms (see Bureau of Labor Statistics, 2017, for US data). As a pure opportunity for a small, first time entrepreneur to start an enterprise, the hospital sector ranks poorly in terms of the potential and the actual rate of entrepreneurship and new business formation. While there could arguably be substantial entrepreneurial opportunities in the hospital sector, it also faces significant public sector regulations and licensing restrictions which,

are high. For a discussion, see Holcombe (1998). For our purposes, this distinction does not matter as both phenomena are generally both considered to be entrepreneurship.

Figure 4: Eating Out vs. Health Care as Share of Budget by Age

Source: Foster, 2015.

coupled with other factors listed above, block the entry of new firms, particularly first-time entrepreneurs.

Now consider the restaurant industry. It contrasts starkly with the hospital industry. The failure rate of restaurants is among the highest of all industries at almost 17 percent per year, according to the Bureau of Labor Statistics. But this industry also has the highest percentage of new firms each year. Quite simply, there are more opportunities for new young entrepreneurs to open new restaurants than to open new hospitals.

This differential in entrepreneurial opportunities across industrial sectors is important to understand because changes in the population's age distribution have predictable patterns of consequences for consumer spending among industries. By itself, this could lower entrepreneurial opportunities if older individuals tend to spend more money in the industries that have fewer opportunities for new entrepreneurs, such as a switch in spending from restaurants (or games) to hospitals. Consider the spending data in figure 4.

As figure 4 makes clear, the share of a typical consumer's budget spent on eating out and health care are highly dependent on age. While younger consumers spend 5 to 6 percent of their budget on eating out, older individuals spend less than 4 percent. To put these numbers in perspective, note that consumer spending makes up just slightly over two-thirds of the economy as measured by Gross Domestic Product (GDP). A swing of two percentage points in a category of consumer spending (e.g., eating out going from 6 to 4 percent of total consumer spending) can therefore amount to a swing of just under one and a half percent of GDP—implying that this one factor alone may cut hundreds of billions, if not trillions of dollars, from consumer spending at restaurants. In contrast, health care spending rises from about 3 percent to over 14 percent of the average person's budget as they move into their senior years. Thus, consumer spending is falling in restaurants and rising in hospitals and health care as the population ages.

Again, it is not that entrepreneurial opportunities are absent in the health care industry. Obviously, there are extensive entrepreneurial opportunities in the health care sector as a whole, and an aging population spending more in the sector will create even more opportunities for innovation. More spending in hospitals will create entrepreneurial opportunities in machines, tools, equipment, patient access solutions, 3D printed drugs and organs, and other areas. The point is that in some specific sub-sectors, such as hospitals in particular, there are fewer new entrepreneurial opportunities created per dollar of consumer spending than there are in the restaurant industry, both due to larger firm sizes and longer firm survival rates (part of which may be caused by government rules and regulations). If spending patterns shift in such a manner as to move spending into these more heavily regulated, large firm dominated industries with fewer entrepreneurial opportunities, it could also work to reduce opportunities for entrepreneurship. This is particularly true if the regulations that cause some of these barriers are not reformed (the subject of a later chapter).

The data also show that spending in other areas, such as vacations and transportation, fall with age. These two are important because they are at the forefront of the new “sharing” economy dominated by on-line platform businesses such as Uber and Airbnb. These areas have created tremendous

opportunities for entrepreneurial individuals, even those with little business experience, to use their cars and homes to generate income. In the process, they learn about marketing and customer relations and therefore are more likely to try even more ambitious entrepreneurial endeavors in the future (see Morgan, 2015). As spending in these areas as a share of the economy also falls, the opportunities for entrepreneurship and self-employment could fall even further.

This first area of focus has been on how the changing age distribution affects entrepreneurial opportunities. Schumpeter (1911/1934, 1942) described how entrepreneurs search for new combinations of resources, guided by the profit and loss system, and unleash a process of “creative destruction” in which new goods and services replace old ones. While the process of creative destruction does result in a churning in which some firms die and others are born, this rate of churn differs substantially across industries. In summary, the demographic trends in the age distribution of the population will affect spending patterns. If these trends shift spending away from sectors that are typically easier for budding entrepreneurs to get a start, and toward sectors that tend to be much less entrepreneurial and dominated by larger, longer-lived firms, it could also result in reduced rates of entrepreneurship.

The “Age of Discovery”: How age and creativity are related

Noted Austrian economist Israel Kirzner (1973, 1997) focused on entrepreneurship as a discovery process. A clear understanding of his ideas is important as we begin our analysis of how changes in the age distribution may influence the supply of entrepreneurs. To Kirzner, the key factor in entrepreneurship is the ability of an individual to notice, or discover, something that has been either overlooked or previously unthought-of by other individuals. It was not possible, in Kirzner’s view, to do a systematic search for entrepreneurial opportunities, but instead it was more the creation of a new idea that was previously unknown. Kirzner’s notion of entrepreneurial discovery is perhaps better thought of as undeliberate ser-

endipity or epiphany. For example, Kirzner (1979: 159) writes of Robinson Crusoe “climbing a tree to look far out to sea—without realizing at all that his action will yield him fruit.” The discovery of the fruit is true discovery in the language of Kirzner.

Perhaps one of the best and most entertaining examples of Kirzner’s idea is contained in an academic article by Demmert and Klein (2003), in their attempt to test Kirzner’s ideas. In particular, the article set out to see if the percentage of times people were able to discover something was related to the reward. That is—do profits motivate discovery. The article attempted to do this using an experimental method by putting a nonobvious opportunity before the study’s participants to see if they could discover it. The participants were basically tasked with carrying as much water as possible in one trip from a full bucket on one side of a room to an empty bucket on the other side of the room. They were given four plastic cups, placed on a small plastic table, and the only rule was that the participants could not move either bucket. To Demmert and Klein, the “obvious” method of transferring the water was for a participant to fill the four cups, carry them across the room, and empty them into the collection device. But the true discovery opportunity was to see that the table could be flipped over, the underside could hold water, and it could be filled as well. After using the cups to fill the underside of the table, the cups could then be filled again and placed on the crosshatch pattern on the underside of the inverted table, and it all could be easily carried across in one trip. Only about 30 percent of participants “discovered” the thought to use the table. Their study was done using college students as participants. Returning to the main thrust of the chapter, the research on creativity clearly suggests the percentage would have been lower had Demmert and Klein used an older group of individuals. Creativity declines with age.

The fact that aging populations suffer declines in creativity is one of the main arguments that Lazear (2002) and Liang, Wang, and Lazear (2014) employ to explain recent declines in entrepreneurship associated with aging populations in the developed world. While we will discuss these papers in more detail, the main argument is that entrepreneurial capability depends on two factors: creativity and business acumen. They define

creativity as the ability to think in novel ways and to break from methods of the past, and a key part of their analysis rests on the fact that younger individuals are more creative. They argue that it's not a continuous process of decline from birth, as very young children do not have the skills or wisdom to be creative, but rather an "inverted U" shaped pattern as the elderly do not possess the mental facilities to be creative. They cite a vast literature, mostly outside of economics, that establishes that creativity is maximized in early adulthood and declines afterward (see Ruth and Birren, 1985; Florida, 2002; Kaufman and Horn, 1996; Ryan, Sattler, and Lopez, 2000). There is variance, however, in the estimated age at which creativity peaks, but the general conclusion from the literature is early adulthood, as we will discuss in the next section.

In summary, the trends toward an older population in our sample countries will work to lessen entrepreneurship rates through declines in creativity, which, as we will see, is a trend that has already started.

Human Capital Theory and business skills

There is a second key part of the Lazear (2002) and Liang, Wang, and Lazear (2014) argument about why entrepreneurship rates decline in aging populations. Part of the decline in entrepreneurship rates is due to the relationship between age and the skills necessary to run a business. Using data from the Global Entrepreneurship Monitor, Khyareh and Mazhari (2016) show decisively that an individual's level of knowledge about business and knowing other entrepreneurs are two of the main determinants of entrepreneurship. While the first part of entrepreneurship may be the presence of opportunities and the ability to be creative and discover new solutions, the second part of the process is being able to physically open and run a business. This requires a different set of skills, which are attained through experience on the job in the business world.

This part of the chapter differentiates between the age of the individual who may (or may not) become an entrepreneur, the average age of the population as a whole, and discusses the impact of changes in each factor

separately. A person's age will affect their personal likelihood of becoming an entrepreneur for many reasons, including changing risk preferences, different levels of income (and income diversification), and the level of knowledge the person has acquired through both formal education and on-the-job training and work experience. In general, these factors point toward an inverted U-shape pattern over one's life—the odds of becoming an entrepreneur rise as one moves out of childhood through early adulthood, then fall for the remainder of one's life. The exact age where it peaks is of some debate, but between the ages of 30 and 44 is the generally accepted range where the odds of becoming an entrepreneur are maximized, with the likelihood trailing off at both ends. The obvious implication of this relationship at the individual level is that when a society ages, more individuals are moving past this peak age and rates of entrepreneurship decline. From the data presented earlier, the percentage of the population in this key entrepreneurship age group will fall by approximately 5 percent over the coming decades as more of the population moves into the older part of the age distribution.

To understand how the age of the population as a whole plays a role here, let us return to a specific part of the argument in the previous paragraph and explore it further—that on-the-job experience matters. Gary Becker (1964, 1975) pioneered the economic analysis of “human capital” accumulation. Human capital refers to the acquired skills and knowledge one possesses that make a person productive. While formal education is one means of acquiring human capital, Becker also argued that workers acquire human capital through on-the-job training and experience. This is why productivity and earnings generally rise with work experience through mid-career. According to Liang, Wang, and Lazear, “Workers may begin with raw talent and inherent creativity, but the acquisition of skills at work is essential to their founding a business. It is for that reason that the young are not the ones most likely to start businesses, even if they are the most creative. They must have time to obtain the skills on the job that will allow [the] business that they found to succeed” (2014: 5). However, the authors argue that a worker's ability to obtain business-related skills on the job is dependent on the worker's opportunity to be promoted within the

firm—that is, the worker’s opportunity to earn rank and seniority within their jobs. This opportunity to earn rank and promotions is how the overall age distribution of the society comes into importance in their theory.

Liang, Wang, and Lazear continue: “rank in the firm affects an individual’s exposure to experiences that produce the human capital necessary to start a business... The higher one is in an organization, the more opportunity to gain experience that will be useful in starting an enterprise... It is for this reason that the demographic structure of a country affects human capital formation” (2014: 5). In essence, they argue that when there is a higher proportion of older, more senior workers in the population, it slows down the rate at which younger workers are promoted within the workforce. As these younger people accumulate less experience, they acquire fewer of the skills necessary to start a business, and overall rates of entrepreneurship fall. The authors call this the “rank effect.” At any given age, the range and depth of skills that an individual acquires will be reduced as the percentage of the population older than that individual rises.

Thus, as populations age, not only are there fewer workers in the prime age group, but the younger workers are accumulating less business experience. Both factors work to reduce entrepreneurship rates. It is worth discussing one last factor that complicates the age-entrepreneurship link, and that is individual tolerance of risk. The process of being entrepreneurial and starting a business is full of significant risks and uncertainty. This is especially true when compared to the alternative of a job in the normal labour market where wage income is more stable. Thus, as Weller and Wenger (2017) argue, willingness to take on risk (or more precisely, the lack of aversion to taking on risk) is an important factor in the decision to become an entrepreneur. Relevant to our current point, Werner, Oliver and Stephan (2009) argue that as people age and have less opportunity to accumulate new savings, the opportunity cost for risk becomes higher, and they tend to prefer a more stable wage-based income, making them less likely to become entrepreneurs. Even more fundamentally, one could argue that one reason creativity declines with age is because people become more risk averse, and creativity requires taking risks.

Now, let's retrace our steps through all of the channels by which aging populations negatively affect entrepreneurship rates, and tie them together. Entrepreneurship requires three things: 1) the presence of opportunities; 2) human creativity and willingness to take on risks; and 3) business skills. From our discussion of consumption patterns, an aging population may lead to shifts in spending away from areas that are the easiest for new entrepreneurs, such as the restaurant industry, and into areas traditionally dominated by larger, longer-lived private firms and government provision (and regulation), that may offer fewer entrepreneurial opportunities. Second, individual creativity tends to peak in early adulthood and wane as people grow older. Thus, aging populations will have lower proportions of people who are at their most creative ages. Willingness to take on risk also falls with age, so increasing risk aversion will reduce the proportion of the population interested in becoming entrepreneurs relative to those who want more stable sources of wage income. Last, aging populations will lead to reduced business skills and experience among the pool of potential entrepreneurs, not just because human capital accumulation over an individual's own lifecycle follows the inherent inverted U shape, but also because of the "rank effect," as explained by Liang, Wang, and Lazear (2014) in which older work forces diminish promotion opportunities for young workers, and with the drop in those opportunities, the accumulation of skills.

To this point, we have focused on factual demographic trends and on theories about why changing demographic trends may be influencing entrepreneurship rates now and into the future. But to this point we have not discussed the evidence from the literature supporting these claims based on the trends that have already begun. That is the purpose of the next section. There is a very large and robust literature on the relationship between age and entrepreneurship—and not all of it agrees. While some things are generally agreed-upon, there are many minor points of difference among the findings in the literature. We now turn our attention to examining this evidence and discussing the differences.

A review of the literature's empirical evidence

Some of the studies that attempt to examine the relationship between demographic factors and entrepreneurship rates use individuals as the unit of analysis, while others use broader measures of entrepreneurship at the national or subnational level. Available studies also use different measures of the relevant variables, control for different factors, and examine data from different periods, different countries, and even different industrial sectors. Hence, it is not surprising that there are some differences in the findings. The purpose of this section is to briefly summarize a selected set of major papers from the literature to assess the theoretical arguments presented earlier about the relationship between age and entrepreneurship rates.

Despite differences, the vast majority of empirical evidence identifies an inverted U shape that finds entrepreneurship rates maximized among individuals (and populations) roughly somewhere between their late twenties and early forties. As the data presented earlier in this chapter show, the percentage of the population in this age group was at its peak in 1995 in Australia, Canada, the United Kingdom, and the United States. Since 1995, the proportion of people in this age group in each of these countries has begun to decline, a trend that will continue decades into the future and will likely lower the rate of entrepreneurship.

A good place to begin the literature review is with Liang, Wang, and Lazear's (2014) paper that provides both a theoretical and empirical exploration of the relationship between age and entrepreneurship. Because the paper forms a large basis for some of the arguments made in this chapter, it is worth discussing in detail. The authors begin by outlining the long-run trends in global age structures, attributing the changes to declining fertility rates. They pay special attention to Japan's "lost decades" and "entrepreneurship vacuum," which were caused by underlying demographic changes. After establishing the importance of the age on entrepreneurship rates, they continue by setting out the two main arguments that support their theory. The first is to demonstrate that, for an individual, the odds of being an entrepreneur follow an inverted U-shape pattern, and they cite both the prior literature, as well as data from the Global Entrepreneurship

Monitor to illustrate this relationship that they consider “a stylized fact” in the literature. They then introduce their innovation to the literature—the “rank effect” argument, in which an aging population harms the rate of entrepreneurship because older workers dominate management positions and in so doing, block younger workers from moving into those positions, thereby acquiring the business skills they need to become successful entrepreneurs.

The paper contains a detailed theoretical model that produces several formal propositions, corollaries, and lemmas that ultimately generate their empirical implications. The main implications of their theory are: 1) within a country, the effect of age on entrepreneurship is negative, holding the share of those below that age group constant; 2) for any given age group, a country with a smaller proportion of the population below that age will have a lower rate of entrepreneurship; 3) the rates of entrepreneurship at any given age are reduced in a country that is aging more rapidly; 4) countries with higher median ages should have lower entrepreneurship rates; and 5) within a country, entrepreneurship rates rise with age and then decline after some point.

The authors then use data from the Global Entrepreneurship Monitor from 2001 to 2010 that covers more than 1.3 million individuals aged between 20 and 60 in 82 countries. They use the more than 16,000 data observations to calculate the entrepreneurship rates of interest. For demographic data, they employ the population estimates and projections from the US Census Bureau’s International Database for over 200 countries and areas of the world, along with other country-level attributes from several other sources including the Penn World Tables, World Bank, and Property Rights Alliance. This additional data allows the authors to control for an impressive number of factors such as each country’s GDP per capita, rates of tertiary education, country-specific costs to register a business, and the security of property rights. In the end, they empirically confirm their theoretical predictions and find that a one-standard deviation increase in the median age of a country decreases the rate of entrepreneurship by 2.5 percentage points. They also estimate the inverted U-shape pattern and find that entrepreneurship peaks roughly around age 32.

To show the great variety in the findings of the papers in the literature, let us now consider those that reach conclusions that contrast somewhat to Liang, Wang, and Lazear (2014). Weller and Wenger (2017) argue that there is a growing age gap in entrepreneurship and that entrepreneurship has declined in households younger than 50 and increased in older households, mainly due to younger people having less diversified income sources. The authors employ data for the United States from the Federal Reserve's *Survey of Consumer Finances* to examine their hypothesis. But the main take-away from their paper that is central to this chapter is that if the key ages for entrepreneurship begin to change, it may have an impact on future entrepreneurship rates. The entire argument about demographic trends, which says that age will affect entrepreneurship rates, assumes that the critical age for entrepreneurship will remain in the 30 to 40 age group. Other papers, such as that by Kadam and Ayarekar (2014), have begun to explore whether the rise of social media may also affect the age distribution of entrepreneurship and entrepreneurial performance, and this could contribute to a change in the fundamental U-shaped pattern assumed in the literature. They argue that social media has broken age, class, and social barriers, and in doing so may open more opportunities for younger individuals. If true, this may make the key age range for entrepreneurship younger, further contributing to the negative impact of demographic trends on entrepreneurship rates.

Stangler and Spulber (2013) argue that there may be reasons to expect entrepreneurship to decrease less than some fear, and instead to increase. They point to the fact that while the *proportion* of the population in the middle-age bracket is falling, from now until about 2030 in the United States the absolute *number* of people in their thirties and forties (the peak age for entrepreneurship) will be larger than ever before. They also point to the dampening effect that continued immigration will have on problems of entrepreneurship as immigrants have higher rates of entrepreneurship (and fertility). They also warn, however, that policy changes are necessary to help slow the decline in entrepreneurship including ensuring labor market flexibility, lowering barriers for occupational and industry entry, and expanding immigration.

Despite the slightly contrasting results in these few papers, the vast majority of the literature agrees with the general thrust of the Liang, Wang, and Lazear (2014) argument. Perhaps one of the most insightful papers is by Khyareh and Mazhari (2016). They empirically examine some of the factors and relationships that the other key papers simply assume. The authors look at the Global Entrepreneurship Monitor data for Iran in 2014 at the individual survey level to see if four possible things matter as to whether a person becomes an entrepreneur: 1) whether they know another entrepreneur; 2) whether they perceive there are profitable business opportunities present in their economy; 3) if they perceive they personally have sufficient entrepreneurial knowledge; and 4) whether they fear business failure. Interestingly, their data show that for Iran, the most entrepreneurially active age is 18 to 24, a younger age than much of the literature finds for other countries. The study finds that knowing another entrepreneur increases the probability of an individual being an entrepreneur by 8 percentage points. The perception of business opportunities increases the probability by around 4 percentage points, especially for those aged 25 to 44. The fear of failing causes a 3 to 6 percentage point reduction in the probability of being an entrepreneur, and particularly affects those who are middle-aged. Perhaps most importantly, the study finds the greatest determinant of whether someone chooses to become an entrepreneur is whether the individual believes he or she possesses entrepreneurial knowledge and skills. That factor has a very large, 18 percentage point impact on the probability of being an entrepreneur and is strongest in the 18 to 24 age group.

Khyareh and Mazhari's (2016) findings are important in that they demonstrate that the knowledge factor—the possession of business skills—is a significant determinant of entrepreneurship. This is, of course, a critical (and assumed) part of Liang, Wang, and Lazear's (2014) “rank effect” argument. In addition, because Khyareh and Mazhari find that knowing other entrepreneurs is important, it helps to point to another way in which age distribution can affect entrepreneurship—a peer effect. We will discuss this effect next.

Everyone is generally familiar with the arguments that peer pressure and peer effects can substantially influence human behavior. If one extends this to entrepreneurship, the implications are that the more entrepreneurs there are around you, the more likely you are to become an entrepreneur. To the extent that this peer effect is important it is yet another reason why an aging population will result in reduced entrepreneurship rates. With fewer individuals in the key entrepreneurial age range, there are fewer other individuals with whom to interact. This argument is made and confirmed empirically by Werner, Oliver, and Stephan (2009) using regional data for Germany. They find that peer and societal influences affect entrepreneurship levels and the motivation to start a business through three channels: 1) peers facilitate access to resources such as capital and labour; 2) peers provide information on opportunities and risks, therefore decreasing uncertainty; and 3) peers provide psychological support which helps to ease the stress of starting a business. The clustering of technology-intensive industries and thriving technology entrepreneurship sectors in locations such as Silicon Valley in the southern San Francisco Bay area of California is an indicator of the importance of these networking and peer effects.

Markussen and Røed (2017) take the peer effect one step further by arguing that gender matters. They find that men are mostly influenced by other men, and women by other women, which helps to explain the persistence of men being more likely to be entrepreneurs than women, as the number of male entrepreneurs historically was larger than the number of female entrepreneurs. Markussen and Røed argue that the gender disparity among entrepreneurs is not due to capabilities or human capital that is different across genders, but the desire to become an entrepreneur. They did find that family members had a strong influence, but even then, the effect was strongest among those of the same gender. Their analysis is based on data from Norway from 2002 to 2012.

Not all studies entirely support the peer effect argument, however. Kim, Aldrich, and Keister (2006) explore the relative importance of net worth, education levels, and business skills in the decision to become an entrepreneur. What they find is that contrary to popular belief, net worth did not

have a statistically significant impact on the likelihood of becoming an entrepreneur. On the other hand, they did find a strong human capital effect of educational background and work experience (managerial experience and current business ownership). Perhaps most surprisingly, they find that experience with entrepreneurial family members did not promote a transition to entrepreneurship. They employed data for the United States from the Panel Study of Entrepreneurial Dynamics.

The literature on gender differences in entrepreneurship rates does help to give general support to the rank and peer effects arguments. Papers such as Manzanera-Román, and Brändle (2016), Thebaud (2010), Duehr and Bono (2006), and Gupta, Turban, Wasti, and Sikdar (2009) find that social stereotypes play a particularly harmful role in this regard, and that as more women assume managerial positions, this helps them to build skills and increase the rate of entrepreneurship among women. As women have entered the labour force to a greater degree over the past few decades, because their rates of entrepreneurship are lower than those of men, it has resulted in a statistical decline in overall entrepreneurship rates. Whether this will reverse as peer effects and human capital are built among women in the workforce is yet to be seen, but there are promising indicators globally. The Global Entrepreneurship Monitor's 2016 report for the United Kingdom found that between 2003 and 2016, the proportion of women that became entrepreneurs increased by 45 percent, almost twice as much as the increase among men (27 percent). However, men were still nearly twice as likely to be entrepreneurs (see Hart, Bonner and Levie, 2017). According to the same report, though, the United Kingdom's rates of female entrepreneurship still are much lower than other countries, such as Canada, which has the highest absolute rate of female early-stage entrepreneurs at 11.6 percent of working-aged women.

The economic reasons why entrepreneurship rates decline after middle age is also something that has been explored in the literature, independent of arguments about declining creativity. Lévesque and Minniti (2006, 2011) and Cassar (2006) argue that with age, not only does the opportunity cost of time increase as labour wages rise with experience, but also older individuals are less willing to invest time in activities that have a long

and uncertain payback period, which includes starting a business. While Cressy (1996) and Bates (1990) also documented that businesses run by older and more experienced entrepreneurs are more successful and have higher survival rates, these other economic effects dominate and result in reduced entrepreneurship rates after the peak entrepreneurship ages of 25 to 34.

In summary, while the literature is varied and there are some slight disagreements, the preponderance of evidence from other studies does indeed point to peer effects mattering, and to economic and psychological factors causing entrepreneurial tendencies to decline with age past the thirties or forties.

A closer look at the data

With knowledge of the main arguments regarding the impact of demographic trends in age on entrepreneurship, and the factors that the prior literature has found important, we turn in this final section to the data for our countries of interest. This data will allow us to see how the variables cited in the literature reviewed above actually compare for Australia, Canada, the United Kingdom, and the United States. It will also afford an opportunity to summarize the chapter and relate it specifically to these variables.

As this chapter has shown, entrepreneurship requires a few main factors. First is the presence of profit opportunities in an economy, and perhaps more importantly the ability (e.g., human capital and knowledge) of individuals to see (and discover) these opportunities and to take advantage of them. Do individuals in our economies of interest see these entrepreneurial opportunities present and do they believe they have the skills? Table 1 shows data from the *Global Report 2016/17* by the Global Entrepreneurship Monitor.

In table 1, the “Perceived opportunities” column shows the percentage of the population between ages 18 and 64 years who say they see good opportunities to start a business in the area where they live for each of

Table 1: Self-perceived Entrepreneurial Opportunities, Capabilities, and Intentions

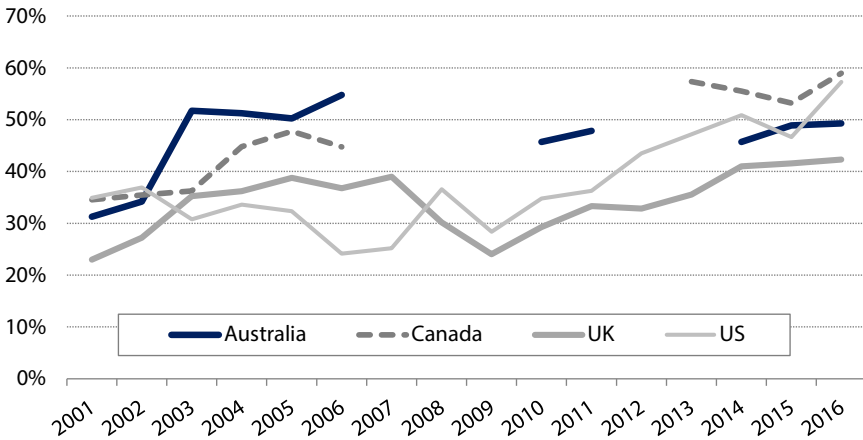
Country	Perceived Opportunities	Perceived Capabilities	Entrepreneurial Intentions
Australia	49.3%	52.3%	12.3%
Canada	59.0%	54.1%	14.0%
U.K.	42.3%	48.0%	9.1%
U.S.	57.3%	55.0%	11.7%

Source: Global Entrepreneurship Monitor (2017): 107-109.

our four countries of interest. In Canada, 59 percent of the population sees such opportunities, while it is 57 percent in the United States, 49 percent in Australia, and 42 percent in the United Kingdom. The next column shows “Perceived capabilities,” which is the percentage of population between the ages of 18 and 64 years who believe they have the required skills and knowledge to start a business. The United States and Canada again top the list at 55 and 54 percent respectively of people who feel they have the capabilities, with Australia at 52 percent and the United Kingdom at 48 percent. The final column shows “Entrepreneurial intentions,” which is the percentage of the population between 18 and 64 years of age who intend to start a business within three years (current entrepreneurs excluded). This is highest for Canada at 14 percent, followed by Australia and the United States at roughly 12 percent, and the United Kingdom at 9 percent.

The question of interest pertains not just to what these numbers are today for these economies, but how they will change in the future. Will entrepreneurial opportunities dwindle? Will the aging workforce reduce the ability of individuals to develop capabilities? Will fewer people have entrepreneurial intentions because they are older? While it is impossible to know what the future holds, the data enable us to explore recent trends. The GEM Entrepreneurial Behavior and Attitudes database compiles the answers to the above questions (and others) for as many years as are avail-

Figure 5: Perceived Opportunities: Percentage of Population Aged 18-64 That Sees Good Opportunities to Start a Business in the Area Where They Live, 2001 – 2016



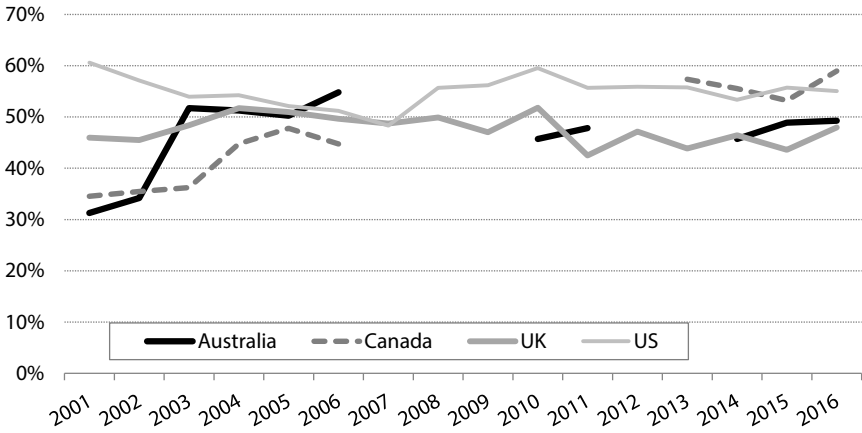
Source: GEM Entrepreneurial Behavior and Attitudes database.

able. Going back in time, however, the survey was not always done in the same years for all countries, so there are some gaps in the data that are visible in the following figures.

Figure 5 shows how the responses to the question about perceived opportunities have changed in these countries over the past 15 years. As it shows, the recent recession reduced these opportunities relative to the pre-existing trend. However, the data have rebounded. In three of the four countries, the perception of entrepreneurial opportunities is still rising. Australia is the exception; in that country the data have not yet returned to their highest mid-2000s levels. So far, recent data give no signs that entrepreneurial opportunities, or at least individuals' perceptions of those opportunities as measured by a survey technique, are starting to dwindle rapidly in these sample countries.

Figure 6 shows how the responses to the question about perceived capabilities have changed in these countries over the past 15 years. A much

Figure 6: Perceived Capabilities: Percentage of Population Aged 18-64 That Believes They Have the Required Skills and Knowledge to Start a Business, 2001 – 2016

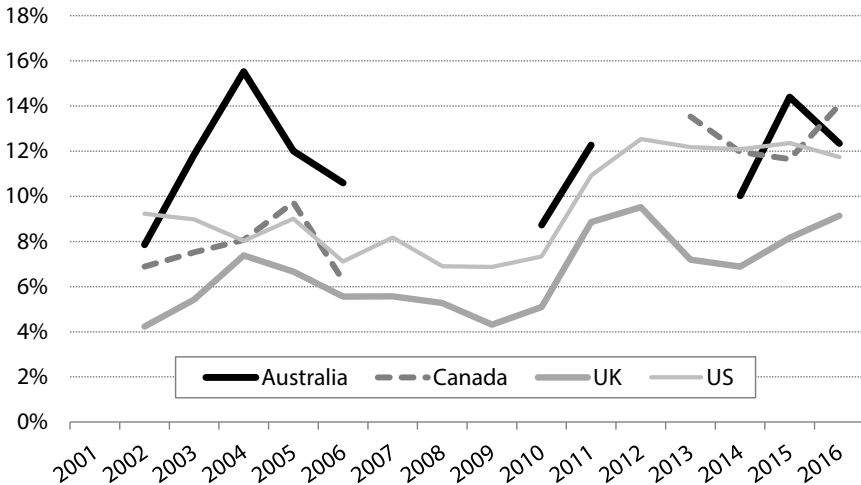


Source: GEM Entrepreneurial Behavior and Attitudes database.

different trend emerges from that shown in figure 5. With the exception of Canada, the lines in figure 6 are generally flat or dropping slightly. Only in Canada is the 2016 value higher than in any earlier year covered by the data. The perceptions of capabilities in the other three countries are currently all below the highest values reported during the period. Australia peaked at almost 55 percent in 2006, the United Kingdom peaked at almost 52 percent in 2010, and the United States peaked at almost 61 percent in 2001, the first year of the data. While declines are not steep, the perceptions of entrepreneurial capabilities definitely are not rising as fast as the perceived opportunities, a contrast with important implications that are worth expanding upon.

Generally, the incentive for individuals to invest in skills depends on whether there are lucrative opportunities available to those who learn the skills. For example, Freeman (1975) found that for every 1 percent increase in starting law salaries, there was a 2 percent increase in first-year

Figure 7: Entrepreneurial Intentions: Percentage of the Population Aged 18-64 That Intends to Start a Business within Three Years, 2001 – 2016



Source: GEM Entrepreneurial Behavior and Attitudes database.

law school enrolments. More recently, in the early 2000s, widely available and high paying careers in the finance industry led to a rising number of finance majors in colleges and universities. In contrast, today there are not many opportunities for skilled blacksmiths, so few people are acquiring those skills. Thus, the decline we can see in perceived entrepreneurial capabilities cannot simply be a secondary effect that has resulted from a reduced incentive to acquire those capabilities due, in turn, to fewer opportunities to become an entrepreneur. In fact, among the very same people who report declining perceived skills, perceived entrepreneurial opportunities are rising. If acquiring these skills were as straightforward as choosing a major, we should see an upward trend in skill acquisition, as opportunities in the field have risen. Instead, we see the opposite. This suggests that something exogenous, outside of the choice of the individuals in question, is becoming a barrier to the development of these skills. This is precisely what the Liang, Wang, and Lazear's (2014) "rank effect"

would cause to happen in the data, so it is clearly one possible explanation of the observed data. Alternatively, it could be a sign of something deeper as the survey question focuses on perceived capabilities, and while people may be investing in capabilities, it is also possible that they believe that the threshold of capabilities needed to be a successful entrepreneur is rising.

Figure 7 shows how the responses to the question about entrepreneurial intentions, the percent of respondents that intend to start a business, have changed. Generally, these data show that there has been a U-shaped trend since the end of the 2008-09 recession, but in general there are more potential entrepreneurs today than in the early 2000s (with the exception of Australia, where the 2004 data was the highest of the years). Fortunately, even though we have begun to see some decline in perceived entrepreneurial capabilities, the number of individuals who intend to open a business has not yet begun to fall.

Conclusion

This chapter has set out to help the reader understand the complex relationship between the long-run demographic trends in age and the potential impacts it will have on entrepreneurship rates in the developed world, paying special attention to Australia, Canada, the United Kingdom, and the United States. As is well documented, the future trend is clear: these societies are aging. Not only is the average age rising steadily, but the proportion of the population in the key age group for entrepreneurship is declining. Having a smaller percentage of the population in this age group means less entrepreneurship going forward, other things constant. Because entrepreneurship is such a key factor in progress and prosperity, a decline in entrepreneurship rates could be very troubling for the future.

In addition, aging populations will lead to changes in consumption patterns that may shift revenue away from activities that are easier for first time entrepreneurs to enter, such as restaurants, and into areas that are mostly dominated by larger, longer-lived businesses and government run enterprises, such as hospitals. Finally, the presence of both peer effects and

the “rank effect” detailed by Liang, Wang, and Lazear (2014) will add to the decline in entrepreneurship rates as older individuals remaining in the workforce will reduce the opportunity for younger workers to gain skills and capabilities through occupational advancement.

Fortunately, demographics is not the only factor affecting entrepreneurship rates. The rules and laws in each country or sub-national area can also have large impacts on rates of entrepreneurship. By pursuing policies that encourage entrepreneurship, it may be possible to offset the coming declines caused by aging populations in developed countries. Later chapters in this volume explore those potential policies.

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