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CHAPTER ONE

Introduction

Modern economic development is to an important extent determined and driven by the emergence of the knowledge economy (Jorgenson, 2001). Advances in technical and organizational knowledge have been identified as key drivers of economic growth. Access to knowledge is generally recognized as a key condition for innovation, improved standards of living, and international competitiveness (Jones, 2002). This seems to imply that there is something new about growth being based on knowledge, as if knowledge is more important today than in the past. While this may be true, it may very well be misleading. It has long been the consensus among economists who have studied the problem that long-term growth is always based on the growth of technical and organizational capabilities (Chandler, 2000).

However, according to Peter Howitt (1996), what is new about knowledge from the economist's point of view is that we are now beginning to incorporate it into our framework of analysis. Even more importantly, we are dealing with knowledge not as an extraneous outside influence but as one of the main factors whose evolution we seek to explain as the outcome of economic forces. Although many of the ideas of the new growth theory go back to writers such as Joseph Schumpeter, it is only with the work of Paul Romer (1986) and Robert Lucas (1988) that economists were able to incorporate these ideas into simple dynamic, stochastic, general equilibrium models.

One of the advantages of the new growth theory is that it supports more relevant discussion of regional issues. While the Kaldorian approach to growth (Kaldor, 1961) also pointed to a need for regional economic policies, the new growth theories suggest that such policies would need to

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be more supply oriented, focusing on innovation, infrastructure, and ecological sustainability, rather than on the traditional simplistic tools of local demand stimuli through subsidies and lower interest rates. The new growth theory also has important implications for entrepreneurship research. By shifting the focus from the demand side of the economy to the supply side of the economy, and from tangible to intangible inputs, growth theory is now much better aligned with Schumpeterian insights on innovation. The emphasis on knowledge and technological change gives us an operational way in which to think about the sources of opportunity and how the opportunity set may be expanded and exploited. While these new growth theories give us better insights into the role of knowledge in economic growth, they only hint at how knowledge leads to innovation. This book addresses these gaps in our understanding of the processes underlying growth.

We build on two previous empirical studies. *Innovation and Small Firms* (Acs and Audretsch, 1990) examined the question “Why should entrepreneurship emerge as a driving force of the U.S. economy precisely when both technical change and globalization seem to play an unprecedented role in the national welfare?” However, this first book did not answer the question “Why is innovation important to national welfare?” *Innovation and the Growth of Cities* (Acs, 2002) demonstrated that innovation is the driving force of the growth of cities and regions. Innovation is not an autonomous miracle; it emerges out of knowledge creation and adoption. However, this second book did not answer the question “Why is entrepreneurship important for regional growth?”

The current work bridges the gap between these related but disparate works. We suggest that variations in entrepreneurial activity, and agglomeration effects, could potentially be the source of different efficiencies in knowledge spillovers and ultimately in economic growth. In other words, we try to answer the question “*What is the role of entrepreneurial activity and agglomeration effects in economic growth?*” As early as 1976, *The Economist* magazine wrote about the coming entrepreneurial revolution, and in 1985, then-President Ronald Reagan announced that “we are living in the age of the entrepreneur.” David Hart at the Kennedy School of Government at Harvard University, discussing the dot-com bubble in the late 1990s, wrote, “The Entrepreneurship fad rested on a foundation of fact. New companies made a significant contribution to economic

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growth in the past decade, both directly and by stimulating their more established competitors” (Hart, 2003, 3). And, Edward Lazear at Stanford University wrote, “The entrepreneur is the single most important player in a modern economy” (Lazear, 2002, 1).

Schumpeter After Romerian Insights

In *The Theory of Economic Development* (1911 [1934]), Schumpeter unveiled his concept of the entrepreneur against the backdrop of economic development. He looked upon economic development not as a mere adjunct to the central body of orthodox economic theory, but as the basis for reinterpreting a vital process that had been crowded out of neoclassical economic analysis by the static general equilibrium theory. He draws attention to the role of the entrepreneur, who is a key figure and plays a central role in his analysis of capitalist evolution.

Schumpeter uses a blend of economics, sociology, and history to arrive at his unique interpretation of “the circular flow of economic life.” He shared the view with Marx that economic processes are organic and that change comes from within the economic system. It is the entrepreneurs’ social function that is central to his theory. Schumpeter made the entrepreneur into a mechanism of economic change. The system is driven by innovation, and the innovator makes things happen; for Schumpeter, this is the role of the entrepreneur (2005).

Schumpeter makes a distinction between the innovative function of the entrepreneur and the financial function of the capitalist. For Frank Knight (1921), a member of the Chicago School, the entrepreneurial and capitalist functions are inextricably intertwined. Entrepreneurs must finance themselves, must bear the risk of failure, and by definition are recipient income claimants. Thus, for Knight, the superior foresight of the entrepreneur and his willingness to bear financial risk must go hand in hand. However, Schumpeter wrote, “If we choose to call the manager or owner of a business an ‘entrepreneur’ then he would be an entrepreneur of the kind described by Walras, without special function and without income of a special kind” (1911 [1934], 45–46).

The entrepreneur, as a member of a social class, is what gives rise to continued self-generated growth. According to Robert Heilbroner (1984, 690), it is the “essentially unadventurous bourgeois class that must

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provide the leadership role, it does so by absorbing within its ranks the free spirits of innovating entrepreneurs who provide the vital energy that propels the system. In Schumpeter's theory the entrepreneur is the person who innovates. In this system, the underlying 'pre-analytic' cognitive vision is thus one of a routinized social hierarchy creatively disrupted by the gifted few."

Three decades after the original publication of *The Theory of Economic Development* in 1911, it was the large corporation and the rise of socialism that drew attention to Schumpeter's gloomy prospects for economic progress. As Schumpeter himself wrote in 1942 in *Capitalism, Socialism, and Democracy*, the ideologically plausible capitalism contains no purely economic reason why capitalism would not have another successful run. The socialist future of Schumpeter's drama, therefore, rested wholly on extraordinary factors. When large corporations take over the entrepreneurial function, they not only make the entrepreneur obsolete but also undermine the sociological and ideological functions of capitalist society. As Schumpeter ([1942] 1950, 134) himself wrote in the classic passage:

Since capitalist enterprise, by its very achievements, tends to automatize progress, we conclude that it tends to make itself superfluous – to break to pieces under the pressure of its own success. The perfectly bureaucratized giant industrial unit not only ousts the small or medium-sized firms and "expropriates" the bourgeoisie as a class, which in the process stands to lose not only its income but also what is infinitely more important, its function. The true pacemakers of socialism were not the intellectuals or agitators who preached it but the Vanderbilts, Carnegies and Rockefellers.

As the large firm replaces the small- and medium-sized enterprise, economic concentration starts to have a negative feedback effect on entrepreneurial values, innovation, and technological change. Technology, the means by which new markets are created, and source of that "perennial gale of creative destruction" that fills the sails of the capitalist armada, may die out, leading to a stationary state.¹ This view of the future

¹ This inherent tension between innovation in hierarchical bureaucratic organizations and entrepreneurial activity has been more recently echoed by Oliver Williamson (1975, 205–206), who suggested a division of labor between large and small firm innovation: "I am inclined to regard the early stage innovative disabilities of large size as serious

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of capitalist society held by Schumpeter ([1942] 1950) was not universally accepted. John Keynes (1963) was much more optimistic about the economic prospects of our grandchildren.

Nevertheless, in long-run economic progress, prosperity gives way to stagnation when the rate of basic innovation remains at a low level. This of course did not happen, at least not in the capitalist world. Why was Schumpeter wrong about the future of capitalist society? We believe he made this mistaken forecast in part because he was writing at a point in time when the world was indeed on a socialist trajectory after the Russian Revolution, with communism spreading throughout Eastern Europe and China. He did not err by missing the essential feature of the class struggle—the principal driving force of history—the struggle between “elites and masses, privileged and underprivileged, ruler and ruled.” He erred by underestimating the deep-rooted nature of the entrepreneurial spirit buried within American civilization. While for Marx the principal struggle is between privileged and underprivileged, for Schumpeter, as in the transition from feudalism to capitalism, the quintessential struggle is between “elites and elites: merchants and aristocrats, entrepreneurs and bureaucrats, venture capitalists and Wall Street” (Acs, 1984, 172).

Perhaps Schumpeter did not see—partly because of his European background—that the entrepreneurial spirit would emerge from America’s past and rise to challenge, engage, and extinguish the embers of bureaucratic hegemony, bringing to an end the era of monopoly capitalism. Bruce Kirchoff (1994), building on Schumpeterian dynamics, demonstrated that entry of new business is a necessary condition for economic development if long-run market concentration and declining innovation rates are to be avoided. The reemergence of entrepreneurship in the United States during the 1980s, and the positive channeling of it, must be seen as triumphs of the capitalist system. Of course, other countries also experienced a revival of capitalism during this time period, most notably

and propose the following hypothesis: An efficient procedure by which to introduce new products is for the initial development and market testing to be performed by independent inventors and small firms (perhaps new entrants) in an industry, the successful developments then to be acquired, possibly through licensing or merger, for subsequent marketing by a large multidivisional enterprise. . . . Put differently, a division of effort between the new product innovation processes on the one hand, and the management of proven resources on the other may well be efficient.”

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in the UK under Margaret Thatcher. For a discussion of the different institutional frameworks, see Michael Porter (2000) on Japan, Wolfgang Streeck and Kozo Yamamura (2002) on Germany, Honah D. Levy (1999) on France, and Charlie Karlsson and Zoltan J. Acs (2002) on Sweden.

Where does all this leave Schumpeter, the early Schumpeter, that is? The answer is provided by R. Nelson (1992, 90) who wrote:

In his *Theory of Economic Development*, Schumpeter is curiously uninterested in where the basic ideas for innovations, be they technological or organizational, come from. Schumpeter does not view the entrepreneur as having anything to do with their generation: “It is not part of his function to “find” or “create” new possibilities. They are always present, abundantly accumulated by all sorts of people. Often they are generally known and being discussed by scientific or literary writers. In other cases there is nothing to discuss about them, because they are quite obvious” (Schumpeter, 1911 [1934], pp. 88).

While Schumpeter did not worry about where opportunities come from, a generation of economists spent the better part of a half century trying to figure out the relationship between technology, economic growth, and public policy (Nelson, Peck and Kalachek, 1967). After the Romer revolution, however, we now realize that the opportunity set is expanded and that economic growth is explained, to a large extent, by investments in knowledge and human capital (Jones, 2002). A second generation of new growth theorists recognized that Schumpeter’s entrepreneurship was missing from these models, and they incorporated entry through “R&D races” into the model (Aghion and Howitt, 1992).

While this was a step forward, the essence of agency was missing from these models. There is a “missing link” between new growth theory and entrepreneurship theory. In Schumpeter we have no explanation of where opportunity comes from, or how it is expanded, and in Romer the Schumpeterian entrepreneur is missing. These models assume that knowledge and economic knowledge are the same and that knowledge spillovers are ubiquitous. Acs, David Audretsch, Pontus Braunerhjelm, and Bo Carlsson (2004) identify entrepreneurship as the “missing link” in converting knowledge into economically relevant knowledge. Thus, the development of new growth theory reinforces the seminal contributions made by Schumpeter a century ago on the importance of entrepreneurship and innovation for economic development.

The Definition of the Entrepreneur

In colloquial English, entrepreneurship has at least two meanings. First, entrepreneurship refers to owning and managing a business on one's own account and risk. Within this concept of entrepreneurship, a dynamic perspective focuses on the creation of new businesses, while a static perspective relates to the number of business owners. Second, entrepreneurship refers to entrepreneurial behavior in the sense of seizing an economic opportunity. At the crossroads of behavioral entrepreneurship and the dynamic perspective of occupational entrepreneurship has risen a new discipline (Sternberg and Wennekers, 2005).

The entrepreneur, according to Mark Casson (2003, 225), "is someone who specializes in taking judgmental decisions about the coordination of scarce resources." The term *someone* emphasizes that the entrepreneur is an individual. The term *judgmental* implies that the decision cannot be simply a routine application of a standard rule. The idea that the perception of opportunities is subjective, but opportunities are objective, has a long history in the theory of entrepreneurship. It is most clearly expressed in Frederick Hayek (1937). Knight (1921) expressed the same idea in somewhat different language when he introduced the distinction between risk, which is objective, and uncertainty, which is subjective, and identified uncertainty bearing as the economic function of the entrepreneur (Casson, 2005; Alvarez and Barney, 2005). As G. L. S. Schackle wrote, "The entrepreneur is a maker of history, but his guide in making it is his judgment of possibilities and not a calculation of certainties" (in Hebert and Link, 1982, viii).

We view entrepreneurship as what happens at the intersection of history and new technology (Acs and Audretsch, 2003, Chapter 1). History is the codified record of what has happened in the past, and new technology changes the future. This leads to two useful concepts. First is the stock of technical knowledge, what one might think of as codified language and knowledge. The second is the technology opportunity set, which consists of all the opportunities that have not been exploited. Investment in new knowledge increases the technology opportunity set and sharpens our ability to gaze into the future. This leads to a simple definition of entrepreneurial activity that involves the discovery, evaluation, and exploitation of opportunities within the framework of an individual-opportunity nexus.

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According to Scott Shane (2003), this definition involves some assumptions. They are

- the existence of market and technological opportunities;
- differences between people to recognize opportunities;
- the decision to exploit under conditions of uncertainty;
- some form of innovation;
- the creation of a means-end vehicle to exploit the opportunity.

The nature of the vehicle to exploit opportunities depends on the mix of the exploitation and discovery matrix. The four types of ventures discussed in the literature are independent start-ups; spin-offs; acquisitions; corporate ventures.

When one looks at these four vehicles to exploit new opportunities, it becomes clear that the first three have empirical counterparts in the real world. Many large corporations engage in both the spin-off of existing operations and the acquisition of independent start-ups. However, corporate venturing does not have an easily identifiable empirical counterpart in the business world. By far the most popular vehicle for exploiting newly discovered opportunities is the independent start-up.

While independent start-ups are difficult to conceptualize in the empirical world, two types of empirical data exist for studying it. The first is self-employment data, a legal definition as much as an economic one, however. The self-employed work on their own account and do not work for wages. Self-employment data have been used to investigate many aspects of entrepreneurship, including occupational choice questions, financial constraints, and the characteristics of entrepreneurs (Parker, 2004). The second operational measure is the founding of a new business with employees, which may or may not be incorporated. New firm formation implies that the new venture is independent of any existing business currently in operation. It is not a subsidiary or branch establishment of any existing business. This measure has been used to study industry evolution, including new firm formation, firm survival, firm growth, and firm exit (Audretsch, 1995b).

Therefore, the operational definition of entrepreneurial activity used in this book is the *new firm formation*: the process whereby an individual or group of individuals, acting independently of any association with an existing organization, creates a new organization (Sharmes and Chrisman, 1999). Thus, our definition operates outside the context of

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a previously established organization and is consistent with the early Schumpeter (1911 [1934]).²

Geography: The Unit of Analysis

To investigate the relationship among entrepreneurship, geography, and economic growth, we need to analyze differences across local economic areas that are big enough to comprise the local labor and consumer markets. Cities and their broader integrated economic areas provide much more suitable units than do states or nations (Lucas, 1988). The local economic areas centered on primary cities tend to function as open economies, with a tremendous internal mobility of capital, labor, and ideas. These city-based economic areas are much more homogeneous units than those defined by the political boundaries of states. Cross-national analysis is complicated by the barring of factor mobility across national boundaries; national policies that encourage industrial diversification, reducing the gains from internal factor mobility; and distortions from the aggregation of diverse socioeconomic regions within countries. City-based regions allow us to look at fairly integrated units of economic growth without these concerns (Glaeser, Scheinkman, and Shleifer, 1995).

Within the United States, there are many levels of geographic units that have some economic data associated with them. Most politically defined units, including states, counties, cities, and towns, have boundaries that rarely represent the borders of functional economic areas. Furthermore, most of the data collected for these politically defined units are based on where people live, rather than where they work or shop. Data based on the location of business establishments (where people work) are needed for measuring the effect of location-specific economic growth, productivity, employment, and other economic factors. These data are also collected for various political units – particularly for states and counties.

The city proper has the advantage of being a smaller geographic unit, within which there is reasonably integrated economic and social activity, which might be important for spillovers operating in dense areas. However, city boundaries are often quite arbitrary relative to the local

² This work does not include self-employment in its empirical analysis. We define self employment as working for profit alone and not for wages.

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patterns of economic activity, and their relatively small size means that neighboring political units may substantially influence them. In addition, while cities and towns usually collect some economic data, these data are rarely comparable across areas because they tend to vary with the details of local regulations and tax laws.

State- and county-level business data collected by the federal government are generally comparable across all the states, but most states are composed of multiple, diverse economic areas. Therefore, analyses of economic data based on states as geographic units usually suffer from aggregation problems due to the diversity of economies within a state. On the other hand, many integrated local economic areas cross both state and county boundaries, and both people and businesses flow freely back and forth across these boundaries, so that the economic behavior of agents within a given state or county may be significantly affected by unmeasured influences from adjacent areas in other states or counties.

Metropolitan Statistical Areas (MSAs) are multicounty units that are defined to include all of the densely populated areas surrounding the larger cities. These geographic units do a better job of ensuring that people both live and work within their boundaries. However, until 2000, they were based primarily on residential population densities, with only secondary consideration for where people worked. In addition, MSAs are periodically redefined to keep pace with changing urban population patterns, and they exclude large areas of the country whose local economies are not centered on large cities.

The geographic unit of analysis chosen for this study, Labor Market Areas (LMAs), substantially avoids all of the problems associated with the aforementioned units. These LMAs are aggregations of the 3,141 U.S. counties into 394 geographical regions based on the predominant commuting patterns (journey-to-work). Each LMA contains at least one central city, along with the surrounding counties that constitute both its labor supply and its local consumer and business market.³ Many of the 394 LMAs cut across state boundaries, to better

³ These LMAs are defined according to the specification of C. M. Tolbert and M. Sizer (1996) for the Department of Agriculture, using the Journey-to-Work data from the 1990 U.S. Census of Population. They are named according to the largest place within them in 1990. Some LMAs incorporate more than one MSA, whereas others separate some of the larger MSAs into more than one LMA, depending on the commuter patterns. A few smaller independent (usually rural) Commuting Zones have been appended to