

A Simple Model of Entrepreneurship For Principles of Economics Courses

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Over the last four decades since Baumol’s 1968 critique, there has been some progress in incorporating entrepreneurship into principles of economics texts. However, the critical roles of entrepreneurs in creating, operating, and destroying markets as well as their importance in driving long-term economic growth are generally either absent or relegated to later chapters. The primary difficulties in explaining entrepreneurship at the principles level are the lack of a universally accepted definition, a plausible explanation of the demand for entrepreneurship, and a diagram that summarizes the impact of entrepreneurship on market equilibrium and growth – a definition, a story, and a picture. This paper discusses how the notion of the stationary state associated with Schumpeter (1911 and 1928), Knight (1921), and Weber (1930) can provide a framework for integrating the entrepreneur into the early part of principles of economics courses. In addition, the research of Romer (1990), Audretsch et al. (2006), and others is used to demonstrate the critical role of entrepreneurship in explaining economic growth. The study ends with a discussion of how institutions can be crafted to encourage entrepreneurship.

Key terms: entrepreneurship, principles of economics, stationary state, Kirzner, Schumpeter

JEL Classification Codes: A22, D01, O30

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Introduction

The challenges of teaching principles of economics’ courses are many. They include teaching the most important economic concepts, in an integrated fashion, assuming no

prior knowledge of economics and – hopefully – never teaching anything that must be unlearned later. And all of this must be accomplished subject to a severe time constraint. In addition, there is a continuing debate on which new topics or insights should be added to the principles of economics curriculum. In fact, many articles in the *Journal of Economic Education* are arguments to add new topics to the economics curriculum. (For example, see Ferguson (2011).)

With respect to the inclusion of entrepreneurship, some progress has been made since the 1999 Kent and Rushing study of the generally lightweight coverage of entrepreneurship in principles textbooks. However, the amount and depth of coverage varies greatly. Some texts are completely silent on the subject of entrepreneurship. For example, neither Mankiw (2012) nor Krugman and Wells (2005) list entrepreneurs or entrepreneurship among either their key definitions or in their indices. Other texts do not clearly distinguish between entrepreneurship and operating a business. (For example, Hubbard and O'Brien 2010, pp. 15 & 53). Baumol and Blinder (2010, Chapter 20) provide a more extensive treatment but it occurs late in the text – not in the foundation chapters. Among the top ten texts, even those that provide a treatment of entrepreneurship tend to fall between the stools. Some attempt to treat entrepreneurship as just another input along with labor, capital, and natural resources. Others state that entrepreneurship is entirely exogenous. These approaches either ignore or distort the critical role of entrepreneurship in the creation, operation, and expansion of a market economy as well as its critical role in determining long-term economic growth.

This divergence in treatments has several causes. First, there is an ongoing debate on the exact nature of entrepreneurial activity and, therefore, definitions vary substantially. (See Parker 2009, Chap. 2 and Audretsch et al. 2006, p. 6). Most attention focuses on the creative-destruction activities of the innovative (Schumpeterian) entrepreneurs. However, Kirzner and others emphasize the important economic role of the arbitrage or speculative (Kirznerian) entrepreneurs. These two classes of entrepreneurs may have similar motivations but they have very different impacts not only on individual markets but also on the entire economy. Second, as Baumol (2010, pp. 18-19) pointed out, it is difficult to distinguish the demand for entrepreneurship from its supply. Entrepreneurial acts tend to be heterogeneous and the discovery process is non-linear or even random. Therefore, if an entrepreneur is the only one who sees the need for his economic contribution then does demand exist for an entrepreneurial act prior to the entrepreneur's insight?

The characteristics of entrepreneurship defy analysis using principles-level Marshallian demand and supply curves. (Humphrey 2010, pp. 29-37) For an input such as coal or labor, it is assumed that either each unit of input is of the same quality or, if the inputs differ in quality that the purchaser can either estimate the marginal productivity of each unit of input or, at least, rank the inputs in marginal productivity order. If this assumption of estimable quality is not valid then the concept of a supply curve is not meaningful. A firm is unable to purchase the most productive input before it purchases the second most productive, etc. because the firm cannot distinguish the productivity of each. As a result, there is no reason to think that the supply curve would be upward sloping rather it would reflect a random walk. Using similar reasoning, in the case of variable and unobservable

outputs, one cannot construct a traditional downward sloping Marshallian demand curve for entrepreneurs or entrepreneurial acts.

The stationary state framework provides an effective means of clarifying the entrepreneur's role in creating markets and bringing these markets to equilibrium. The rest of this paper will provide a principles of economics appropriate definition of entrepreneurship that includes both major types, discuss the concept of the stationary state, provide an illustration of the stationary state appropriate for a principles of economics course, discuss the critical impact of entrepreneurship on economic growth, and end with a discussion of some policy issues related to small entrepreneurial businesses.

What is entrepreneurship?

All markets whether for buggy whips, railroads, private aircraft, IPADS, plastic sewer pipe, university education, open heart surgery, or Amanda Carr music downloads were created, existed for a time, and, have either ceased to exist or will probably cease in the future. These markets are created by, often operated by, and sometimes destroyed by entrepreneurs. They are the major drivers of economic activity. Without entrepreneurs, not only would it be difficult for an economy to operate efficiently - approach its production possibility frontier (PPF) - but also economic growth - outward shifts of the PPF - would slow or cease entirely.

Like blind men describing an elephant, definitions of entrepreneur and entrepreneurship tend to differ greatly. Researchers in sociology, industrial organization, management, and microeconomics not only approach the study of entrepreneurs from different perspectives but also each tends to focus on the one (or few) entrepreneurial characteristic that is most relevant to the researcher's interest. However, Morris (1998, Table 2.2, p. 17) examined seventy-seven definitions of entrepreneurship and identified eighteen terms or concepts that were common to six or more of the definitions.

The definition given below contains only five of the eight most common terms used in definitions of entrepreneurship. The third and seventh terms in the Morris study are excluded because they refer exclusively to innovative - Schumpeterian - entrepreneurship. They exclude arbitrage - Kirznerian - entrepreneurship that also plays an important role in the market economy. The definition also excludes the eighth most used term - management. While many entrepreneurs are managers, it is possible to be a manager without exercising entrepreneurial skills.

Using these common terms, an inclusive definition of entrepreneurs is:

Entrepreneurs are individuals who, in an uncertain environment, recognize opportunities that most fail to see and create ventures to profit by exploiting these opportunities.

Entrepreneurs are individuals... While many large corporations strive to create environments that encourage entrepreneurship within their organization – often called intrapreneurship - failure is common. Baumol (2010, Chap 2) argues that these failures result from attempting to flout comparative advantage. His analysis points to a more efficient David-Goliath division of labor between individual entrepreneurs who engage in innovation and large oligopolistic firms that buy out the entrepreneur in order to move the innovation to a mass market. This dichotomy is discussed at greater length in the section on economic growth below.

...who, in an uncertain environment... One of the most widely accepted characteristics of entrepreneurs is that they specialize in business related “judgmental decisions” where there is no obviously correct answer *and* information is costly. (Casson et al. 2006, pp. 3-4) In other words, entrepreneurs make business decisions based on insight in an uncertain environment. Uncertainty is different from risk. Risk occurs when there are well-defined possible outcomes, sufficient sample size, and a generally accepted statistical procedure. (Knight 1921). If one or more of these characteristics is missing then a possible outcome is uncertain. For example, bringing a dramatically different product to market and attempting to fill an inside straight in a poker are both very difficult. However, while the former involves Knightian uncertainty, the latter is simply a matter of risk. It has been argued that uncertainty is the first cause of economics. If uncertainty did not exist then societies could deal with scarcity by having mathematicians solve a series of simultaneous equations describing resources, technology, and consumer preferences – economists would not be necessary! (Hayek 1945, p. 530)

...recognize opportunities that most fail to see... This means that entrepreneurs tend to possess the quality of “alertness”; they are prepared, curious, and attentive. (Kirzner 1985, p. 7) To researchers and, sometimes, to entrepreneurs themselves, the reasoning that leads an entrepreneur to an innovation seems non-linear or intuitive rather than the result of a deliberate process. Biographies of successful entrepreneurs often point to two manifestations of this non-linear or intuitive thinking. Many entrepreneurs claim that after spending months or years in unsuccessful attempts, the entrepreneur realizes in a flash of insight that there was always a simpler way of achieving his or her end. Another commonly reported occurrence involves obtaining an insight by drawing analogies between very different phenomena. For example, an entrepreneur notices that butterflies fly in a different “formation” when it is windy and she realizes that there is a much better way of structuring the Internet protocol to prevent delays when the system is under stress.

As discussed above, since entrepreneurial acts are *not* homogeneous – each is unique - and the entrepreneurial discovery process is not linear, markets for entrepreneurial acts (and entrepreneurs) can’t be shown with the usual demand and supply diagrams.

...and create ventures to profit by exploiting these opportunities. The entrepreneur faces a challenge when he or she seeks to profit from his or her judgmental decision or insight. Usually, the entrepreneur’s ability to immediately sell the insight is severely limited because the insight is either too simple or it is too complex. If too simple then it is

unlikely that intellectual property laws can protect it. The detailed description or demonstration of the insight to a prospective purchaser will allow its theft. At the other extreme, since many innovations are based on non-linear thinking or intuition, it is difficult to convince another that the insight will eventually lead to a substantial return on investment.

The most practical way that most entrepreneurs can profit from their insights or judgmental decisions is to establish a firm. If the entrepreneur possesses the necessary knowledge or skill and is able to obtain sufficient finance then he can sell processes or products that incorporate his insight. Also, once the value of his insight is demonstrated, there is the potential for a very profitable cash-out through purchase by another firm or by selling stock, an initial public offering (IPO).

But if one accepts this definition of entrepreneur then how do entrepreneurs shape the market economy? One way of answering this question is by imagining an economy that doesn't need entrepreneurs – a stationary state.

Stationary State

Visualize an economy that merely reproduces itself at constant rates. There is a given population, not changing in either numbers or age distribution. The tasks and wants of households are given and do not change. The ways of production and commerce are optimal from the standpoint of the firm's interest and with respect to existing horizons and possibilities. And since they are optimal, they do not change. In other words, year after year, the same products are produced in the same way, sold in the same way, and consumed in the same way. All markets are in equilibrium with the amount demanded equal to the amount supplied at current prices. In such a Schumpeter-Knight-Weber stationary state there is nothing that requires an entrepreneur. All that is required are managers. (For further discussions of the stationary state, see Schumpeter 1911, pp. 43 & 81; Knight 1921, pp. 264-266; Schumpeter 1928, p. 241; Weber 1930, p. 67; Hayek 1945, p. 523; and Link and Siegel 2007, p. 21)

But stationary states are subject to outside forces or shocks that disrupt their smooth predictable patterns. These outside forces can take two forms, both of which lead to market disequilibria. However, if the society provides the proper institutions and profit incentives then two types of entrepreneurs will act in response to these outside forces. Their entrepreneurial acts will eventually result in a restoration of market equilibria and/or accelerate economic growth. These relationships are illustrated in Figure 1.

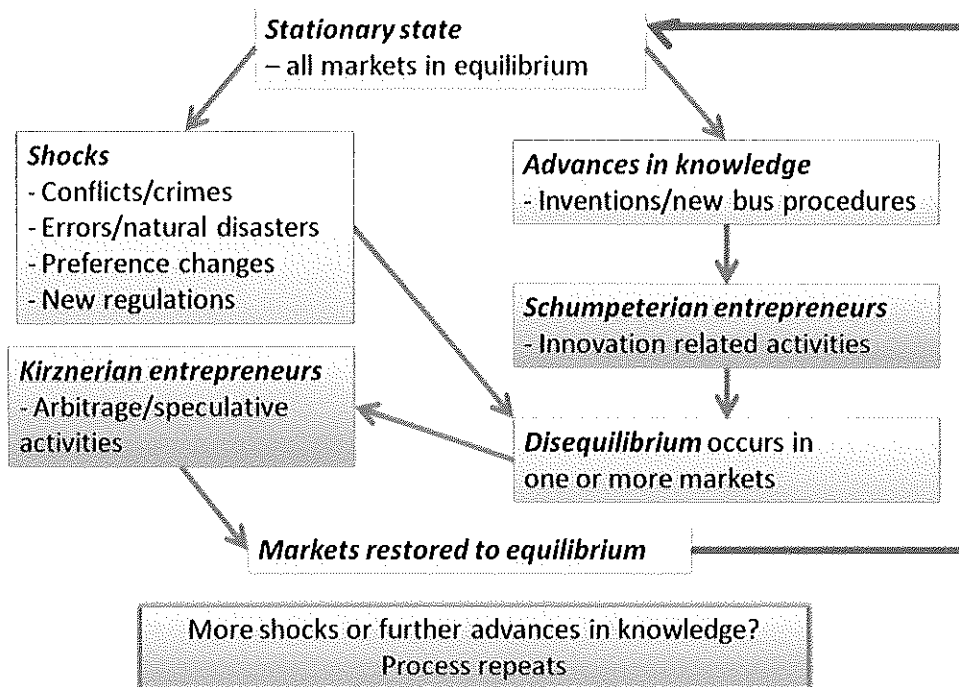
Natural or manmade shocks. Outside forces can take the form of a variety of natural or manmade shocks to the stationary state economy. These shocks disrupt markets leading to – at pre-shock prices - excess amount demanded of one or more goods or services and an excess amount supplied of other goods or services. For example, human error may wreck a railroad line that carries corn to an urban market leading to an excess supply of corn in the countryside and a shortage in the urban market. A hurricane may sink a string

of coal barges leading to shortages of coal in one area and excesses of coal mining labor and equipment in another. An act of war may destroy a factory leading to a shortage of the firm's output and an excess of the inputs that would have been used by the firm. Or a new government regulation may forbid the use of a particular fertilizer that was formerly widely utilized. As a result, there will be shortages of substitute fertilizers and excess amounts of the chemicals that were formerly used to produce the now-forbidden product.

This disruption of equilibrium in multiple markets implies inefficient use of labor, capital, or natural resources – the economy has been pushed inside its production possibility frontier (PPF).

Figure 1: Stationary State and Entrepreneurship

Cycle of Entrepreneurship



This disruption also provides opportunities for profitable arbitrage or speculation by (Kirznerian) entrepreneurs. (Kirzner 1979, p. 92) In both arbitrage and speculation, the entrepreneur attempts to buy a good or service at a low price and sell it at a high price. And profit by the difference! Kirznerian entrepreneurs engaged in arbitrage and speculations increase demand and therefore tend to increase prices in the market in which they are net buyers. And they increase supply and therefore tend to reduce prices where they are net sellers. Therefore, arbitrage and speculation tend to restore market equilibrium and, by doing so, eliminate the opportunity for further profit.

Consider the wreck of the corn carrying railroad line mentioned above. An entrepreneur may realize that attempting to transport corn by truck to the urban areas would lose money since corn has substantial weight compared to its value. Therefore an entrepreneur might buy corn cheaply in the rural areas and distill it into corn whiskey with a much higher value/weight ratio that could be profitably transported to and sold in the urban areas. Arbitrage in this fashion will raise corn prices in rural areas from the levels to which they fell immediately after the shock and lower corn prices in the urban areas since the demand for corn for urban whiskey making will decline.

As Kirznerian entrepreneurs profit by engaging in their arbitrage or speculative activities, they restore market equilibria and eliminate the opportunities for further profitable arbitrage or speculative activities. The economy returns to its stationary state on the PPF until the next shock arrives.

Advances in knowledge. But shocks aren't the only events that disturb the stationary state and create profit-making opportunities for entrepreneurs. Advances in human knowledge - whether in the form of inventions, new business procedures, or changes in consumer values - have the potential of shifting out an economy's PPF. In fact, it has been estimated that over 80% of long-term economic growth occurs as a result of advances in human knowledge.

Advances in knowledge generate profit opportunities for individuals who are able to make use of these advances to create new products, processes, or markets. (Schumpeter 1911, p. 214) Unlike the Kirznerian entrepreneurs discussed above who arbitrage or speculate among existing products, processes, or markets; innovative or Schumpeterian entrepreneurs tend to destroy existing products, processes, or markets in the process of replacing them with new ones. Therefore it is Schumpeterian entrepreneurs that are responsible for much technological change. The Schumpeterian entrepreneur does not create a new product, process, or market in order to sell a product that the ultimate consumer wants. Rather he or she attempts to create a new product, process, or market in order to sell a product that the ultimate consumer *will* want. The emphasis in the definition of Schumpeterian entrepreneurship is on the "new": a new product, service, or method. Some Schumpeterian entrepreneurs are inventors but many are not. Most engage not in invention but rather in innovation.

Inventions and innovations are closely related but distinct. Following Schumpeter (1911), first, there is an idea; second, an invention that is an idea made manifest; and, finally, an innovation that is an invention actually used to create value. Of course, an invention or other advance in knowledge may wait a long time, possibly hundreds of years, before an entrepreneur actually uses the invention for a successful innovation. An example would be the steam engine that after being used for dramatic effect during temple ceremonies in ancient times waited almost 1,700 years before it found a substantial economic role.

Interaction of Schumpeterian and Kirznerian entrepreneurs. Therefore the response to shocks or advances in knowledge in the stationary state leads to two different but related forms of entrepreneurship. In a simplest form, the demand for Schumpeterian

entrepreneurship is a function of advances in human knowledge. During periods of rapid advances in knowledge, the rewards for creative-destruction are greater. This motivates these entrepreneurs to disturb existing equilibria. On the other hand, the demand for Kirznerian entrepreneurship is a function of actual changes in existing markets. These actual changes create disequilibrium situations that provide profit opportunities those entrepreneurs can exploit and, in the process, restore equilibria. (Schumpeter 1928 and Kirzner 1979) The relationship between the two types of entrepreneurship is as follows:

Schumpeterian entrepreneurs profit through creating market disequilibria, which provides opportunities for Kirznerian entrepreneurs to profit by restoring equilibria.

And, in response to these market changes, Schumpeterian entrepreneurs will then perceive new opportunities for applying new or existing knowledge. "...the appearance of one or a few entrepreneurs facilitates the appearance of others, and these the appearance of more, in ever-increasing numbers." (Schumpeter 1911, p. 228)

Another way of distinguishing between Kirznerian and Schumpeterian entrepreneurs is their different impacts on the production possibility frontier (PPF). The innovations based on advances in knowledge by profit-seeking Schumpeterian entrepreneurs not only create market disequilibria but also shift the economy's PPF out. However, the newly created disequilibria mean that the economy is now inside the recently expanded PPF. Also seeking personal profit, Kirznerian entrepreneurs through arbitrage or speculation in the disrupted markets restore market equilibria. This restoration of market equilibria moves the economy to the efficient surface of the PPF.

An alternative view is to treat management, Kirznerian entrepreneurship, and Schumpeterian entrepreneurship as a continuum. To the extent that business decisions are of the simplest kind involving low-risk alternatives of existing processes or products in existing markets then a firm only requires management. If a decision must be made under uncertainty and therefore requires a creative response that utilizes existing processes or products then a Kirznerian entrepreneur is involved. Finally, if a business decision involves uncertain options with completely new processes, products, or markets then this is Schumpeterian entrepreneurship.

The simultaneous efforts by the two types of entrepreneurs will not only lead to substantial changes in the structure of the economy but also facilitate long-term economic growth. With respect to structure, entrepreneurial activities help explain both the origin of small businesses and the important role of such businesses in producing new products, creating employment, and facilitating long-term economic growth.

The Big Roles of Small Business

Small firms have been responsible for a great increase in the variety of markets, processes, and products. Table 1 provides a representative list of innovations by entrepreneurs who got their start by establishing small firms. (Baumol 2010, p. 31)

Table 1: 20th Century Innovations Created by Small Firm Entrepreneurs

Articulated tractor chassis	Overnight delivery service
Artificial skin	Portable computer
Biomagnetic imaging	Quick-frozen foods
Biosynthetic insulin	Reading machine
Computerized blood pressure controller	Rotary oil-drilling bit
DNA fingerprinting	Soft contact lens
Front-end loader	Stereoscopic map scanner
Helicopter	Supercomputer
Hydraulic brake	Variable output transformer
Link trainer	Zipper
Oral contraceptives	

Source: W. J. Baumol 2010, p. 31

It is increasingly understood that young small firms tend to be the most rapid job creators. In a detailed study of job creation, the U.S. Small Business Administration estimates that small businesses (less than 500 employees) accounted for 64% of all net new jobs – jobs created minus jobs eliminated - created in the United States. If the definition of small firms is limited to those with 100 employees or less than such firms still account for 42% of all net new jobs created. (Bialik 2011, p. A2) However, as Haltiwanger has pointed out, rapid job creation is more of a function of the age of small firms than their size. Young firms account for the greatest proportion of new net job creation. (2011, Figure 3, p. 25) This is consistent with the uncertainty facing entrepreneurs who establish new firms in order to bring innovations to market. Their firms tend to rapidly move either up or out – either rapidly expand if their innovation is economically successful or rapidly go out of business if their innovation fails. But whether they succeed or fail, researchers have increasingly recognized the important impact of small entrepreneurial businesses on economic growth.

Entrepreneurship and Economic Growth

The stationary state model of an economy can be made more realistic by positing that adverse and favorable shocks occur in a cycle. Agricultural communities experience years of good harvests and bad. Towns suffer periodic bouts of disease followed by periods of general good health. The countryside is at times overrun with bandits followed by times of security. Reasonably honest governments follow corrupt ones. While there are good times and bad, little changes over the long run. This crude cyclic form of the stationary state generally describes the lives of almost all of humanity from roughly 8,000 BC until at least 1500 AD. DeLong (1998) and Maddison (2003) estimate that the average per-capita income of the world was barely above the subsistence level during this entire period.

In fact, it was only with the spread of the Industrial Revolution, that substantial proportion of the world's population finally escaped from a Malthusian hand-to-mouth existence. Until the Industrial Revolution, every generation lived the same lives as their ancestors within a cycle of good times and bad. If time-travel transported a second century BC rice farmer from southern China or a sailor from a Roman ship in the Mediterranean and dropped them off 1700 years later in the same areas, the farmer and sailor would discover that their professions and quality of life had changed little if at all.

In economic terms, this cyclical stationary state reflects the efforts of generations of Kirznerian entrepreneurs continually striving through arbitrage or speculation to restore market equilibria after every shock. However, the failure of the world's economies to achieve any substantial long-term improvement in living standards for several millennia points to an absence of Schumpeterian (innovative) entrepreneurship. Of course, the appearance of innovative entrepreneurship was not the sole cause of the sharp rise in living standards experienced during the Industrial Revolution, expanding markets accompanied by greater specialization also had a major impact. However, even after the living standards began their dramatic increase with the Industrial Revolution, progress was very uneven across countries. Some countries like the U.S. were able to achieve per-capita incomes of \$48,400 a year while a billion people in the world still live in countries with per-capita incomes of less than \$975 a year. (World Bank 2010, Table 1.1)

Schumpeterian entrepreneurship – “creative destruction” – is the dominant cause of economic growth and development.

The recognition of the critical role of entrepreneurship in bringing about economic growth is relatively recent. In neo-classical economics, technological change was exogenous – manna from heaven. However, when economic researchers estimated the impact of technological change on economic growth, there was a large unexplained disparity among nations. Why should advances in technology affect some countries but not others? Romer (1990) argued that the answer to this disparity could be that the rate of technological change in an economy is determined by the stock of knowledge. And the accumulation of knowledge was endogenous – it could be increased by appropriate policies.

Policies intended to accelerate the rate of knowledge accumulation have to account for the fact that knowledge is to a great extent both non-rival and only partially excludable – it is neither a conventional private nor public good. (Arrow 1962a, pp. 614-616; Romer 1990, pp. S73-S74) There is a free-rider problem. It follows that production of knowledge by firms in competitive markets is likely to be suboptimal since a firm creating knowledge would bear the cost but much of the benefit would “spill over” to its competitors. While some knowledge accumulation occurs as a by-product of production (learning by doing), societies also rely upon large firm (oligopolistic or monopolistic) R&D, university research, or government supported laboratories to create the needed knowledge. (Arrow 1962b, pp. 168 & 172) Therefore, in order to accelerate a nation's economic growth, governments should attempt to increase the amount of human capital devoted to research

in large firm R&D, university or government research programs. There was no role in this theory for small businesses, entrepreneurs, or uncertainty. (Romer p. S82)

However, empirical tests of this basic knowledge-growth model generally failed. Some countries with large investments rates in R&D, such as Sweden and Japan, experienced slow economic growth while other countries, with lower rates of knowledge creation, grew rapidly. These observations were confirmed by a test of the effect on GDP growth rates of an increase in the percentage of GDP spent on R&D. This test found no statistically significant results. (See Figure 1 in Braunerhjelm et al. 2010, p. 106) The combination of high rates of knowledge accumulation and sluggish economic growth is often referred to as the European Paradox. (Audretsch et al. 2006, pp. 33 & 171-172; Carlsson et al. 2009, p. 1193)

The missing link between knowledge accumulation and economic growth is entrepreneurship. Innovations are by their very nature uncertain. As a result, different individuals can have different estimates of the value of an innovation. (Audretsch et al. 2006, pp. 31 & 51-52) That it is difficult to accurately predict the ultimate economic value of inventions is illustrated by the relatively few inventions that actually earn a significant return. In a study of U.S. university research, Carlsson and Fridh found that only about half of invention disclosures led to patent applications, and only about half of these applications resulted in patents. And, of these patents, only 37% eventually yielded any income and in only 10%-20% of the cases was the income significant. In other words, only 1% to 2% of all inventions that resulted from some very expensive university research eventually resulted in a significant economic return! (2002, p. 211; see also Braunerhjelm et al. 2010, p. 107)

Knowledge creators, whether corporate R&D entities, governments, universities, or small “garage” inventors will, of course, only pursue those innovations whose expected return on their investment (ROI) exceeds a certain target percentage. For example, as a matter of corporate strategy, a firm may decide to only pursue those projects that have an expected ROI that exceeds 20%. As a result, an economy can fail to receive the full advantage of beneficial advances in knowledge for two reasons. First, because of the uncertainty involved, knowledge creators may misjudge the potential ROI of an innovation. They may think that the potential ROI is low (or even negative) while it might actually turn out to be much higher. Second, there might be other entities that would be willing to accept a lower ROI target. For example, another firm might pursue any innovations that are expected to have a ROI greater than 10%.

While some entrepreneurs may be creators of economic knowledge, as seen in Table 1, most play a more important role in reducing the amount of “abandoned” knowledge. Knowledge obtained through research is at least partially non-excludable and therefore can spill over through professional publications, news stories, departures of key employees, and through casual conversations over coffee with friends. As a result of these spillovers, entrepreneurs become aware of knowledge advances and, based on their differing assessments of the economic value of innovations based on this knowledge, they may pursue innovations that were rejected - abandoned - by the original knowledge

creators. (See Audretsch et al. 2006, Chap. 3 for a detailed discussion of the spillover theory of entrepreneurship.)

In its simplest version, the spillover effect might be seen as a sequential process. Corporate R&D, university, or government research programs produce advances in knowledge. Since the profitability of these advances is uncertain, there will be a diversity of opinions about whether the knowledge advance can be converted into an economically successful innovation. Corporations and other entities will pursue those innovations that they think will exceed their target ROI and abandon the rest. However, due to the knowledge spillover effect, other firms or individuals will become aware of the abandoned knowledge. And if other firms or individuals believe that the return on innovations based on this abandoned knowledge will exceed their - possibly lower - target ROI then they will pursue them. The result is less waste of knowledge advances and a more rapid rate of technological change driven economic growth.

Of course, the reality of the innovation spillover process is more complex than a sequential model shows. For example, the development of the personal computer – one of the most successful innovations of modern history – was incredibly convoluted. As a result, attempts to accurately delineate the personal computer's genealogy have great difficulty in separating reality from myth. However, it is clear that while large corporations such as Intel, Xerox, and IBM played important roles; other advances depended on many small entrepreneurs exemplified by Steven Jobs and Stephen Wozniak, the founders of Apple Computer. Knowledge spillover between the large corporations and small entrepreneurs was substantial and critical.

Beyond anecdotes, there is an increasing amount of empirical work that emphasizes the important role for entrepreneurs in facilitating economic growth. For example, Braunerhjelm et al. show that, irrespective of econometric specification, a proxy for entrepreneurship is a strongly significant determinant of real GDP growth in seventeen OECD countries over a twenty-year period. (2010, Table 4, p. 117)

Therefore, in order to maximize the rate of economic growth, an economy needs both knowledge creators and Schumpeterian entrepreneurs. Why do some countries possess a large number of Schumpeterian entrepreneurs and have progressed rapidly while others are stagnant? Extrapolating from personal preferences and circumstances, the most common explanations are culture and institutions.

Impact of Culture and Institutions on Entrepreneurship

The impact of culture on entrepreneurship is extremely controversial. Some researchers have argued that particular cultures are hostile to entrepreneurship while others have argued that such arguments reflect a biased or mistaken perception of the cultures in question. However, societies with vibrant Schumpeterian entrepreneurship tend to have several characteristics in common. The general population thinks more in terms of the individual rather than the community. There is less respect for authority and age. Persons

tend to think that success should be rewarded by profit or other financial gains rather than promotion to higher status positions. Finally, it is accepted that rewards from successful entrepreneurship should accrue to the individual entrepreneur and not to his extended family, tribe, or to the state. (See Weber 1930, Landis et al. 2010) But even if the cultural environment is important in determining the scope of innovative entrepreneurship, it is uncertain whether culture – especially when grounded in religious beliefs – can be changed in order to provide a more entrepreneur friendly society. And attempts to move beyond culture to focus on institutions raise the question; to what extent do institutions reflect cultural values? (See, for example, Kuran 2010.) However, the U.S. experience provides some insights into the impact on Schumpeterian entrepreneurship of institutions.

“The major role of institutions in a society is to reduce uncertainty by establishing a stable (but not necessarily efficient) structure to human interaction”. (North 1990, pp. 4 & 6) Institutions perform this role by limiting individual choice – they are the “rules of the game” that make transactions possible or more efficient. These institutions can be either formal ones established by law or informal ones hallowed by tradition. But in either case, they facilitate transactions by limiting choice. For example, a corporation may consider increasing its profit by simply choosing not to pay an inventor for the use of his invention. If existing institutions severely punish such behavior formally – through criminal or civil sanctions – or informally – through public disgrace - then it is unlikely that a firm will choose to cheat in this way. By reducing the uncertainty about whether inventors will be paid, these formal or informal institutions make it easier for firms to purchase useful inventions because inventors are more confident that their efforts will be rewarded.

The existence of a vibrant entrepreneur community is particularly dependent on the specific incentives embedded in a country’s formal or informal institutions. A growing literature on a myriad of policy initiatives intended to encourage entrepreneurship has identified some critical institutional needs. (See, for example, Parker 2009, Chaps. 15, 16, & 17; and Baumol, Litan, and Schramm 2007, Chap. 8.) These include the development of legal, regulatory, and tax systems that deal with the two most serious challenges facing small-scale entrepreneurs: incomplete contracts and a hostile regulatory environment.

Incomplete contracts. Because of the inescapable uncertainty associated with entrepreneurship, contracts involving entrepreneurs tend to be incomplete in the sense that it is impossible to negotiate in advance every possible contingency. There are just too many unknowns in agreements involving intellectual property rights. (Arrow 1962a pp. 617-618) Therefore, the parties involved will rely upon formal or informal institutions to resolve any future disputes between the entrepreneur and other contracting parties. Ideally, a country’s institutions should favor timely, effective, predictable, fair, and low cost resolution of contract disputes. (Parker 2009, pp. 448-449) If any of these characteristics is missing then it will tend to discourage entrepreneurship. For example, if a nation’s court system takes years to adjudicate even simple patent cases then it is likely that a small-scale entrepreneurial firm will be bankrupt long before a court even has the chance to rule in its favor. As North noted, the inability of a country to develop a means

of efficiently adjudicating disputes concerning incomplete contracts is the major cause of economic stagnation in the world. (1990, p. 54)

Hostile regulatory environment. An extensive web of business regulations often has a disproportionate adverse impact on small innovative firms. (Parker 2009, p. 442-443) These regulations may have desirable public purpose such as protecting the environment or they may result from some form of rent seeking, such as lobbying, by one group to gain an advantage over its competitors, its suppliers, etc. Regardless of the motivation, complex regulations make it more difficult to operate a small business especially an entrepreneurial small business.

For example, according to the World Bank's 2011 Ease of Doing Business survey, there are nineteen separate regulatory procedures required to build a simple warehouse in New York City. Dealing with these administrative procedures – not actually building the warehouse - requires an estimated forty days and costs over \$6,000. Another example is the 2002 Sarbanes-Oxley Act that greatly complicates the management of corporations especially since the Act calls for criminal penalties for non-compliance. (Parker 2009, p. 450) Large firms are more likely to have specialists to deal with government regulatory agencies and the administrative cost of complying with regulations tends to be a small fraction of a large firm's revenues. But in new small firms, not only are owner-entrepreneurs distracted from growing their businesses by having to deal with complex regulations but also the costs of compliance tend to be a much larger fraction of small businesses' revenues.

Developing good policies to deal with incomplete contracts and ensure that the regulatory environment is favorable for entrepreneurship is necessary but insufficient. It is also necessary to turn those policies into institutions and this runs into a fundamental problem. Institutions are not generally created to maximize the welfare of a society as a whole but rather institutions are usually formed so as to maximize the welfare of those who have the political power to devise new institutions. (North 1990, p. 16) This is an implication of the "public choice theory" of political-economy. With respect to entrepreneurship, this is often seen as a conflict between small firms that favor a more dynamic economy but lack political influence and big business (and big labor!) that oppose change that they cannot control and, generally, have more political influence. This is an example of a principal-agent problem where the interests of the principals – the voting public – and their agents – elected officials – diverge. Fortunately, if surveys, newspaper and online opinion pieces are any guide, there is increasing recognition among the voting public of the value of entrepreneurial small firms in introducing new products, creating employment, and facilitating economic growth.

Conclusion

Is entrepreneurship important enough to either push another topic out of the principles text in order to make room or to further expand already encyclopedia length texts? Yes. The role of the entrepreneur is critical not only to understand the creation, operation, and

destruction of markets but also because of its important role in long-term economic growth. As a result, it is time for a serious treatment of entrepreneurship in the early – foundation – chapters of principles of economics texts. A clear definition, the notion of the stationary state, and the accompanying diagram provide a framework for introducing the key aspects of entrepreneurship at the principles level. This can facilitate classroom discussions on both the implications of having a mix of small and large firms in the same industry and the role of public policy in furthering economic development.

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