Entrepreneurs in the Theory of the Firm

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Abstract

Microeconomics should reflect the central economic role of the entrepreneur. I describe a general theory of the firm in which entrepreneurs, firms, markets and organizations are endogenous. The entrepreneur makes a fundamental economic contribution by establishing a firm, which in turn creates markets and organizations. The entrepreneur faces three types of competition. In type-I competition, the entrepreneur competes with other entrepreneurs to establish the most efficient new firm. In type-II competition, the entrepreneur competes with direct exchange between consumers; the newly-established firm must create efficiencies of exchange that consumers cannot achieve on their own. In type-III competition, the entrepreneur competes with existing; the newly established firm must offer innovations and efficiencies that cannot be achieved by adjusting or expanding incumbent firms. A basic general equilibrium model illustrates the main points of the theory. In the model, consumers choose between being establishing firms and working for firms. The analysis extends the separation theorem to price-setting firms. The entrepreneur's profit is the value of the firm net of the costs of establishing the firm. The basic model can be extended to examine a wide variety of research questions regarding the entrepreneur and the firm.

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Introduction

Entrepreneurs are major contributors to economic growth, development, and prosperity, see Schramm (2006a) and Baumol, Litan, Schramm (2007). Entrepreneurs are responsible for a large share of technological innovation in products and production processes, driving economic transformation and international trade. Entrepreneurs establish new forms of organizations and employ new types of business methods. Economic theory must keep up with these critical developments by understanding the fundamental contributions of entrepreneurs. Such an understanding is essential for formulating economic policies that do not restrict productive entrepreneurs. Yet, despite the essential nature of their economic contribution, the importance of entrepreneurs has not been recognized fully in neoclassical economics.

I propose an economic framework for understanding the economic contribution of the entrepreneur. The framework is based on extending the theory of the firm to include the entrepreneur. The main conclusion of the analysis is as follows. Entrepreneurs play a central role in the modern economy because they are the prime movers – the makers of firms. Entrepreneurs are fundamental to economic equilibrium because they establish firms that in turn create both markets and organizations. Firms are responsible for practically all economic activity outside of government: innovating, pricing, contracting, employing resources, labor, and capital goods, raising financial capital, organizing production, and marketing goods and services.

In The Theory of the Firm (2008), I present a general approach to microeconomics in which not only entrepreneurs, but also firms, markets, and organizations are endogenous. Consumers choose to become entrepreneurs based on the

personal rewards offered by market opportunities and generated by their capabilities. Entrepreneurial decisions make the establishment of firms endogenous. In equilibrium, firms create markets as well as organizations, making both types of institutions endogenous. Market transactions and prices are determined endogenously in equilibrium as are organizational transactions and management. In this paper, I examine the economic role of the entrepreneur in the general theory of the firm.

I begin by presenting a general framework that identifies the role of the entrepreneur in the economy. Then, I consider the three main types of competition faced by entrepreneurs. In type-I competition, entrepreneurs compete with each other to establish firms. The many personal attributes of entrepreneurs that are critical include preferences, income, wealth, judgment, knowledge, ability, ideas, and opportunity costs. In type-II competition, entrepreneurs compete with direct exchange between consumers. Entrepreneurs will be successful in establishing firms only if firms provide transaction benefits that cannot be achieved by consumer organizations. In type-III competition, entrepreneurs compete with established firms since the entrepreneurial start-up must provide incremental economic benefits that incumbents are unable or unwilling to provide. To add value, the entrepreneur must launch a firm that can offer scarce capacity, more effective organizations, better market transactions, more efficient technologies, or differentiated goods and services.

The general theory of the firm presented here contrasts substantially with neoclassical economics.[1] In neoclassical general equilibrium theory, firms and markets

[1] The entrepreneur has played practically no part in neoclassical economics for two main reasons. First, firms already are given exogenously, so no entrepreneur is needed to

are given exogenously. Firms are described by the production technology. Markets are given for practically every good, location, time and state of the world, and operate costlessly. Organizations are missing from the neoclassical framework. Most significantly, because firms are givens, the entrepreneur has no economic function. As William Baumol (2006) observes, the entrepreneur is mentioned virtually never in the modern theory of the firm and observes that "The more critical explanation of the absence of the entrepreneur is that in mainstream economics the theory is generally composed of equilibrium models in which, structurally, nothing is changing. But, this excludes the entrepreneur by definition," see also Baumol (1993). The entrepreneur also tends to be absent from economics courses. Dan Johansson (2004) studies Ph.D. programs and textbooks in economics and finds that required Ph.D. courses in microeconomics, macroeconomics, and industrial organization and the related textbooks completely exclude the concept of the entrepreneur. Johansson concludes that "there is a need for economics Ph.D. training based on theories that incorporate entrepreneurship and institutions."

Despite their absence from current microeconomic theory, entrepreneurs have been discussed by economists since the dawn of the field of economics. Richard

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establish them. Second, entrepreneurs play little part in neoclassical economics since markets already exist in standard models. Moreover, markets attain an equilibrium by means of the invisible auctioneer, so that firms are not needed to create or manage markets. Neoclassical economics is silent on entrepreneurs because they serve no purpose since firms are confined to production. When firms make markets, entrepreneurs are needed to provide the market-making mechanism.

Cantillon introduced the entrepreneur in 1732 in his path-breaking economic treatise. The theory of the entrepreneur has undergone cycles of revival and neglect throughout the history of economic thought. Jean-Baptiste Say (1841, 1852) provides the first comprehensive discussion of the entrepreneur in economic analysis, emphasizing the effects of the entrepreneur's reputation, judgment, and risk bearing on profit. Entrepreneurs are central to Frank Knight's (1971) discussion of risk, uncertainty, and profit. Knight emphasizes both the supply of and demand for entrepreneurship. Joseph Schumpeter (1934, p. 75) identifies entrepreneurship as "the fundamental phenomenon of economic development. The carrying out of new combinations we call 'enterprise'; the individuals whose function it is to carry them out we call 'entrepreneurs.'" Schumpeter (1934, p. 66) further observes that "new combinations are, as a rule, embodied, as it were, in new firms which generally do not arise out of the old ones but start producing beside them."

These classical themes are developed further in the modern literature on the entrepreneur. Mark Casson's (1982, p. 23) discussion emphasizes intermediation by entrepreneurs: "an entrepreneur is someone who specializes in taking judgmental decisions about the coordination of scarce resources," see also Casson (2003). Casson (1982, 2003) describes the entrepreneur as a coordinator and middleman. Casson (1982, p. 84) argues that the firm provides market-making activities to address each of these: contact making via search or advertising, specification and communication of the trade to each party, negotiation, transport and administration, monitoring of quality, and enforcement. Casson (1982, chapter 9) concludes that the entrepreneur "specializes in providing market-making services." The entrepreneur builds the firm as a "market-

making organization" to reduce the transaction costs of intermediation.[2] Thomas Hellmann (2007) models the entrepreneur as an intermediary in the market for inputs needed to establish a firm and shows how the entrepreneur convinces suppliers of complementary resources to commit to the new venture.

Baumol (1968) emphasizes the function of the entrepreneur as locating new ideas, putting them into effect, and exercising leadership. Baumol (2006) argues that the innovative entrepreneur relies on price discrimination to raise funds for innovation. Baumol (1993) presents theoretical models that examine the innovative activities of the entrepreneur, see also Baumol (2002, 2006). Baumol (1993) contrasts innovations that are substitutes from those that are complements, and shows how incentives can differ for firms engaged in complementary innovation.

The paper is organized as follows. Section 1 considers the economic role of the entrepreneur in the general theory of the firm as set forth in Spulber (2008). Sections 2, 3, and 4 examine the three types of competition that entrepreneurs encounter. Section 5 concludes the discussion.

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[2] Casson (1982, p. 84) identifies various obstacles to trade including no contact between buyer and seller, no knowledge of reciprocal wants, no agreement over price , need to exchange goods and pay taxes, no confidence in product descriptions, and no confidence that restitution will be made for default. Casson (1982, p. 97) points out that "For information flows as complex as those required for the operation of a market, social convention is usually unable to provide the degree of structure required. Greater sophistication is called for and this necessitates the use of purpose-built organizations. Among these purpose-built organizations are market-making firms."

1. The Economic Role of the Entrepreneur in the Theory of the Firm

Because of their importance in the modern economy, entrepreneurs should be at the heart of microeconomics. Entrepreneurs set up firms in response to economic incentives. In turn, firms create and operate markets that provide mechanisms of exchange for consumers. Firms also create and manage organizations that provide internal coordination and market interactions. This process is illustrated in Figure 1. The actions of entrepreneurs are the essential force that helps to drive the economy toward an equilibrium.

Some definitions are useful. An entrepreneur is an individual who establishes a firm. A firm is an economic institution that manages transactions by creating markets and organizations. Also, the firm is an institution that is distinct from its owners, managers, employees, customers, or suppliers. A market is a mechanism that brings buyers and sellers together. A market can be a store, a web site, a matchmaker, or an auction. An organization is a mechanism for managing nonmarket transactions inside the firm, including those between owners and managers, between managers and employees, and between employees, and for managing the firm's market transactions. An organization can involve hierarchies, bureaucracies, groups, teams, and networks.

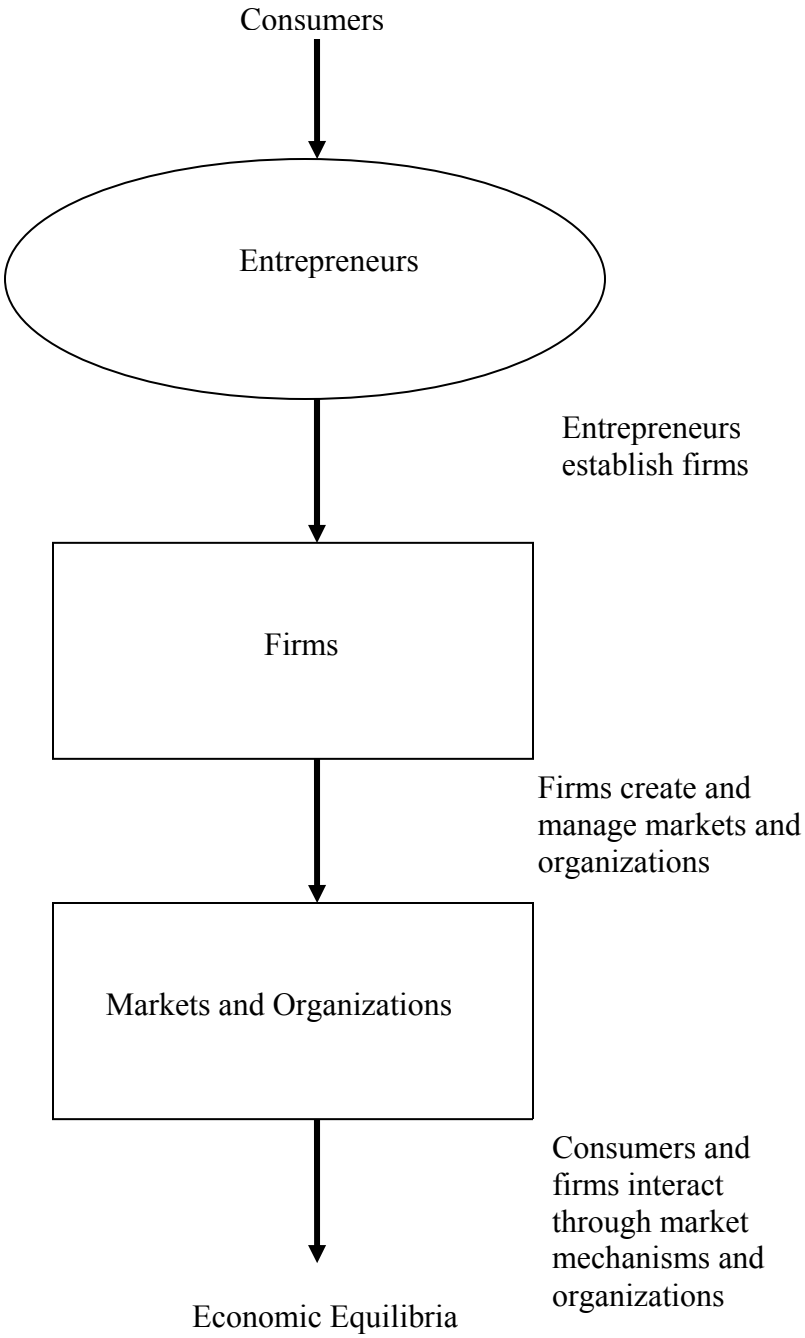

Figure 1 Microeconomics with endogenous entrepreneurs, firms, markets and organizations

All firms involve some combination of market mechanisms and organizational structures. The entrepreneurial start-up firm can be large or small, innovative or replicative. Two examples are helpful for illustrating the main concepts.

Example 1. Creating markets. Entrepreneur Jeff Bezos established Amazon.com. The firm in turn created a vast set of online markets for a wide range of products. These products were grouped into such broad categories as (1) books, music, and movies, (2) toys & video games, (3) consumer electronics, (4) computer and office, (5) tools and automotive, (6) food and household, (7) home and garden, (8) clothing and jewelry, (9) health and beauty, (10) kids and baby, and (11) sports and fitness. Within these broad categories were over 40 product categories containing many thousands of products from many manufacturers. These represented thousands of markets where Amazon brought together buyers and sellers. Amazon served tens of millions of buyers and over one million sellers. Amazon also offered start-up sellers an alternative to "heavy lifting," by providing web hosting and transaction intermediation.

Example 2. Creating organizations. Entrepreneurs Bob Noyce and Gordon Moore established Intel. About forty years after its founding, the firm's organization had more than 90,000 employees. The firm was structured around five groups: three groups were based on the company's technology platforms for mobility, the digital enterprise and digital home, another group was concerned with digital applications in healthcare, and another group dealt with worldwide distribution. The firm had a worldwide network of R&D laboratories, the firm's researchers focused on advanced computing,

communications, and wireless technologies. The firm operated manufacturing plants for producing microprocessors, component assembly, and quality testing, and conducted research on manufacturing processes.

1.1 The Economic Contribution of Entrepreneurs

The economic contribution of the entrepreneurs can be measured by the market value of the firms that they establish. Although many individuals contribute to the value of a firm, including investors, inventors, employees, managers, suppliers, and partners, these contributors are rewarded directly for their contributions through a return to capital, royalties for technology, wages, salaries, factor payments, and shared returns. These payments are deducted from the firm's earnings. The entrepreneur is rewarded by the value of the firm once it is established. Thus, the value of the firm represents the market return to the entrepreneur's efforts.

Entrepreneurs start millions of firms per year. The U.S. Small Business Administration estimates that there were over 612,000 new firms with employees in the year 2000 (U.S. SBA, 2001). Reynolds (1997, 2000) estimates that about four percent of the U.S. labor force participates in the entrepreneurial process (with the labor force exceeding 110 million people). Reynolds et al. (2004) estimate that in the year 2000 there were over 11.8 million "nascent entrepreneurs" and about 6.5 million start-up efforts in progress. Reynolds (1997, p. 460) finds that over 80% of those trying to establish a firm are self-employed in an existing business or are part-time or full-time employees.

Practically all firms were established by entrepreneurs whether in retail, wholesale, finance, manufacturing, agriculture, mining, utilities, construction,

transportation, information, services, health care, or arts and entertainment. Firms occasionally establish other firms through joint ventures divestitutres and initial investment. Managers and employees of firms that help the firm establish new firms are known as intrapreneurs. The firm's intrapreneurship contributes to the value of the original firm. Governments establish firms by privatizing public enterprises. Some privatizations of government enterprises occur through the sale of shares to investors, which occurs somewhat more frequently in countries undergoing a transition from socialist to market economies. Entrepreneurs establish some privatized public enterprises as firms by acquisition of public assets.

1.2 Entrepreneurs are Endogenous

Entrepreneurs are endogenous to the economy. The general theory of the firm begins with the characteristics of consumers. The entrepreneur is, before anything, a consumer. The consumer becomes an entrepreneur by choosing to establish a firm. Consumers bring to the task of entrepreneurship their judgment, knowledge, and technology. Consumers decide to become entrepreneurs based on their personal characteristics and their judgment of available market opportunities. After establishing a firm, the consumer-entrepreneur becomes an owner of the firm.

Entrepreneurs act rationally and purposefully. Ludwig von Mises (1998, p. 255), in his classic analysis of human action, states that in the context of economic theory, "Entrepreneur means acting man in regard to the changes occurring in the data of the

market."[3] For von Mises (1998, p. 259), "The market process is entirely a resultant of human action." He (1998, p. 312) observes that "The market is a social body; it is the foremost social body, The market phenomena are social phenomena."

Individual members of the society establish firms to facilitate, formalize, and enhance economic relationships. The social and economic origins of the firm should be reflected in the structure of the economic theory of the firm. Rather than being given exogenously, firms arise endogenously because consumers choose to become entrepreneurs. Consumer characteristics are the givens and firms are the result of consumer decisions. The existence of firms, their purpose, and their organizational structure depend on the decisions of the entrepreneur.

The entrepreneur establishes a firm to achieve a desired economic objective. As with any type of man-made instrument, the firm augments the abilities and capacity of the entrepreneur who creates it. The individual becomes an entrepreneur because

[3] von Mises (1998, p. 255) distinguishes the usage of the term entrepreneur as establishing firms from the more commonplace usage by economists and others as "those who are especially eager to profit from adjusting production to the expected changes in conditions, those who have more initiative, more venturesomeness, and a quicker eye than the crowd, the pushing and promoting pioneers of economic improvement." von Mises (1998, p. 255) suggests that the notion of the entrepreneur as a highly eager person is actually the narrower one and should perhaps be called "promoter." Owners and managers can have entrepreneurial qualities.

establishing a firm allows him or her to accomplish something that otherwise could not be done as effectively.

Consumers have preferences over consumption bundles. They own endowments of goods and services. They own production technologies and can carry out manufacturing using those technologies. Consumers also possess ideas, capabilities, skills, blueprints, transaction methods, and other types of intellectual property. Consumers can invent new technologies and can exchange them. Consumers also have the capacity to perform various activities, acting as inventors, investors, managers, and workers.

In the theory of the firm with endogenous entrepreneurs, the exogenous data of the model are the characteristics of consumers. The characteristics of entrepreneurs have been studied extensively and data is available to examine their decisions to establish firms.[4] Consumers choose to become entrepreneurs based on two primary considerations: personal characteristics and market conditions. Individual characteristics of the consumer that affect the decision to start a firm include the consumer's preferences and

[4] Reynolds (2000) reviews the National Panel Study of U.S. Business Startups, which provides an extensive and detailed statistical overview of new businesses and the personal characteristics of entrepreneurs. The personal information that is studied includes all of the usual demographic data such as age, sex, ethnic background, education, and household income. In addition, interviews and questionnaires are used to obtain information about the entrepreneur's motivation, expectations, knowledge, career experiences, competitive strategy, decision-making style, and risk preferences.

endowments. Preferences are important because the entrepreneur may derive greater satisfaction from the creative process of establishing a firm in contrast to management positions or various types of employment. Holtz-Eakin et al. (1994a, b) show that the entrepreneur's endowment matters. Using estate and income tax data, they find that the size of an inheritance affect the likelihood of a consumer becoming an entrepreneur, presumably by relaxing liquidity constraints.

In addition, the consumer decision depends on knowledge of production and transaction technologies and ownership of intellectual property, such as patents, copyrights, industrial processes, brands, and trademarks. The consumer's education, training, and experience are likely to influence the decision to become an entrepreneur. In addition, the consumer's access to information about market opportunities is critical to making business decisions. The consumer's abilities, interests, creativity, and business judgment can enter into the decision to become an entrepreneur.

Market opportunities open to the consumer are crucial to the decision to become an entrepreneur. Scott Shane (2003, p. 4) defines entrepreneurship as "an activity that involves exploitation of opportunities." Shane emphasizes that entrepreneurship involves interaction between the individual characteristics of entrepreneurs and the set of market opportunities. He stresses the effects on opportunities of changes in technology, regulation and public policy, and social and demographic conditions. Shane (2003, p. 18) observes that "the examination of opportunities that are available to the entrepreneur is a central but largely overlooked aspect of entrepreneurship."

The interaction between the entrepreneur's characteristics and the menu of market opportunities recalls a traditional framework in the field of management strategy. The

manager of the firm examines the firm's opportunities and competitive threats. The manager then considers the firm's strengths and weaknesses. The manager formulates a competitive strategy by making the best match between the firm's characteristics and the choice of opportunities.[5] The entrepreneur makes a similar choice by making the best match between his own personal characteristics and market opportunities. The entrepreneur establishes a firm that involves the best combination of his personal talents and endowments and the menu of available opportunities. Such a combination will maximize the entrepreneur's profit.

1.3 The Entrepreneur's Costs

The consumer is an entrepreneur only during the time period that he endeavors to establish a firm. Schumpeter (1934) points out that being an entrepreneur is "not a lasting condition." Upon the establishment of the firm, the entrepreneur becomes an owner of

[5] The notion that both external analysis and internal analysis are vital for strategy making draws upon Kenneth R. Andrews (1971, p. 48), who wrote that "Economic strategy will be seen as the best match between qualification and opportunity that positions a firm in its product/market environment." Andrews stated that "Determination of a suitable strategy for a company begins in identifying the opportunities and risks in its environment" (p. 48). Andrews observed that "opportunism without competence is a path to fairyland," (p. 70). Bourgeois (1985), citing Andrews, puts describes "strategic fit" as follows: "The central tenet in strategic management is that a match between environmental conditions and organizational capabilities and resources is critical to performance, and that a strategist's job is to find and create this match."

the business. The entrepreneur can continue his association with the firm as an owner and can keep working to develop, expand and diversity the firm. Alternatively, the consumer can divest his ownership share. To describe this important change in the consumer's economic roles, I introduce the term foundational shift. The entrepreneur engages in entrepreneurial activities to establish the firm and becomes an owner after its foundation.

What makes the foundational shift so important is that the once the entrepreneur becomes an owner, the firm becomes an entity that is separate from the entrepreneur. After becoming an owner, entrepreneur can choose whether or not to continue to exercise control and obtain returns from the firm without necessarily affecting the survival of the firm. The firm is an offspring with an independent identity and its own objectives.

The entrepreneur may have supplied some essential inputs to the firm, such as the entrepreneur's reputation, talents, creativity, and other unique services, but the entrepreneur could continue to supply these to the firm on a contractual basis once the firm has become established. Although the owner may exercise considerable control over the firm, the firm generally is distinguished from the owner's personal budget and personal activities. After the foundational shift occurs, there is a separation of the owner's consumption decisions from the firm's decisions.

The entrepreneur can maintain a connection to the firm after the foundational shift by remaining as an owner and also by performing such functions as manager, consultant, supplier, or customer. The entrepreneur can still be creative and innovative as an owner and manager, or the entrepreneur can delegate these duties to managers and employees. After the foundational shift, the entrepreneur can choose to end all economic ties to the

firm by divesting the ownership share. Even after divesting his ownership share, the consumer can maintain other economic relationships with the firm.

The foundational shift, from entrepreneur to owner, is what makes the firm such a valuable economic actor. The firm pursues activities that maximize its profit. The foundational shift allows the firm to provide limited liability for its owners. The firm is a additional economic actor that augments the number of actors in the economy. The firm is a social institution with capabilities that differ from those of the entrepreneur.

The entrepreneur takes time to establish a firm. For example, Kaplan, Sensoy, and Strömberg (2005), study 49 venture-capital-financed companies and find that the average time elapsed from early business plan to public company is almost six years. The relative importance of human capital, especially the entrepreneur's expertise declines over time, while there is an increase in the importance of intellectual property, patents, and physical assets.

During the period of entrepreneurship, the consumer incurs costs to establish the firm. Transaction costs often are the most important type of costs incurred by the entrepreneur. The entrepreneur learns about the industry and makes contacts with potential customers and suppliers. There are substantial transaction costs associated with search, communication, negotiation and forming relationships with prospective customers and suppliers. The entrepreneur incurs transaction costs in assembling the productive inputs and technology needed to establish the firm.

The entrepreneur often devotes significant effort to raising financial capital from banks and investors. Financial transaction costs are thus part of the entrepreneur's costs. The entrepreneur must devise a business plan to guide the new enterprise and to attract

investment. Typically, the business plan includes the entrepreneur's vision of the business and a description of the objectives of the new enterprise. The business plan also features a strategic analysis of the markets that will be served by the firm and the competitors that will be encountered. The entrepreneur formulates a competitive strategy and examines potential sources of competitive advantages for the new business.

The planning process also includes an examination of what production technology will be used, what types of products and services the business expects to provide, and how the firm will market, sell and distribute its offerings. The business plan features a preliminary organizational structure for the new enterprise. The business plan includes projected costs and revenues and a financial analysis of the capital resources needed to establish the firm. The entrepreneur bears the costs of preparing the business plan.

In addition, the entrepreneur's costs include the effort and resources devoted to information gathering and learning. To establish the firm, the entrepreneur is likely to require information about the needs and characteristics of potential consumers, the availability and features of alternative products, the technology required to manufacture the product, and the business methods involved in supplying the product. The entrepreneur must gather other types of market knowledge including the prices of comparable products and the prices of productive inputs needed to provide the good. The entrepreneur may need to purchase the technology used to provide the good.

The entrepreneur takes into account the opportunity cost of his time, given his skills and other abilities. The entrepreneur will spend time researching and develop the idea of the business. The entrepreneur may need to devote time and effort to developing

the skills needed to understand and apply the technology. The entrepreneur will invest time in the process of setting up the business and forming the organization.

The entrepreneur's costs of establishing the firm should be distinguished from the costs of the firm itself, which start to be incurred once the firm begins its operation. The entrepreneur incurs costs during the period that he is establishing the firm. The entrepreneur necessarily bears risk in practice because of the delay between the time that he begins to establish the firm and the time the firm begins to operate. This time lag introduces uncertainty about the firm's profit. The dynamic nature of the entrepreneur's activity implies that starting a firm is a type of investment.

The entrepreneur's personal satisfaction can offset some of the costs incurred to establish the firm. The entrepreneur may derive consumption benefits from establishing the firm. The process of establishing a firm can be creative, entertaining, informative and enjoyable. Then, the per-period costs of establishing the firm reflect the entrepreneur's costs net of the benefits of being an entrepreneur.

The costs of establishing a firm reflect the consumer-entrepreneur's idiosyncratic productivity and costs of effort.[6] The costs also include the entrepreneur's use of

[6] The entrepreneur works on establishing the firm from date 0 to date $\tau - 1$, with the foundational shift from entrepreneur to owner occurring at date τ. The entrepreneur i incurs a stream of expenditures over time during the period that he is establishing the firm. Let k_x^i represent the entrepreneur's expenditures at date x and let $k^i(\tau)$ be the present value of the entrepreneur's costs of establishing the firm at date τ, $k^i(\tau) = \sum_{x=0}^{\tau-1} \delta^x k_x^i$.

resources, labor and capital. The consumer-entrepreneur also can purchase a production technology, Y^j, and a transaction technology, T^j, from another consumer j.

The transaction costs required to establish a firm provide a solution to a long-standing puzzle. It is often asserted that entrepreneurs face a dilemma because entrepreneurial profit will be eroded by competitive entry. However, the cost of establishing a firm limits entry and reduces the erosion of profit. Moreover, costly transactions mean that competitors will encounter difficulties discerning and in imitating entrepreneurial innovations. Economic frictions reduce the prospect of perfect competitive challenges. Economic frictions further provide opportunities for entrepreneurs to establishing market making firms that earn rents from mitigating transaction costs.

1.4 The Entrepreneur's Profit

The entrepreneur acts in pursuit of entrepreneurial profit. The reward of the entrepreneur is the economic value of the firm. In turn, the firm's economic value depends on its provision of transaction efficiencies that the economy cannot attain otherwise. Accordingly, consumer-entrepreneurs choose to establish firms if and only if doing so increases transaction benefits net of transaction costs in comparison with the best institutional alternative. The firm is an economic actor that is distinct from the entrepreneur once the foundational shift takes place.

After the firm is established at date τ, the consumer's role undergoes the foundational shift from entrepreneur to owner of the firm. From the point of view of the consumer-owner, the firm becomes a financial asset at the date that it is established. As

an owner, the consumer obtains rights of residual control over the firm's activities. The consumers also obtains residual returns equal to the firm's revenues net of expenditures including debt payments and residual claims of other owners.

Is the entrepreneur's interest in the firm after it is established purely financial? The answer lies in the Fisher Separation Theorem. The Theorem states that the consumption decisions of the owner are separate from the decisions of the firm. The consumer-owner wishes the firm to maximize profit so as to increase the owner's income rather than making decisions to benefit the owner as a consumer. If the Fisher Separation Theorem holds, there is an additional important implication: the entrepreneur takes a purely financial interest in establishing a firm. The consumer-entrepreneur seeks the rewards of ownership rather than, for example, the goods and services produced by the firm.

After the foundational shift, the consumer takes on the economic role of an owner. The consumer-entrepreneur no longer acts in the economic capacity of an entrepreneur, having completed the task of establishing the firm. The owner of the firm can divest his share of the firm or direct the firm's activities using rights of residual control. The firm acts under the authority delegated to it by its owners.

After it is established, the firm is a new economic actor. The firm plays various economic roles as a seller of outputs, a buyer of resources, a borrower of finance capital, an employer of workers and a party to contracts. The firm is an intermediary that matches buyers and sellers and makes markets. The firm's managers choose goals, strategies to achieve the goals, and means to implement strategies. Although it acts under delegated authority, the newly-established firm is an additional decision maker in the economy.

The entrepreneur does not earn money directly. The entrepreneur often does not earn anything while he is establishing the firm because the entrepreneur receives payments by becoming an owner of the firm. The entrepreneur is rewarded based on the quality of his product. As in professions such as science and art, the entrepreneur earns money indirectly by creating something new. This indirect payment may explain why entrepreneurs say that they do not do it for the money. Of course, entrepreneurs also may enjoy the creative process involved in designing the firm and seeing it take shape.

The return to being an entrepreneur is the value of the firm at the time it is established. The value of the firm is affected by market demand and supply conditions and by transaction benefits and transaction costs. Competition with other firms is a major determinant of the firm's value. The motivation of the entrepreneur is to obtain the value of the firm. The value of the firm depends on the entrepreneur's market knowledge, organizational design, and intellectual property. The value of the firm can depend on the entrepreneur's production technology Y^i and the entrepreneur's transaction technology for firms, T^i.

When the Fisher Separation Theorem applies, the firm's decisions are separate from the consumption decisions of its consumer-owners. The consumer-owner receives the firm's profit based on his ownership share of the firm. The consumer also makes consumption decisions that are independent of the firm's profit maximization decisions.

The entrepreneur's profit is equal to the value of the firm, discounted to account for the time it takes to establish the firm, less the costs that the entrepreneur incurs in establishing the firm. The entrepreneur's profit is the consumer's incentive to become an

entrepreneur. The entrepreneur only begins to receive the firm's profit after the foundational shift takes place.[7]

The entrepreneur obtains the value of the firm by becoming an owner of the firm at the time the firm is established. As an owner, the entrepreneur receives the firm's profit by remains an owner of the firm over time and thereby receiving the residual returns from the firm's operation. Alternatively, the entrepreneur can realize the value of the firm by selling the firm to others after it is established. The entrepreneur also can form contracts with potential buyers that allow the firm to be sold before it is established.

Although the entrepreneur's problem is significantly more complex that an investment problem, a number of insights can be gained from theories of investment. The entrepreneur may experience adjustment costs in establishing the firm. The faster the firm

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[7] The value of the firm is the present discounted value of the firm's profit stream. Let $\Pi^i(\tau)$ represent the value of the firm that is established at date τ. Let π_x^i be the profit of the firm at date x. Suppose that the appropriate discount factor for the firm's profit is δ. Then, the value of the firm equals $\Pi^i(\tau) = \sum_{x=\tau}^{\infty} \delta^x \pi_x^i$. The profit of the entrepreneur, Φ^i, is represented as follows, $\Phi^i(\tau) = -k^i(\tau) + \delta^\tau \Pi^i(\tau)$. The entrepreneur's profit is a standard net-present-value (NPV) statement. The establishment of a firm differs from a standard investment project because the payoff of the project is the value of the firm, which is an initial value. However, the standard results from NPV analysis still apply. The entrepreneur should establish the firm only if it yields a positive entrepreneur's profit Φ^i. Given a choice among alternative firms that could be established, the entrepreneur should choose the type of firm that yields the greatest profit Φ^i.

is established the greater the costs of establishing the firm. This can be represented by a cost function that is decreasing in the length of the entrepreneurship time period, $K(\tau)$. Then, the entrepreneur chooses the date τ at which to establish the firm so as to maximize profit, $\Phi^i(\tau)$. The entrepreneur may face a tradeoff between the high cost of rapidly establishing a firm and the cost of delay in obtaining the value of the firm. As in any standard investment problem, the entrepreneur can choose the amount to invest in the firm.[8] More generally, the entrepreneur chooses the characteristics of the firm that he plans to establish, which in turn affect the value of the firm and also determine the costs of establishing the firm.

The entrepreneur's profit can be generalized easily to incorporate uncertainty about the future value of the firm. The entrepreneur may wish to delay establishing the firm as a means of learning more about the market. If the start date depends randomly on the stream of expenditures made to establish the firm, the entrepreneurs problem resembles a standard research and development (R&D) problem.[9] The entrepreneur can choose the optimal level of investment at each date that reflects the tradeoff between the cost of investment and the forgone return due to the expected delay in establishing the firm. The entrepreneur must make decisions that determine the market activities and

[8] Consider a basic example in which the costs of establishing the firm are simply the amount investment and let the value of the firm can depend on the level of the entrepreneur's investment, $\Pi(\tau, K)$. Then, the entrepreneur chooses the level of investment K to maximize the entrepreneur's profit, $\Phi^i(\tau, K) = -K + \delta^{\tau}\Pi^i(\tau, K)$.

[9] This can be modeled as in the patent race literature, see Reinganum (1981, 1982) and see Reinganum (1989) for a survey.

organizational design of the firm. The entrepreneur's profit depends the entrepreneur's strategy and on the intensity of competition. The following sections examine economic models that are used to examine the entrepreneur's decision.

2. Type-I Competition: Competition Between Entrepreneurs

Entrepreneurs compete with each other by determining whether or not to establish a firm. Entrepreneurs consider their costs of establishing a firm and the relative value that their firm will add to the market. They compare the costs of establishing a firm and the value a firm will add with those of other entrepreneurs. As a result, some consumers will choose not to establish a firm because of the competitive activities of other entrepreneurs.

Entrepreneurs also compete by proxy in the market. If there are multiple new firms that compete in the same industry, entrepreneurs will take this into account when deciding whether or not to establish a firm. Entrepreneurs also will consider proxy competition in designing the firms that they establish.

Not all consumers choose to become entrepreneurs, and not all entrepreneurs successfully establish firms. The entrepreneurial process helps to determine what will work best in the market place. Entrepreneurs effectively conduct economic experiments that test the relative effectiveness of the production and transaction technologies. Entrepreneurs who compete to establish firms perform the valuable function of comparing and selecting the best technologies.

Entrepreneurs compete to establish firms so that they effectively compete for final customers. Entrepreneurs who compete to enter the market also implicitly compete for

inputs. Scarce inputs not only include resources, labor, and capital, but also production and transaction technologies. In a competitive setting with full information, the most efficient entrepreneurs obtain resources to establish firms.

Entrepreneurs compete with each other by deciding whether or not to establish firms. Entrepreneurs make their establishment decisions based on information about the characteristics of competing entrepreneurs. Entrepreneurs only establish firms if they believe that the expected value of the firm they set up will be sufficient to justify the costs of establishing the firm. Accordingly, an entrepreneur must evaluate the potential contribution the new firm will make in competition with the firms that other entrepreneurs plan to establish.

Competition between entrepreneurs depends on many factors that can be summarized by differences in individual preferences and endowments. In terms of preferences, entrepreneurs can differ in terms their degree of risk aversion, rate of time preference, and disutility of effort. In terms of endowments, entrepreneurs can differ in terms of ability, creativity, judgment, information, and wealth. Also, since consumers own technology, they can have different endowments of production technology or transaction methods.

I now present a general model that can be applied to examine many types of competition between entrepreneurs. The model considers the general equilibrium for an economy in which any consumer may become an entrepreneur and establish a firm. The general equilibrium model extends the basic model of Richard Kihlstrom and Jean-Jacques Laffont (1979, 1982). Assuming that establishing firms is risky, they show that those consumers who become entrepreneurs are those who are the least risk averse. Their

analysis of the entrepreneur's self-employment decision demonstrates the feasibility of incorporating the entrepreneur in equilibrium economic models. My model differs from theirs in several ways. In their model, firms offer a homogeneous product while in my model firms offer differentiated products. In their model, owners maximize the expected utility of profits, while in my model, a separation theorem holds so that the firm's owners want the firm to maximize profits. In their model, price are set by a neoclassical Walrasian auctioneer whereas in my model firms set prices competitively. The oligopoly model draws on Dixit and Stiglitz (1977) and Lancaster (1980). My assumption that every firm produces a unique product illustrates the creativity of entrepreneurs.

The model can be generalized to address all kinds of differences between entrepreneurs. The model can incorporate differences in entrepreneur preferences, including risk aversion, rate of time preference, and disutility of effort. The model can include differences in entrepreneur endowments, such as technology, information, and wealth. The equilibrium analysis of entrepreneurship shows how consumers decide whether or not to become entrepreneurs. The model examines the effects of the size of the economy and the effects of demand and cost parameters on the equilibrium number of entrepreneurs.

To illustrate differences in technology endowments, consider the model when each consumer has a different cost of establishing a firm. Competition between entrepreneurs results in the selection of entrepreneurs who are most efficient at establishing firms. The consumer-entrepreneur's labor cost of establishing a firm equals $1 + k$. The consumer-entrepreneur supplies the first unit of labor and employs other consumers for the incremental labor units. The differences in set-up costs represent the

ability, judgment, and knowledge of the consumer-entrepreneur. Differences in set-up costs also reflect differences in the product that will be offered by the firm. The incremental set-up costs k are distributed uniformly with unit density on the interval $[0, n]$. The measure of the number of consumers equals n.

Each consumer owns a production technology for producing a good. Although the final product is unique, the production technology for every good is identical and exhibits increasing returns to scale technology. To produce q_j units of good j, requires $\alpha + \beta q_j$ units of labor, where $\alpha > 0$ represents fixed costs and $\beta > 0$ is marginal cost. The consumer can operate the technology for his own benefit, or establish a firm and sell the product to other consumers, thereby earning profit from sales.

Each consumer has an endowment of one unit of labor. A consumer must choose between becoming a worker and becoming an entrepreneur. The consumer-worker receives a wage in return for supplying a unit of labor, and the wage is normalized to equal 1. The consumer-worker either works for an entrepreneur to establish a firm or works for a firm once it is established. The consumer-entrepreneur becomes an owner of the firm once it is established and receives the profit of the firm, Π, net of the incremental labor cost of establishing the firm, k.

A consumer chooses to become an entrepreneur only if the profit net of the incremental labor cost of establishing the firm exceeds what the consumer would earn elsewhere as a worker,

$$\Pi - k \geq 1.$$

The worker's labor earnings are the entrepreneur's opportunity cost. At the competitive equilibrium with differentiated products, it will be shown that all firms earn the same

profit. This means that consumers with low costs of establishing firms will become entrepreneurs while those with high costs will become workers. In equilibrium, consumers with incremental labor costs k in the interval *[0, m]* will choose to become entrepreneurs, while consumers with incremental labor costs k in the interval *(m, n]* will choose to become workers. Since each firm produces a unique product, the number of goods that will be produced in equilibrium will equal m. The number of entrepreneurs will be determined by consumer decisions at the market equilibrium.

Every consumer has a utility function with the CES form,

(1) $$u(x) = \left(\int_0^m x_j^{(s-1)/s} dj \right)^{s/(s-1)}.$$

The demand parameter is greater than one, $s > 1$, which is necessary and sufficient for products to be substitutes. Let I be the consumer's income. The consumer's problem is to maximize utility subject to the budget constraint,

(2) $$\max_x u(x) \quad \text{subject to} \quad \int_0^m p_j x_j dj \leq I.$$

The solution to the consumer's problem yields the level of consumption of each good i,

(3) $$x_i = \frac{I / p_i^s}{\int_0^m (1/p_j)^{s-1} dj}.$$

Recall that the own-price elasticity of demand is $\eta_i = s$, for any consumer i because the derivative of the price index with respect to any price is zero when there is a continuum of goods.

Substitute for the consumption levels from equation (3) into the consumer's utility function in equation (1), to obtain the consumer's benefit as a function of price and income,

(4) $$u(x) = I[\int_0^m (1/p_j)^{(s-1)}\,dj]^{1/(s-1)}.$$

The income of a consumer-worker is $I = 1$. The income of an entrepreneur equals the profit from the firm minus the cost of establishing the firm, $I = \Pi - k$.

The consumer's problem satisfies a separation theorem. Substitute for the entrepreneur's income in the consumer's benefit function in equation (4). Since there are many firms, the price chosen by any individual firm has no effect on the price index in the bracketed term. It follows that any consumer-owner chooses the firm's price to maximize profit. This is an important result because it extends the traditional neoclassical separation theorem for price-taking firms to an economy with price-setting firms. This means that the consumer-owner delegates profit maximization to the firm. The entrepreneur's reward from establishing the firm is the value of the firm net of the set-up cost, $I = \Pi - k$.

Consider the market equilibrium in which m consumers choose to become entrepreneurs and establish firms. Each consumer-entrepreneur will then become an owner of a single-product firm. Each firm produces a differentiated good and sells that good to all consumers. The profit from producing q_j units of good j equals

(5) $$\Pi_j(p_j) = p_j q_j - \alpha - \beta q_j.$$

The separation theorem demonstrates that each consumer-owner maximizes profit when there are many differentiated products.

Profit maximization by consumer-owners implies that the mark-up above marginal cost equals price divided by demand elasticity,

(6) $$p_j - \beta = p_j/\eta_j.$$

Substituting for the elasticity of demand into the firm's first order condition for profit maximization shows that prices are equal in equilibrium,

(7) $$p^* = s\beta/(s - 1).$$

Since prices are equal across goods the amounts of the goods that are produced also are equal $q_j = q$ for all j. The profit of a firm at the competitive equilibrium equals

(8) $$\Pi = p^*q - \alpha - \beta q = [s\beta/(s - 1)]q - \alpha - \beta q.$$

The equilibrium number of entrepreneurs is determined by the critical incremental labor cost at which profit minus the incremental labor cost of setting up a firm equals what the entrepreneur could earn as a worker, $\Pi - k = 1$. Letting $k = m$ be the critical cost, the marginal entrepreneur is determined as follows,

(9) $$[s\beta/(s - 1)]q - \alpha - \beta q - m = 1.$$

The number of firms m is equal to the incremental labor cost of the marginal entrepreneur

Consider now the economy's labor resource constraint. The total amount of labor in production equals the number of goods times the labor cost of each good, $m(\alpha + \beta q)$. In addition, the number of workers employed in setting up firms equals $\int_0^m kdk = m^2/2$. Recall that entrepreneurs provide the first unit of labor in establishing a firm, which equals m units of labor. The economy's labor constraint equates the total demand for labor to the number of consumers, n,

(10) $$m(\alpha + \beta q) + m^2/2 + m = n.$$

Equations (9) and (10) determine the equilibrium number of entrepreneurs and the amount of each good that is produced. One way to think about the equilibrium is to consider equation (9) as the output-entrepreneur pairs consistent with the determination of the number of entrepreneurs, $q^E(m)$, which is an upward-sloping line. Also, consider equation (10) as the output-entrepreneur pairs consistent with the labor constraint, $q^L(m)$, which is a downward-sloping line. Using these curves, the equilibrium is represented in Figure 2.

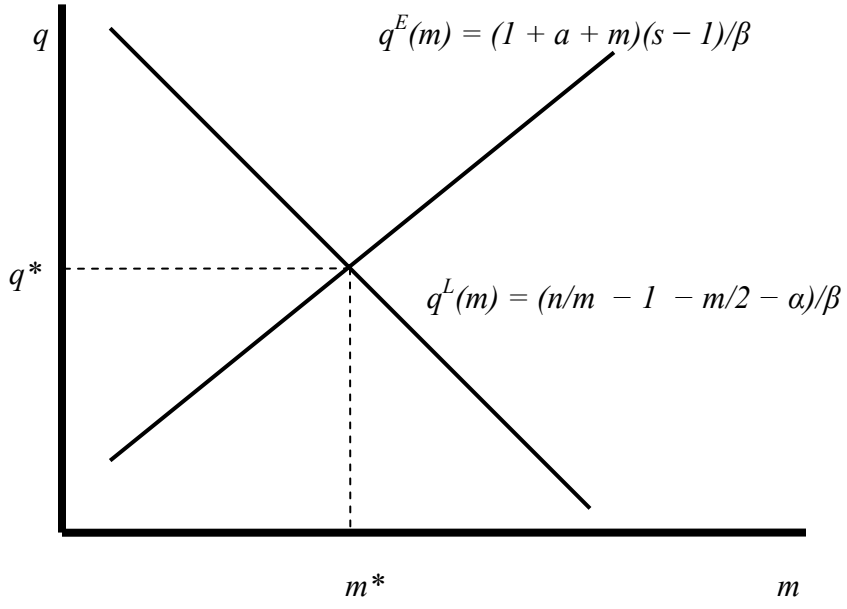

Figure 2 **The equilibrium number of entrepreneurs and output of each product.**

Solving equations (9) and (10) gives the number of entrepreneurs and amount of each good that is produced,

$$m^* = -\frac{s(1+\alpha)}{2s-1} + \left[\frac{s^2(1+\alpha)^2}{(2s-1)^2} + \frac{2n}{2s-1}\right]^{1/2}. \tag{11}$$

$$q^* = \frac{(s-1)^2(1+\alpha)}{\beta(2s-1)} + \frac{s-1}{\beta}\left[\frac{s^2(1+\alpha)^2}{(2s-1)^2} + \frac{2n}{2s-1}\right]^{1/2} \tag{12}$$

It follows from equation (11) that the number of entrepreneurs is positive.

Comparative statics analysis yields the following results. An increase in the marginal production costs, β, lowers the output of each good but does not affect the number of entrepreneurs in equilibrium. An increase in the fixed cost of production, α, raises the amount of each good that is produced but lowers the number of entrepreneurs that choose to establish firms.

The substitution parameter inversely measures the value of variety. An increase in the substitution parameter s, increases the amount of each good that is produced and lowers the number of entrepreneurs that choose to establish firms. An increase in the total number of consumers results in greater output of each good and more entrepreneurs. The presence of more entrepreneurs implies that there is an increase in the total of firms' fixed costs. Moreover, more entrepreneurs increases the total cost of establishing firms as well as the marginal cost of establishing a firm. The presence of more consumers provides the additional demand for final goods and the additional labor resources to support these higher costs. Even though entrepreneurship becomes more costly at the margin, a larger economy results in more entrepreneurial activity overall. Consumers in the larger economy benefit both from greater product variety and greater economies of scale in production.

More consumers also leads to lesser entrepreneurial activity per capita, m^*/n. Consider the equilibrium output curves in Figure 2 on a per-capita basis,

(13) $$q^E(m/n) = [1 + \alpha + n(m/n)](s - 1)/\beta,$$

(14) $$q^L(m/n) = [1/(m/n) - 1 - (n/2)(m/n) - \alpha]/\beta.$$

The axes are output q and entrepreneurs per capita, m/n. See Figure 2. A greater number of consumers shifts the first curve upward and shifts the second curve downward. The result is that the number of entrepreneurs per capita declines as the number of consumers increases. This reflects the rising cost of establishing a firm as the number of entrepreneurs increases. The result also is due to increased scale of firms as the number of consumers increases. Entrepreneurs become less efficient at the margin while firms become more efficient.

The model of the economy with endogenous entrepreneurs can be extended to generalize the type of firms established by the entrepreneur. The entrepreneur can choose between different types of organization – sole proprietorship, partnership, corporation. Poblete and Spulber (2007) examine an equilibrium model with homogeneous entrepreneurs who choose between different organizational forms. A sole proprietorship functions efficiently, while a partnership is subject to free riding, and a corporation is subject to moral hazard by a CEO. The type of firm that emerges in equilibrium will be a sole proprietorship when investment costs are low, a partnership when investment costs are in an intermediate range, and a corporation when investment costs are high. The wealth of entrepreneurs also affects the organization of the firm. When endowments are high, entrepreneurs will establish sole proprietorships, when endowments are in an

intermediate range they will establish partnerships, and when endowments are low, they will corporation corporations.

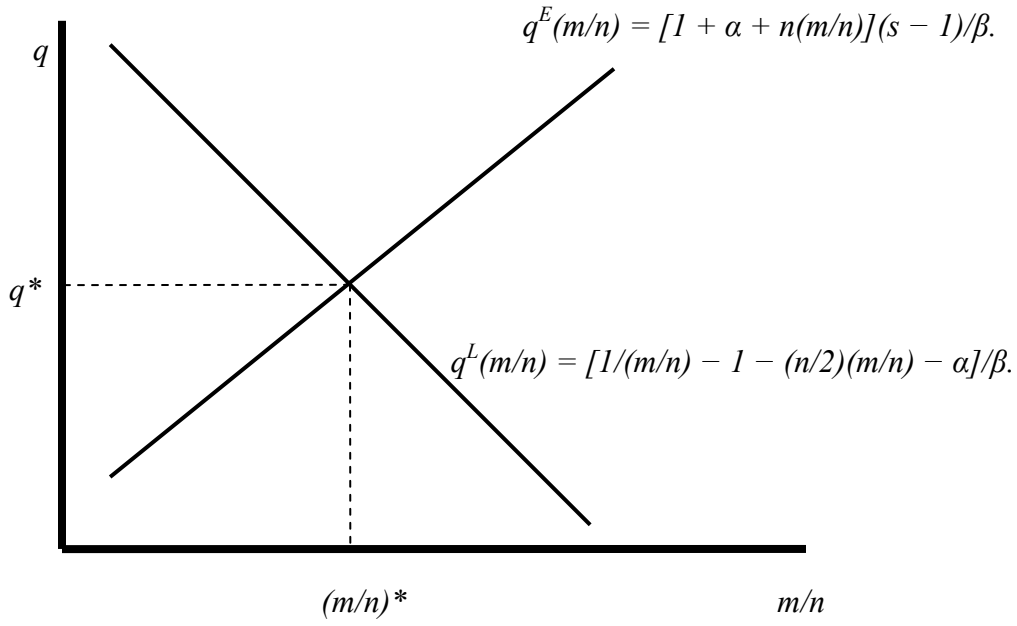

Figure 3 The equilibrium number of entrepreneurs per capita and output of each product.

3. Type-II Competition: Competition Between Entrepreneurs and Direct Exchange Between Consumers

Type-II competition refers to the contribution of the entrepreneur in comparison with direct exchange, that is, exchange between consumers without intermediation by firms. If firms do not contribute sufficiently to economic efficiency there is no need for

entrepreneurs to establish firms. For entrepreneurs to establish firms, there must be sufficient gains in economic efficiency for the value of the firm to cover the costs of establishing a firm. Then, there will be an incentive for entrepreneurs to set up firms.

Consumers can undertake a variety of economic activities without the need for firms. Because consumers own production technologies and transactions technologies., they have the option of engaging in autarkic production. Consumers can develop inventions and put them into production without the need for firms. Consumers can create economic transactions without the need for centralized markets. Consumers can transact directly with each other through search, negotiation, barter, spot transactions, and contracts. Also, consumers can form organizations without the need for firms. For example, consumers can form buyers' cooperatives, sellers' cooperatives, worker cooperatives, and basic partnerships.

The entrepreneur competes with direct exchange by establishing a firm that creates organizations and markets. The entrepreneur will create value if the firm provides intermediated transactions that improve upon direct exchange. The firm's market making activities should improve efficiency in comparison to decentralized exchange activities of consumers, including search, bargaining, and adverse selection. The firm's organization should improve efficiency in comparison to consumer organizations, such as buyer cooperatives, worker cooperatives, and basic partnerships. The organization established by a firm improves efficiency when it alleviates governance costs associated with free riding, moral hazard, and adverse selection in organizations.

The entrepreneur does not engage in head-to-head competition with direct exchange because it is the firm, once it is in operation, that must contend with direct

exchange between consumers. The entrepreneur competes with direct exchange by proxy, that is, through the firm that he established. The entrepreneur's contribution is to anticipate the need for the firm as an intermediary and as an organization. The entrepreneur has an incentive to establish the firm only if the firm will add value relative to direct exchange.

There are many forms of type-II competition between entrepreneurs and direct exchange. Firms create markets by setting up and managing allocation mechanisms, including posted prices and auction markets. Firms provide services as intermediaries and design market microstructure, see the analysis presented in Spulber (1996a, b, 1998, 1999, 2002a,b, 2003). Firms centralize exchange by creating networks and matching buyers and sellers, see Spulber (2006). Firms establish and operate information systems that supply buyers and sellers with some of the means to communicate and process information. Firms engage in communication with buyers and sellers to gather information about their characteristics and to provide information about terms of exchange, such as prices and product features. Firms also provide computation to improve the efficiency of matchmaking and market making activities, helping buyers and sellers search for each other, adjusting prices, and providing immediacy. In these ways, firms provide alternatives to direct exchange between consumers by intermediating transactions.

Firms also establish organizations that provide alternatives to direct exchange . The firm's organization manages its internal transactions and its market transactions. Transactions within the firm provide an alternative to market transactions between consumers. For example, consumers can combine their inputs, technology, and

capabilities by supplying labor services to a firm rather than through market contracts with each other. The firm as a contracting hub reduces transaction costs through standardization and scale and avoids the complexities of multilateral contracting between many individuals.

The firm's organization also provides an alternative to consumer organizations. It is the autonomy of the firm that distinguishes it from consumer organizations such as consumer cooperatives, worker cooperatives and basic partnerships. The firm provides transaction efficiencies through relational contracts, delegation of authority, incentives for performance, monitoring, communication and information gathering, see the discussion of contracts and of agency in Spulber (1999).

To illustrate one or two of the basic issues, consider the model of the economy presented in the preceding section. Suppose that consumers can form cooperative organizations to take advantage of economies of scale in production and to obtain the benefits of product variety. All of the members of a cooperative contribute their labor to jointly produce goods. Each cooperative shares its benefits equally among its members by allocating an equal share of the output of each good to each of the members. Each cooperative is assumed to operate efficiently by maximizing the benefit of each member.

Consumers that form cooperatives are likely to encounter transaction costs. To represent the coordination costs of establishing and operating a cooperative, assume that the population of consumers is evenly divided into cooperatives of size L. Since a larger size confers benefits of both scale and variety, the limited size of the cooperative represents difficulties in coordinating efforts within the organization. To represent market

transaction costs, assume further that cooperatives only transact internally, so that trade between cooperatives is not possible.

A cooperative produces m goods at a scale of q units for each good. A consumer in a cooperative of size cooperative of size L obtains consumption $x = q/L$ of each good. This means that the benefit of each member of a cooperative of size L obtains benefits equal to

$$u(x) = m^{s/(s-1)} q / L. \tag{15}$$

Each member of a cooperative contributes a unit of labor. The labor constraint of the cooperative is thus

$$L = m(\alpha + \beta q). \tag{16}$$

Solve the resource constraint for the scale of production of each good, q, and substitute into the consumer's benefit function. This yields an expression that depends on the number of goods produced by the cooperative and on the size of the cooperative,

$$u(m, L) = m^{s/(s-1)} \left(\frac{1}{\beta m} - \frac{\alpha}{\beta L} \right). \tag{17}$$

The cooperative chooses the variety of goods to maximize the benefits of each of its members. Choosing the number of goods to maximize the benefit function in equation (17) yields the optimal variety for a cooperative of size L,

$$m = L/(\alpha s). \tag{18}$$

Substitute for the optimal number of goods into the benefit function of a member of the cooperative. The consumer's benefit will depend on the size of the cooperative,

$$u(L) = \left(\frac{L}{\alpha s} \right)^{1/(s-1)} \left(\frac{s-1}{s\beta} \right). \tag{19}$$

The consumer's benefit is increasing in the size of the cooperative. Note that as the size of the cooperative gets small, the consumer's benefit approaches that under autarky. As the size of the cooperative approaches the size of the population, the consumer's benefit approaches the social optimum.

Consider now competition between entrepreneurs and direct exchange. In the equilibrium with entrepreneurs, all workers obtain the same benefits and all inframarginal entrepreneur obtain additional benefits from profit net of the costs of establishing a firm. The benefit of a worker in the equilibrium with entrepreneurs equals

$$u^* = (m^*)^{1/(s-1)}\left(\frac{s-1}{s\beta}\right). \tag{20}$$

All entrepreneurs except the marginal entrepreneur obtain greater benefits than u*. If the presence of entrepreneurs makes workers better off than they would be in a cooperative, then entrepreneurs make every consumer better off. The condition for the activities of entrepreneurs to make workers better off is obtained by comparing equations (19) and (20),

$$L \leq \alpha s m^*.$$

Otherwise, workers will be as well off or better off with cooperatives than with firms established by entrepreneurs. Every consumer is made better off by entrepreneurs establishing firms if cooperatives are sufficiently small. The condition is also necessary for the market equilibrium with entrepreneurs to compete with the equilibrium with cooperatives. If firms paid workers more, the market equilibrium would result in lower product variety, so that workers would be worse off.

When the condition holds, the equilibrium with entrepreneurs (weakly) Pareto dominates the equilibrium with cooperatives. Recall that the number of entrepreneurs is

increasing in the size of the population, n. This implies that the greater is the population, the more competitive is the market equilibrium with entrepreneurs in comparison with cooperatives.

When the cooperative is limited in size, the market with firms offers advantages of greater scale in production and greater product variety. When the cooperative encounters transaction costs in the market, the firm offers advantages due to gains from trade. The market mechanism operates through price setting by firms. Gains from trade result because each firm sells to many consumers and each consumer buys from many firms to obtain the benefits of scale and variety.

4. Type-III Competition: Competition Between Entrepreneurs and Existing Firms

The entrepreneur chooses to establish a firm if it will address market conditions more effectively than existing firms. Entrants can introduce capacity in response to growth in market demand or they can provide products that respond to changes in customer preferences. Alternatively, existing firms can expand, diversify, or change their products.

The entrepreneur establishes a new firm if the entrant offers improvements in market transactions, organizational transactions, production technology, or products. Existing firms can address technological change by introducing their own new transaction methods, production processes, or new products. Entrepreneurs compete with established firms in terms of incentives for managerial performance. All other things equal, a new firm must offer greater efficiency if incentives for performance and

opportunities to monitor performance are greater than within a established firm. Otherwise, an established firm could offer the same products by expanding or diversifying. Established firms also can offer organizational innovations by restructuring their firm to increase its efficiency. The entrepreneur must offer innovations more effectively than existing firms.

The entrepreneur's establishment decision thus results in a more efficient organization of the industry. The entrepreneur's entry decision plays an important economic role by displacing less efficient incumbents and stimulating innovation by existing firms. In the absence of demand growth and capacity constraints on existing firms, displacing incumbents requires innovation. But, innovation in itself is not enough. The entrepreneur must offer innovations that create add value that what incumbents can offer. This explains the great emphasis on innovation in economic discussions of the entrepreneur, particularly by Schumpeter.

4.1 Entry

Entrepreneurs compete with existing firms through their newly-established firm. The entrepreneur establishes a firm only if it adds value in competition with existing firms. Being newly established, the entrepreneur's firm necessarily is an entrant, and the entrepreneur devises the firm's strategy towards incumbents. The entrepreneur's competitive role ceases once market entry takes place.

Competition between entrepreneurs and established firms can be modeled using the plethora of Industrial Organization models of entry, see for example Spence (1977), Dixit (1980), and Spulber (1981). It is straightforward to interpret these models interms

of entrepreneurship, since all entrepreneurs must make a market entry decision. The entrant's strategies are also those of the entrepreneur. The strategies of incumbent firms in entry models also shed light on entrepreneurial decisions, since the entrepreneur considers the impact of future entry on the firm. The entrepreneur also takes into account the firm's future position as an incumbent in evaluating the value of the firm being established.

The entrepreneur's costs of establishing a firm should be considered as an important component of the entry costs that are examined in economic models of industrial organization. One of the key strategic aspects of entry is the need to make irreversible investments in transaction costs such as planning the new venture, marketing, conducting market research, and obtaining financing. Firms also must make irreversible investments in R&D to develop new products and production technologies.

The empirical industrial organization literature on entry sheds light on the entrepreneur. Geroski (1995) provides a useful overview of data and results in this area, and finds that entry appears relatively easy but survival is not. Ease of entry calls into question many empirical studies that suggest the presence of high barriers to entry. The importance of entry as a means of introducing innovations helps to reconcile these opposing observations. Geroski suggests that entry may be imperfect as a means of short-term price competition. However, entry is a valuable mechanism for introducing product and process inventions, with the best products and processes selected through competition between firms once they are established and operating within the industry. Empirical analysis of entry thus supports the view of the entrepreneur as innovator.

Entrepreneurs can apply creative entry strategies and innovations to surmount potential advantages of incumbent firms. Growing market demand or changes in consumer tastes generate opportunities for entry. Technological change allows entrants to arrange novel transactions, introduce new products, or lower production costs. Bayus and Agarwal (2007) in a study of the computer industry find that technology strategies employed after entry are critical for firm survival.

If the incumbent and entrant offer differentiated products, price competition tends to be reduced. Both the incumbent and entrant will have the opportunity to earn profits in post-entry competition. Because a lower price than a competitor causes only some customers to switch their purchases, the incumbent and the entrant will not have an incentive to engage in an all-out price war. Since the incumbent and the entrant earn positive profits in competition after entry, it is more likely that the entrant can earn a sufficient margin above operating expenses to recover the sunk costs of entry. Other factors that lessen price wars are customer switching costs, customer brand loyalty, different convenience features, and imperfect information. If these factors are present, the entrant can expect a reduction in the severity of post-entry competition, allowing for the recovery of sunk costs. Therefore, with product differentiation and other factors, sunk costs are less likely to be a barrier to entry.

If the entrepreneur establishes a firm that will offer a differentiated product, the firm's value is greater and the entrepreneur has a better chance of recovering costs incurred in establishing the firm. An entrant could offer products that deliver sufficiently greater value to the customer than do the products of established companies. In return, the

entrant will earn margins that allow for the recovery of sunk costs incurred in entering the market.

Generally, with technological change, the need to sink cost is not an insurmountable barrier to the entry of new competitors. If an entrant employs new technologies to reduce its operating costs, it can enjoy a cost advantage over an incumbent operating outdated technology. Even if the incumbent and entrant compete on price, an entrant with an operating cost advantage over the incumbent will earn positive margins that allow for the recovery of sunk costs.

Moreover, sunk costs need not be an entry barrier because the entrant's sunk cost is a matter of strategic choice. The entrepreneur makes various decisions about how much to spend on planning, marketing, R&D and so on. The choice of products, production processes and transaction methods impact the new firm's costs. The entrant can serve different sets of customers than the incumbent, thus changing the entrant's need for distribution facilities and marketing expenditures.

The entrepreneur can adopt different production or distribution technologies than incumbent firms, often drastically changing the mix of investment and operating costs. For example, entrants into telecommunications employ wireless systems with lower sunk cost in facilities in comparison with incumbents that operate traditional wireline systems.

Even with similar products and technology, an entrepreneur can reduce the risk associated with making investment commitments in a variety of ways. The entrepreneur can lessen the risk of post-entry competition for forming contracts with customers before irreversible investments are made. The entrant can compete with the incumbent for customers before deciding to enter the market and then only incur entry costs if the

customer contracts will generate sufficient revenues. The company can find out if their product will be successful before making substantial investments in facilities. For example, aircraft manufacturers such as Boeing and Airbus sign up prospective customers on a contingent basis before starting a production run on an aircraft.

The success of the contracting strategy also depends on the level of transaction costs. Efficiencies in contracting can mitigate the impact of entry costs and entrepreneurs can use contracts as an entry strategy when there are substantial costs to establish the firm. If the transaction costs of contacting with customers are relatively low in comparison with sunk costs of entry, then testing the waters through contracts is worthwhile. The entrepreneur can use contracts to establish prices and customer orders before the established firm operates in the market thus reducing the risk of irreversible investments and avoiding price wars after entry.

4.2 Transaction Costs

The entrepreneur enters the market if it offers more efficient transactions than incumbents. A firm that performs transactions with greater efficiency than its competitors has transaction advantage, see Spulber (2002, 2003). Also, the entrepreneur can enter the market with transactions that create new combinations of buyers and sellers, as Schumpeter (1997, p. 229) emphasized. Transaction advantages are likely to erode quickly limiting their potential effects as entry barriers. Entrepreneurs devise strategies to address the incumbent's transaction advantage. They can create their own innovative transaction methods or they identify new combinations of buyers and sellers.

To surpass incumbent advantages, the entrepreneur must establish a firm that lowers transaction costs relative to incumbents or that offers transactions that create greater value for suppliers and customers. At the most basic level there may be economies of scale and scope in the transaction technology itself. Retail stores have fixed costs of transactions, that is, costs do not depend on the volume of transactions, such as information-processing equipment such as computers, cash registers, bar coding and point-of-sale terminals. These cost economies need not translate into barriers to entry. As with production cost advantages, the entrant can apply innovations in transaction technology to produce transactions at a lower costs. For example, an entrant could apply new types of enterprise software, point-of-sale equipment, or communications devices, as means of lowering transaction costs.

Transaction technologies such as back-office information technology or point-of-sale systems can involve substantial sunk costs. Entrants may perceive an entry barrier if incumbent firms may have made substantial irreversible investments in such transaction technology. However, sunk costs in transaction technology can be overcome by continued innovations. Moreover, entrants can pursue different distribution channels that lower transaction costs.

A critical transaction advantage for a firm stems from identifying innovations and bringing them to market faster than competitors. However, incumbent firms that achieve success from such a strategy often build their business by producing products based on a particular generation of technology. The successful incumbent has an incentive to stick with a particular generation of technology to provide service to its installed base of customers. The incumbent may choose to incrementally improve its products since

continually changing their basic technology would involve substantial investment and costs of adjustment. As a result, entrants can gain a transaction advantage by embracing later generations of technology.

An entrepreneur may believe that the incumbent firm has a transaction advantage resulting from supplier and customer relationships that are difficult to duplicate. Moreover, the established firm may have experience in coordinating its supplier and customer transactions. For entrants to overcome such advantages, it is necessary to offer different types of transactions that improve upon existing types of exchange. For example, Amazon.com was able to enter the retail book business by selling through the Internet even though established bookstores had long-standing relationships both with customers and with publishers.

If the entrepreneur establishes a firm with innovative transactions, the sunk costs of establishing the firm need not be a barrier to entry. Through innovative intermediation between buyers and sellers, the entrant can earn operating profits after entry. By reducing transaction costs, the entrant will earn returns that allow the entrepreneur to recover sunk costs. Accordingly, entrants can make investments in information technology, communications systems, customer support, supplier connections, and back office processes, that are recovered through transaction advantages over incumbents.

4.3 Competition and Innovation

Entrepreneurs compete with established firms to be innovators. In particular, suppose that an inventor makes a discovery of a new production process, product design, or transaction method. How shall the discovery be introduced into the market?

Entrepreneurs and established firms are alternative mechanisms for introducing the invention to the market. Both entrepreneurs and established firms can serve as intermediaries between the inventor and users of the invention.

The entrepreneur can start a new firm to commercialize the invention. Alternatively, an established firm can employ the invention to improve or replace its existing processes, products, or transaction methods. The key question is why would new firms be needed for innovation.

In many cases, a new firm is needed because no existing firm is available. The invention opens a completely new line of business that does not correspond to the activities of any established enterprise. Often, the new line of business while related to the activities of existing firms is sufficiently distinct that established firms lack the knowledge and resources to employ the invention. Also, it may be that the diversification required to employ the invention would distract the company's managers and employees from their existing activities thus overcoming any potential economies of scope.

A new firm may be needed for innovation if existing firms do not correctly judge the economic value of the invention. As is often the case in practice, the managers of existing firms may underestimate the competitive threat posed by the invention. This management problem commonly is referred to a "management myopia."[10] The managers of existing firms follow such a narrow definition of their market that they fail to identify technological changes that create products that are substitutes in demand. Thus, managers of fax machines do not see the value of e-mail since they believe that they are in the fax

[10] The term comes from Theodore Levitt (1960) who wrote about "marketing myopia" in which managers do not understand the implications of inventions for their business.

machine business rather than in the communication business. Similarly, managers may not understand the impact of technologies that create substitute production processes or improved transactions. For example, Levitt (1960) notes that neighborhood grocery store chains believed that supermarkets did not pose a competitive threat.

The entrepreneur's incentive to adopt an invention may differ from that of the established firm. Arrow (1962) identified a displacement effect faced by a monopolist. The firm earning a profit operating a business evaluates an invention on the basis of its incremental contribution to profit, in contrast to a competitive industry that has a zero profit benchmark. This same analysis would apply to an entrepreneur who evaluates an invention de novo in contrast to a profitable incumbent.

The vast literature on R&D yields insights into entrepreneurial innovation. Entrepreneurs can compete with established firms through R&D. An entrepreneur that obtains an invention before an incumbent could establish a firm that displaces the existing firm. This can be analyzed using models of racing to invent in which the winner obtains an exclusive monopoly patent and enters the market, see Reinganum (1989) for a survey. Gans and Stern (2000) look at a race where there is only one winner but licensing and imitation are feasible, see also Salant (1984) and Katz and Shapiro (1987).

In the literature on research tournaments, a sponsor designs the prize for the best innovation and contestants devote effort to producing inventions, see for example Taylor (1995) and Che and Gale (2003). The tournaments approach studies the design of incentives for inventive effort. The contestants in a tournament could be existing firms and entrepreneurs. Entrepreneurs could establish a firm by providing the best invention and supplying the sponsor of the tournament with the desired product.

These examples consider competitions with a single winner. However, even if inventions are scientifically unique, difficult to copy, or protected by patent, there are alternative inventions that are substitutes in demand. As Edmund Kitch (2000, p. 1730) cogently observes "patents that confer monopoly market power are rare." Kitch discusses "elementary and persistent errors in the economic analysis of intellectual property" noting particularly the incorrect assertion that exclusivity in intellectual property confers an economic monopoly. In the same way, copyrighted works compete with each other, see Goldstein (1992) and Yoo (2004). The Justice Department recognizes the possibility of competition. The Antitrust Guidelines for Licensing of Intellectual Property state that "The Agencies will not presume that a patent, copyright, or trade secret necessarily confers market power upon its owner."[11]

In short, the market for inventions can be competitive. Inventions with different scientific and engineering details and patent protections can offer comparable cost savings. These inventions yield process innovations that are substitutes in demand within such categories as machine tools, industrial robots, enterprise software, factory designs, lasers, or chemical processes. Different inventions can be used to develop new products with competing features. These inventions yield product innovations that are substitutes in demand within such categories as appliances, electronic gadgets, automobiles, cameras, fabrics, or medicines.

[11] See U.S. Dep't of Justice & Fed. Trade Commission, Antitrust Guidelines for the Licensing of Intellectual Property §§ 2.0, 2.2 (1995), *reprinted in* 4 Trade Reg. Rep. (CCH) ¶ 13,132, at 20,734–35. This is quoted in Yoo (2004).

The presence of competing inventors provides entrepreneurs with a means of competing with existing firms. By obtaining inventions in the market for ideas, entrepreneurs introduce innovations that compete with the existing products or the innovations of established firms. Shane (2001) finds that an invention is more likely to be commercialized by an entrepreneur than by an established firm the greater is the innovation's importance, impact and patent scope. Hellman and Puri (2000) show that venture capital financing favors innovators over initiators and tends to speed the time to market for new high-tech ventures.

James Anton and Dennis Yao (1995) look at entrepreneurs who are employees of firms, discover a significant invention, and then leave to start a new firm. The employee has three options: keep silent and leave to start a new firm, reveal the invention to the employer in hopes of a reward, or negotiate a reward with the employer before revealing the invention. Dealing with the employer also can result in a new firm is the form of a "spin-off." Here general inventions result in spin-offs while specific inventions lead to "startup-ups." Thomas Hellmann (2005) uses a multi-task incentives model and shows how the choice of organizational structure of new ventures (start-ups, spin-offs, and internal ventures) depends on corporate policies toward employee inventors and the allocation of intellectual property rights.

4.4 Incentives

Economists and management researchers contrast the incentives of entrepreneurs with those of managers. The profit of the entrepreneur is the discounted value of the firm when established minus the costs of establishing the firm. In contrast, the manager

receives contractual incentives that are based on the measured performance of the firm. The entrepreneur acts to maximize his profit, while the manager often responds to incentives designed by the owners of the firm. Yoram Barzel (1987) argues that the entrepreneur takes the role of the residual claimant because his actions are more costly to monitor than those of other factors of production.

Gromb and Scharfstein (2005) consider a partial equilibrium model in which an investor owns two potential projects that depend on managerial ability. The projects must be completed one after the other. The manager must devote effort to improve the chances the first project will be successful. The outcome of the projects provides information about the manager's ability. They interpret the first project as that of an established firm, and they interpret outsourcing of the second project as an entrepreneurial firm. The distinction between existing and new firms has to do with different labor-market incentives for managers, with higher-ability managers preferring to become entrepreneurs.

The incentives of entrepreneurs and managers differ because their tasks differ. The entrepreneur is concerned with defining the new firm, which is by definition a market entrant. The manager who works for an established firm, takes into account the potential continuation of existing business. The entrepreneur is building an organization and works independently. In contrast, the manager of an established firm is part of an existing hierarchy, often with bureaucratic inertia, risk aversion and inefficiencies that are observed in many large business organizations, see Carl Schramm (2006b).

5. Conclusion

Although entrepreneurs implement innovations that may disrupt existing prices and products, entrepreneurs play a pivotal role in economic equilibrium. Entrepreneurs are endogenous since a consumer's decision to become an entrepreneur reflecting the consumer's capabilities and the value provided by establishing a firm. As a result of the actions of entrepreneurs, firms are endogenous as well. Firms create markets and organizations, so that markets and organizations also are endogenous. As a result of firms creating and managing markets and organization, the economy produces equilibrium prices and transactions. Thus, the entrepreneur helps the economy to achieve equilibrium.

The entrepreneur's actions illuminate the main issue in the theory of the firm − why do firms exist? The entrepreneur chooses to establish a firm only if doing so creates sufficient economic value. The entrepreneur finds it worthwhile to incur the transaction costs of establishing a firm only if the value of the firm exceeds those costs. The entrepreneur competes with other entrepreneurs, with direct exchange between consumers, and with established firms. The entrepreneur establishes a firm when it adds value relative to these competing alternatives.

In type-I competition, entrepreneurs compete with each other to establish firms. Entrepreneurs are successful in competing with each other based on their personal characteristics, including preferences, wealth, capabilities, judgment, information, and discernment of opportunities. In type-II competition, entrepreneurs compete with direct exchange because the firms they establish create and manage markets and organizations. The market and organizational transactions of successful firms enhance the efficiency of transactions in comparison with direct exchange between consumers. In type-III

competition, entrepreneurs compete with established firms, offering new capacity, technological innovations, more efficient transactions, and improved incentives for performance. This framework suggest the need to develop further economic models that will help to explain the great economic contributions of the entrepreneur.

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