

Entrepreneurship and Resource Allocation

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The entrepreneur has been accorded a place of prominence in the history of economic thought; a survey of the literature displays a rich tapestry of theoretical approaches, each emphasizing a different but significant aspect of entrepreneurship. The survey of this literature by Hébert and Link (1988) is illuminating; they identify three distinct waves in the evolution of entrepreneurial theory. Richard Cantillon (1755) in his eighteenth century essay first defined the entrepreneur as a risk taker in a market economy. Almost two centuries later Frank Knight, in his classic treatise *Risk, Uncertainty, and Profit* (1921), reasserted and expanded upon the role of the entrepreneur as bearer of risk. A second wave of theory downplayed the role of risk and emphasized the innovative function of the entrepreneur. This approach, primarily attributed to Joseph Schumpeter (1928, 1934, 1939), characterizes the entrepreneur as a creator of change rather than one who simply responds to change. Schumpeter was the first to declare and forcefully argue that the entrepreneur is an endogenous factor in a market economy. The third wave of theory emphasizes the ability of the entrepreneur to perceive and respond to market disequilibria, as exemplified by Israel Kirzner's (1973, 1979) work. Extending this approach, Theodore W. Schultz (1975, 1980) has made a considerable contribution by addressing (as Kirzner does not) the rewards that are captured by entrepreneurs in the process of responding to disequilibria; Schultz argues that entrepreneurial ability is a scarce and valued resource for which society compensates the bearer.

Despite the richness of received theory and the continued relevance of entrepreneurial activity to growth and development, serious questions remain unanswered. Entrepreneurs play an important role in a market economy, yet "... theory fails to give us a full understanding of why entrepreneurial activity ebbs and flows, or of what particular conditions in the market economy are strongly associated with its emergence or absence." (Elwert, 1985, p. 267). In other words, the task at hand is one of adequately modeling the "market" for entrepreneurial skills.

This paper takes a step that direction. While the major received theories stress different entrepreneurial functions, they are not mutually exclusive. The analysis of this paper takes advantage of, and builds upon, the complementarities among the major theoretical contributions. In 1968 William Baumol argued that the most fruitful approach toward a useful theory of entrepreneurship would emphasize the rewards to entrepreneurial activity. Also in this vein, we again allude to Schultz' two important papers on entrepreneurship (1975, 1980) in which he lamented the failure of economists to consider the rewards that accrue to entrepreneurs and the allocative function played by entrepreneurs. In Schultz' words:

The substance of my argument is that disequilibria are inevitable in [a] dynamic economy . . . [that] would fall apart were it not for the entrepreneurial actions of a wide array of human agents who reallocate their resources and thereby bring their part of the economy back to equilibrium. Every entrepreneurial decision to reallocate resources entails risk. What entrepreneurs do has economic value. This value accrues to them as a rent, i.e., a rent which is a reward for their entrepreneurial performance. This reward is *earned*. (1980, p. 443)

Taking heed of these arguments, an effort is made in this paper to account for the full spectrum of rewards to entrepreneurship to more adequately model the market for entrepreneurial activity.

The model assumes that the entrepreneur is motivated by both pecuniary and nonpecuniary factors. It

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assumes that prospective entrepreneurs will differ with respect to how much risk they are willing to bear, and with respect to how much utility they receive from undertaking "their own" projects. Accordingly, the rate of return required by an individual to undertake a given venture is determined by the individual's opportunity rate of return, the degree to which the individual prefers risk, and the degree to which the individual receives utility from the act of creating a new enterprise and exercising complete and absolute control over the venture. The analysis implies a supply of entrepreneurial expenditures function that when coupled with a concept of society's demand for entrepreneurial expenditures—as perceived by prospective entrepreneurs—yields a market model of the entrepreneurial process.

The model is significant in three important ways. First, it synthesizes the different but complementary elements of entrepreneurial behavior that have been fully but separately developed in the received theoretical literature. Second, it supports Schultz' argument that market forces drive an economy toward an efficient allocation of entrepreneurial resources. And third, by providing an analysis of the factors that influence the supply of and demand for entrepreneurial expenditures, the model provides a framework within which policy actions to stimulate entrepreneurial activity and economic growth can be considered and evaluated.

THE ENTREPRENEURIAL DECISION

Characteristics of the Entrepreneur

In a recent study based on interviews with twenty-three representative entrepreneurs, Ronen (1982) cited a number of personal characteristics that are associated with both the decision to become an entrepreneur and financial success subsequent to undertaking entrepreneurial activities. In his words,

Freedom from control by others, the sense of 'doing one's own thing,' emerges as a salient objective of the entrepreneur. Not so the accumulation of wealth, not primary, but most often perceived as the means to a greatly desired independence. Extraordinary wealth leads naturally to power and authority over others and in our society today it is this alone that guarantees the desired freedom from control by others. (1982, p. 140)

This does not mean that financial rewards are trivial; the accumulation of wealth is clearly an objective of the entrepreneur. However, the desire for wealth is not as much derived from the consumption opportunities it creates, but more importantly, from the independence it provides.

Moreover, evidence suggests that successful entrepreneurs are driven by a need to go beyond the tried and true; they are stimulated by new, nonroutine, innovative ideas in contrast to professional managers who prefer the relative financial security offered by the structured environment of established firms. Observation suggests that entrepreneurs are driven to high achievement and have strong desires to be recognized and respected for their achievements (Ronen, 1982, pp. 140–42). In his pioneering work, McClelland (1961) developed the concept of "need for Achievement" (*n Ach*), defined as a preference to be personally responsible for solving problems, for setting goals, and for reaching those goals through one's own efforts. He hypothesized that entrepreneurs should have high measured *n Ach*, and concluded on the basis of his early empirical work (summarized by Brockhaus and Gasse, in Kent, et al., 1982) that high *n Ach* influences the decision to enter an entrepreneurial occupation.

Further insight is gained by considering another strand of the psychological research; the strength of "locus of control belief" seems to be correlated with entrepreneurial success. Individuals who have a strong belief in internal locus of control are those who have confidence in their ability to influence the course of events. (Externally-oriented people are those who believe they have very little control over outcomes; outcomes are determined externally.) Research shows that individuals who have strong internal locus of control beliefs are more likely to be entrepreneurs (Brockhaus, 1982, pp. 43–45). Moreover, such individuals are also more likely to strive for high achievement, which suggests that perhaps a strong internal locus of control belief may simultaneously determine the need for high achievement and entrepreneurial success.

Since activities or ventures that provide a great deal of novelty are untried, entrepreneurs are attracted by opportunities that entail risk. Almost by definition, the entrepreneur must be characterized as

a bearer of risk suggesting that the perceived level of risk is an important factor in the decision to undertake entrepreneurial activity. However, observation indicates that entrepreneurs are not indiscriminate risk seekers. Entrepreneurs typically exhibit moderate (rather than high) levels of risk preference (Brockhaus, 1982, p. 47–48). Rather than avoid it, when faced with moderate levels of risk, entrepreneurs will seek to increase their understanding of the environment to minimize and manage risk. Typical entrepreneurs tend to have much confidence in their ability to gather and assimilate relevant information, identify new opportunities, assess and manage risk, and indeed, to have strong impacts on the outcomes of the ventures they undertake. Thus, to date, research on the psychological and behavioral characteristics of successful entrepreneurs suggests that they have great confidence in their ability to determine their own fate, and they are willing to accept risk in their urgent quest for novelty and independence.¹ It is from this point of departure that we begin to develop an economic model of the entrepreneurial process.

The Decision to Invest in a New Venture

In deriving a model of the entrepreneurial process the questions that need to be addressed at the outset involve the definition and measurement of entrepreneurial activity. Following the profile of the entrepreneur developed above, entrepreneurial activity is assumed to encompass all actions designed to take advantage of newly perceived economic opportunities; simply put, an entrepreneurial venture involves the reallocation of resources in unique, creative, and innovative ways that lead to the introduction of new products, new services, or new processes. It is also assumed that the amount of expenditures on an entrepreneurial venture is a proxy for the quantity of entrepreneurial activity. Choosing a monetary measure allows us to ask not only whether one will choose to become an entrepreneur, but also how much entrepreneurial activity one will choose to undertake.²

We begin the analysis by considering the initial condition of the prospective entrepreneur. As Kanbur (1980, p. 493) has argued in his critique of Schumpeter's view toward risk-taking, "... the gains and losses, and hence risks, are to be thought of as being *relative* to the opportunity cost of the enterprise." We assume that prospective entrepreneurs possess both human and financial capital that provides them with certain returns as determined by market forces. The entrepreneur gives up the financial rate of return on human capital and wealth that would have been received from choosing a "safe alternative"—employment by an existing organization as a professional manager and the placement of any accumulated wealth in very safe assets.³

The curve in Figure 1 depicts the relationship between the entrepreneurial expenditures supplied by the entrepreneur and the rate of return to the investment in a new venture. The intercept, r_0 , is simply the rate of return the entrepreneur receives from the "safe alternative"—the choice of zero entrepreneurial expenditures. At each point along the curve, the ordinate indicates the rate of return required by the individual to make the associated entrepreneurial expenditure. Moreover, the curve slopes upward because, on the margin of decision, the opportunity cost of investing in an entrepreneurial venture increases directly with the amount invested. The decision to invest in an entrepreneurial venture involves a reallocation of resources; first, the prospective entrepreneur's own resources will be reallocated, and second, where necessary, the entrepreneur will attempt to induce the reallocation of external resources to the new venture. In this regard, we invoke the law of increasing costs, which states that when resources are reallocated they are taken from the lowest cost sources first. Thus we assume that the marginal cost of supplying entrepreneurial expenditures rises with the quantity of entrepreneurial expenditures. This definition of the curve is obviously consistent with Kanbur's insightful interpretation of entrepreneurial risk as it fully accounts for the opportunity cost of supplying entrepreneurial expenditures. As a consequence, the ordinate of each point along the curve is, in effect, the supply price of entrepreneurial expenditures.

To complete the derivation of the individual's supply curve, we also need to consider the nonpecuniary factors that bear upon the decision to become an entrepreneur. First, we assume that different prospective entrepreneurs exhibit different degrees of preference for risk, which implies that those who exhibit less preference for risk will require greater financial rates of return to supply a given quantity of entrepreneur-

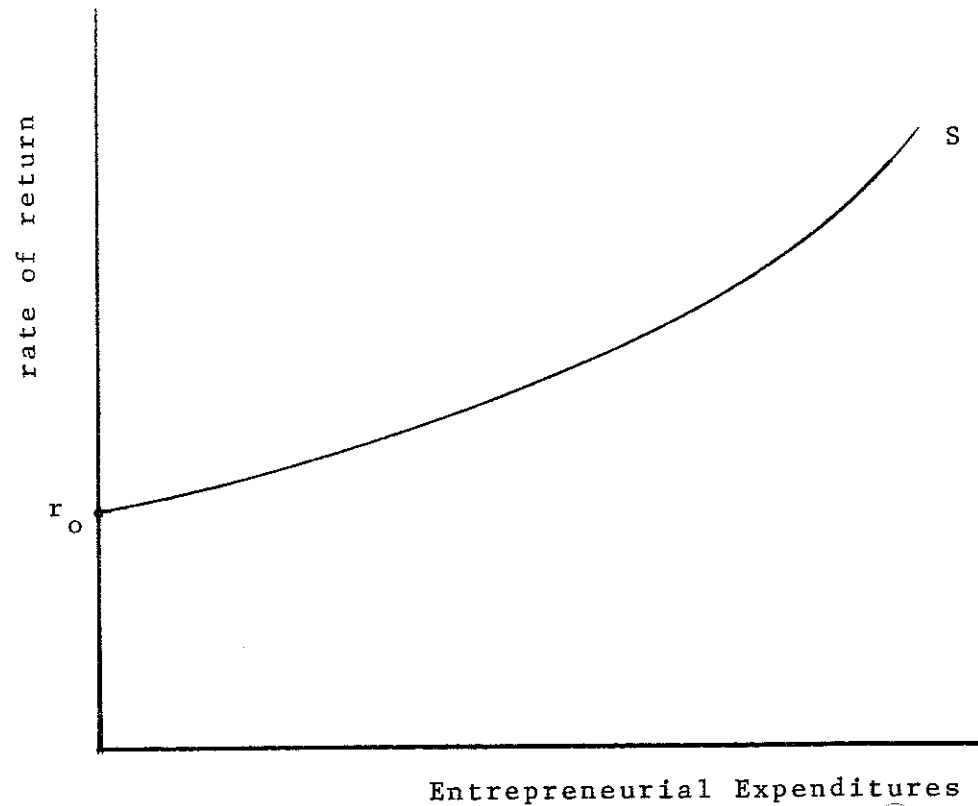


Figure 1. The Supply of Entrepreneurial Expenditures

ial expenditures.⁴ If it is also assumed that one who prefers risk less than others requires a greater increase in the rate of return to provide a given increase in the quantity of entrepreneurial expenditures supplied, then the supply of entrepreneurial expenditures curve will be higher and steeper for those prospective entrepreneurs who are most averse to risk.

Second, as suggested above, those with the strongest needs for autonomy and independence are most likely to become entrepreneurs. Put in the jargon of the economist, one's utility is increased, *ceteris paribus*, by the autonomy and independence acquired by exercising complete control over one's own activities. Hence, those with stronger preferences for autonomy and independence will require lower financial rates of return to undertake a new venture. Therefore, the supply curves of such individuals will be lower than those with weaker desires for autonomy and independence.

The decision of how much to invest in a new venture is most conveniently illustrated with the aid of Figure 2. We begin by assuming that two individuals, A and B, perceive the same pecuniary opportunity costs of investing in a new venture but differ in their preferences over the nonpecuniary outcomes that would result from the venture. Also, assume that they both expect the same rate of return, $E(r)$, from the venture. Since a prospective entrepreneur will choose to invest in a venture as long as $E(r)$ is greater than the supply price, the decision rule for the optimal quantity of entrepreneurial expenditures is the equality of the expected rate of return and the required rate of return, which is picked off the supply curve. Therefore, where A derives more utility from the autonomy and independence of being one's own boss than B does, and/or where A is much less averse to risk than B and has more confidence in his/her ability to manage and minimize risk than B, A will decide to undertake a relatively large expenditure (EE_A^*) on a

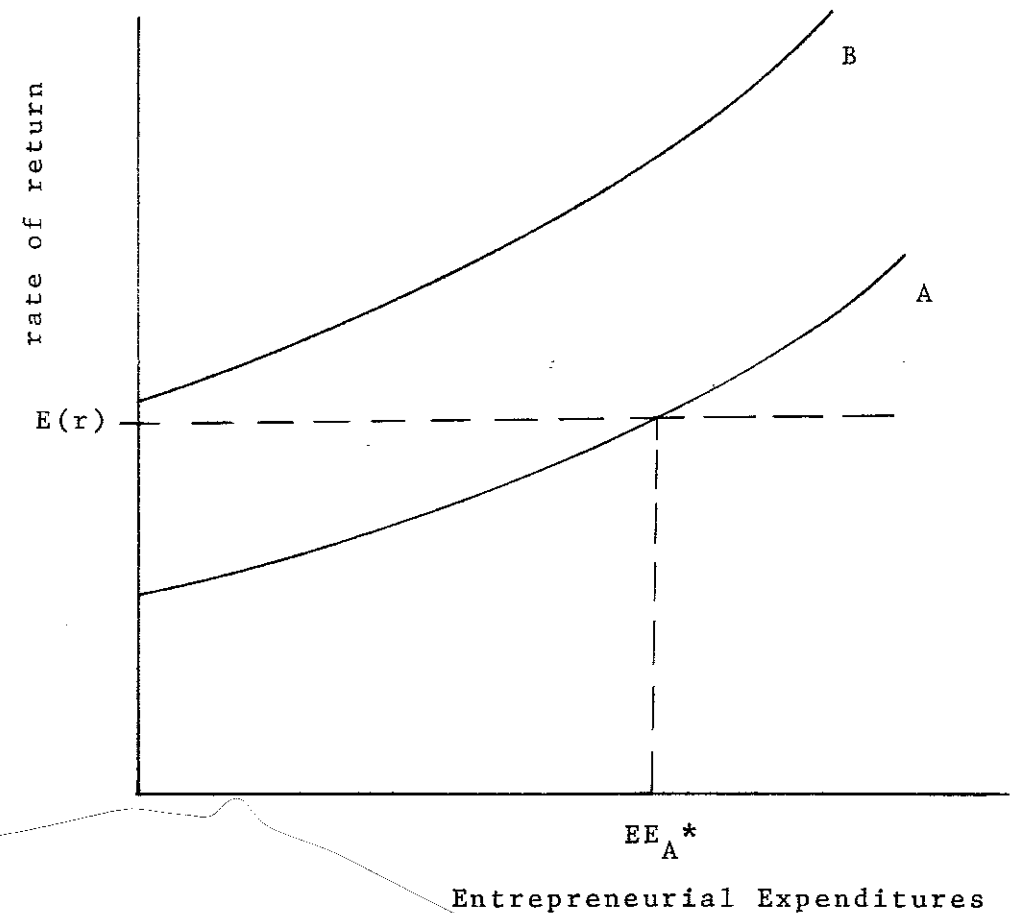


Figure 2. The Optimal Quantity of Entrepreneurial Expenditures

new venture, whereas B will choose to invest a relatively small amount on a new venture, perhaps even zero.

MARKET ANALYSIS OF THE ENTREPRENEURIAL PROCESS

The absence of a generally accepted model of the market for entrepreneurial activity comes as no surprise;⁵ because entrepreneurial activity involves innovation, the emergence of new firms and products and the attendant creation of new product markets, and the growth of "entrepreneurial" industries that ultimately become "established" or mature industries, the concept of such a market is indeed very difficult to pin down. Moreover, this void in the literature is undoubtedly responsible for the lack of attention given to the entrepreneur as one who reallocates society's resources—for we rely primarily on the market mechanism, the invisible hand, to explain resource allocation.

The model of the entrepreneurial decision developed in this paper, at least in part, fills this void. The above analysis can be used and extended to model the entrepreneurial process, which we envision as beginning with the perception of a market niche that leads to the introduction of a new product, and ultimately resulting in the emergence of a mature industry built around the new product.

First, to sort through the complexity of the concept of demand for entrepreneurial expenditures it is helpful to consider exactly what typical entrepreneurs do. This leads to the question of what entrepreneurs perceive and how they develop their perceptions. Begin by assuming a given stock of scientific knowledge and a given production technology. At any point in time there exists a large set of unavailable goods and services that an economy is capable of producing. There exist "gaps" or "niches" in markets that are not yet filled. Entrepreneurs "perceive" such gaps and take action to fill them; in purely economic terms, entrepreneurs act to eliminate the disequilibria they perceive. If it is assumed that prospective entrepreneurs with similar attributes and knowledge perceive a set of similar potential products, then one can postulate the existence of a demand schedule for a class of potential products such that the marginal social benefit of entrepreneurial expenditures on the class of potential products—as indexed by the rate of return—diminishes with the quantity of entrepreneurial expenditures. As prospective entrepreneurs consider new ventures, those ventures that provide society (and indeed the entrepreneur) with the greatest return will be undertaken first. Accordingly, demand is shown in Figure 3 as a downward sloping curve that represents the demand for entrepreneurial expenditures *as perceived by prospective entrepreneurs*.⁶

As Schultz (1980, p. 444) argues, the disequilibria that are created by demand shifts are characterized by much heterogeneity; they are caused by a wide variety of factors, including government intervention, political instability, and national conflict. Moreover, disequilibria are directly caused by

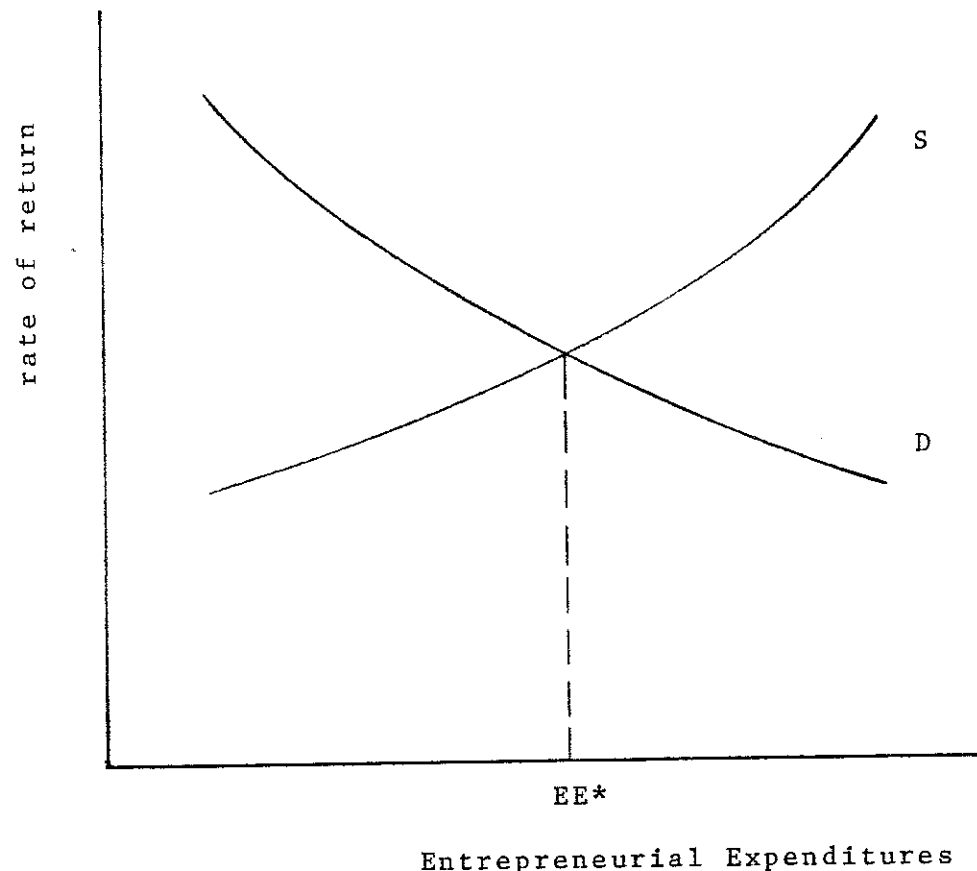


Figure 3. The Allocation of Entrepreneurial Expenditures to a Class of Potential Products

purely economic factors, in particular, technological advance. Regardless of whether new technology results from private or public sector stimuli, it makes possible the production of new goods and indeed creates the opportunity for technological innovation—the refinement of a new idea or concept into a usable product—by entrepreneurial firms. In other words, technological advance potentially increases the demand for entrepreneurial expenditures.

The model of the behavior of the individual prospective entrepreneur developed above provides the foundation for the supply of entrepreneurial expenditures to a class of potential products. At a given point in time there may be any number of individuals who are capable of initiating entrepreneurial activity in a given area of expertise. Thus the total supply of entrepreneurial expenditures is simply the horizontal summation of the individual supply curves. Coupling supply with demand, as in Figure 3, then provides a model of the market for entrepreneurial expenditures on a class of potential products, where EE^* becomes the optimal quantity of entrepreneurial expenditures.

The Market and the Allocation of Entrepreneurial Expenditures

The market for entrepreneurial expenditures is never going to be in equilibrium. Even with fixed scientific knowledge, let alone a continual flow of technological advance that shifts the demand curve outward, it is highly unlikely that all possible uses of our knowledge will have been pursued. Thus, there will always be disequilibria. However, this model allows us to consider the incentives faced by entrepreneurs and their decisions to reallocate their resources to the best uses. In what follows, the entrepreneurial process will be described in the context of the model.

Much takes place before a market niche is filled with a new product. First, entrepreneurs seek to qualify their perceptions of gaps in the market. At the outset, the utility consumers receive from a new product is uncertain. In fact, when a new product is introduced, a market for it must be created by the entrepreneur; potential users must first be informed about the product, they must be made aware of what the product can do for them, and be convinced that they will benefit by purchasing the product. Moreover, subsequent to their efforts to convert perceived (potential) demand to actual demand for new products, entrepreneurs seek to sharpen their knowledge of what will provide consumers with the greatest utility. Market experimentation is a common strategy once a new product has been introduced; typically different models are offered and many units are customized to best meet the needs of individual purchasers (Shapiro, 1986, p. 30). Thus, entrepreneurs make continual efforts to get feedback from the markets they have created to better define the newly introduced products. Information dissemination and acquisition are crucial to the entrepreneurial process.

Assume the process begins with the actions of a single individual. As Shapiro (1986, p. 28) argues, recognition of the inadequacies of existing products stimulates the innovative activity that leads to the provision of new products, and those individuals who have special and intimate knowledge of the market for an existing product are precisely those who are most able to perceive a market niche and create a new product that more adequately meets the needs of consumers. Moreover, the opportunity to pioneer the new product is available to only two groups—the established firms producing the existing product or the scientists and engineers who have intimate knowledge of the existing good and its limitations. Since an established firm will have made significant investments in its existing product line, it may be quite reluctant to introduce a new "competitive" product if the existing one has not yet achieved its full profit potential. Hence, development and introduction of a new product is most likely to occur at the hands of a highly knowledgeable individual who decides to become an entrepreneur.

At this stage the supply of entrepreneurial expenditures for a class of potential products is simply the supply curve of the initial entrepreneur. If the entrepreneur is successful in creating a market for a new product, then the demand curve will shift outward. The dissemination and acquisition of information necessary for market creation are activities that are meant to verify the existence of demand, to clarify consumer preferences, and indeed, to stimulate the growth of demand. Increasing demand serves to confirm the viability of a market for the new product and it drives up the expected rate of return to

entrepreneurial expenditures on further development of the product class.⁷ Thus, the entrepreneur will increase entrepreneurial expenditures (a movement up the supply curve) to facilitate growth of the firm.

Successful market creation is likely to shift the supply curve outward as well. Lenders perceive less risk than they did before the viability of the product was established, which suggests that they would be willing to finance further activity at a lower cost. Also, since the entrepreneur has enjoyed some success, continuing or expanding the activity will appear less risky to the entrepreneur so, *ceteris paribus*, the entrepreneur will require a lower rate of return for a given expenditure—the supply price of entrepreneurial expenditures will fall. Hence, both the equilibrium and actual amounts of entrepreneurial expenditures on this class of potential products will increase over time.⁸ But at this point the rightward shift of the supply curve is likely to be further accelerated by the entry of other firms into the emerging market for the new class of products. As the success of the initial entrepreneur becomes obvious, other individuals who possess the required expertise, perceiving the potential for economic profits, are likely to make entrepreneurial expenditures on slightly differentiated products that will compete directly with the product already on the market. Individuals who have significantly contributed to the success of the initial entrepreneur frequently become dissatisfied because they do not consider the rewards they receive as mere employees of the initial entrepreneur as being commensurate with their contributions. Therefore, such individuals have a strong incentive to use their special talents and intimate knowledge of the new product to start up their own firms.⁹

As new firms enter the market, an infant industry built around the product introduced by the initial entrepreneur will evolve. As competition develops, a more sharply defined and dominant form of the product will emerge, and as Shapiro (1986, p. 34–37) explains, the industry will then enter a new phase of its development. At this point product development centered on the dominant design begins, increasing demand for the product as it is improved, and development of the production process begins, leading to significant and cumulative cost reductions. Hence, the industry embarks upon a stage of rapid growth fueled by the entry of firms that are typically larger and more established than those who created the market and defined the dominant design. As the industry grows the activities of all firms will involve innovation focused on both the product itself and the production process. And entrepreneurial expenditures will continue to be made as long as the expected rate of return to investment in innovative activity (its marginal social benefit) exceeds the required rate of return (its marginal social cost).

Where does this process end? Let us assume that the process leads to a product definition that fully satisfies consumer demand in regard to both the product's characteristics and the quantity in which it is produced; that is, output rates are such that marginal social benefit is equal to marginal social cost, and each firm in the industry is earning a normal profit. Also, assume that no further relevant technological advances have been made. Under this scenario, the industry has fully matured such that all expenditures (costs) made by firms support activities with certain outcomes; the industry is in a static equilibrium that entails no innovative activity. Once this state has been reached, the demand for entrepreneurial expenditures falls to zero. Management activity has completely supplanted entrepreneurial activity. Hence, over the life cycle of the industry, the quantity of entrepreneurial expenditures rises to a maximum, probably achieved at some point during the rapid growth phase, and then falls to zero as all market "gaps" or "niches" have been filled.

But, the process is not likely to end in this way! In a growing and dynamic economy, the continuous flow of new technology is an important determinant of the demand for entrepreneurial activity. Moreover, all manner of economic and political events—e.g., new tax laws, regulatory changes, outbreak of war, . . .—have the capacity to create disequilibria to which prospective entrepreneurs may respond. Schultz' definition of the entrepreneur succinctly conveys the significance of the model presented in this paper: "Human agents who perceive and evaluate . . . disequilibria with a view of deciding whether or not it is worthwhile for them to reallocate their resources, including the allocation of their own time, are entrepreneurs." (1980, p. 443) Entrepreneurial ability is a scarce and valuable resource that entrepreneurs allocate to the benefit of both themselves and society, and in an everchanging world that virtually guarantees the perpetuation of disequilibria, the rewards they receive account for a substantial part of national income.

CONCLUDING COMMENTS

The model developed in this paper synthesizes the historically important theoretical approaches to modeling entrepreneurial activity. At the core of this model lies the Schumpeterian innovator; the entrepreneur as the creator of new products, new processes, and new ways of doing things. To function as an innovator the entrepreneur is portrayed as one who creates economic disequilibria as well as one who has the ability to perceive and deal with disequilibria that have been created by other individuals, institutions, or events. As such, the entrepreneur is an endogenous economic actor.¹⁰ But the role of the Schumpeterian innovator encompasses other entrepreneurial functions. The process of innovation requires alertness to disequilibria (Kirzner) and the ability to deal with it as entrepreneurs must choose the direction in which to reallocate their efforts and their resources. Also, as Kanbur in his discussion of Schumpeter notes, entrepreneurs face alternatives that entail risk when new projects are undertaken; resources must be shifted from the "safe alternative" to the entrepreneurial venture, which creates the possibility of real losses (Cantillon, Knight). As the model implies, reallocation decisions will be guided by market forces that indicate where the entrepreneur's efforts are likely to yield the greatest rate of return; market forces serve to move a dynamic economy toward an efficient allocation of entrepreneurial resources (Schultz). In sum, the model captures the notion that the seemingly different historical characterizations of the entrepreneur are complementary, and indeed, inseparable; innovation, risk taking, and the reallocation of resources are interrelated and interdependent facets of entrepreneurial activity.

Entrepreneurship has recently received a great deal of attention, not only in the academic literature but in the popular literature as well. This is quite natural since entrepreneurship is seen as a vital element in a dynamic and growing economy. As Elwert indicates,

... there are very good reasons to believe that innovation is critically important to growth. It has been estimated that technological innovation was responsible for 45 percent of U.S. national income growth from 1929 to 1969. Of course, technological innovation and entrepreneurship are not the same thing, but a consistent theme in the literature on technological innovation is that a disproportionate . . . amount of it comes from entrepreneurial start ups and from smaller firms that still retain an entrepreneurial character. (1985, p. 270)

Moreover, there appears to be a positive correlation between the extent of research and development and the rate of technological innovation.¹¹ This leads directly to the implication that a policy to support and encourage research and development will ultimately contribute to economic growth.

In the context of the model developed in this paper, a policy to stimulate research and development, almost by definition, must be product-specific or technology-specific, aimed at stimulating the demand for entrepreneurial expenditures on particular classes of potential products. As Schultz notes, the most salient precedent for this sort of policy comes from U.S. agriculture where the rapid and steady flow of scientific advances has provided farmers with a steady flow of opportunities to innovate, and has led to the very high rate of productivity growth observed in agriculture.

However, the tremendous long run growth in agricultural production was not due solely to the advance of technology; a much lower growth rate would have been observed had the ability of farmers to respond to the disequilibria created by new technology not kept pace. "...[T]he proportion of U.S. farmers with one or more years of college education increased between 1940 and 1960 . . . by 83 percent, which exceeded by a wide margin that of the non-farm population." (Schultz, 1980, p. 446) Such a disproportionately large investment in human capital was not a random event, rather, it occurred because it gave farmers the ability to take quick advantage of the "new input combinations" made possible by the continual flow of new technology. The activities of farmers have been very innovative and entrepreneurial in nature as they have continually reallocated their resources to generate the highest possible output rates.¹² In Schultz' (1980, p. 447–48) words: "It is clear . . . [from the empirical evidence] that in U.S. agriculture, which has been remarkably dynamic during recent decades, the entrepreneurial ability of farmers is measurably enhanced by their education."

Public support and encouragement of investment in human capital is the primary policy implication of the model derived in this paper—all other policy proposals are secondary. A rapidly growing stock of

human capital is so important because it directly stimulates both the demand for and supply of entrepreneurial expenditures on many classes of potential products. High rates of investment in human capital will stimulate the demand for entrepreneurial expenditures because a population that acquires a high average education level is likely to generate a more rapid flow of new technology than one with a low education level. Moreover, greater investments in human capital will increase the supply of entrepreneurial expenditures as, on average, prospective entrepreneurs will possess greater confidence in their ability to take advantage of new opportunities (i.e., to deal with disequilibria created by new technology). Also of importance is the positive feedback between demand and supply that further stimulates the quantity of entrepreneurial expenditures; as research and development in a given field creates new opportunities (and a new demand for entrepreneurial expenditures), potential users of the resulting technological advances are likely to have a strong incentive to acquire the specific human capital necessary to apply the new technology to production (increasing the supply of entrepreneurial expenditures), as was the case in U.S. agriculture.

Other policies to stimulate entrepreneurship have been proposed and implemented; these include tax incentives, support of venture capital firms, government grants, etc. These policies all make sense, however, all of these policies are marginal; they are not likely to have much effect on an economy in which the stock of human capital is relatively low. The entrepreneurial process and economic growth are dynamic and interrelated phenomena that are primarily dependent upon a strong societal commitment to the accumulation of human capital.

NOTES

1. As defined by Knight, "risk" is associated with activities for which one can objectively determine probabilities that given outcomes will occur, whereas "uncertainty" is associated with activities for which calculation of the probabilities of various outcomes is not possible. With regard to entrepreneurial activity, elements of both "risk" and "uncertainty" are always present. When a new product is conceived, the demand for the product is obviously uncertain. Yet, other specific activities that will be undertaken during the entrepreneurial process will not involve uncertainty; for example, the entrepreneur may possess objective knowledge regarding his/her own ability to mobilize resources and organize a new venture. Therefore, as it is used in the remainder of this paper, "risk" refers to entrepreneurial activities for which the determination of objective probabilities of various outcomes may or may not be possible.
2. Since the magnitudes of the ventures undertaken by different entrepreneurs will differ widely, measuring the quantity of entrepreneurship in monetary terms (money expended per period) is superior to using the number of entrepreneurs, for it is the extent of entrepreneurial activity and not the number of individuals involved in such activity that provides a more meaningful measure of its contribution to economic growth. For the purposes of this paper, it is most fruitful to think of entrepreneurship as a "flow" of entrepreneurial activity (effort, skill, . . .). However, this is not meant to suggest that a measure of the "stock" of entrepreneurial ability would be inappropriate for different analytical purposes; the most obvious precedent for this, of course, is the common use of both flow and stock concepts of the quantity of labor.
3. Kanbur (1980) criticized the well known Schumpeterian assertion that "the entrepreneur is never the bearer of risk" (Schumpeter, 1961, p. 137). According to Kanbur's interpretation of Schumpeter's position, the entrepreneur who starts from a position of zero wealth faces no risk; in the event the entrepreneur cannot repay borrowed capital, it is the lending capitalist who loses. But, as Kanbur argues (1980, p. 493): "This line of reasoning seems to . . . constitute a misconception in Schumpeter's writings, because it leaves out of account the *opportunity cost*, for the prospective entrepreneur, of undertaking the enterprise." He concludes that risk bearing should, indeed, be accorded a central role in the theory of entrepreneurship.
4. As Kanbur notes, there are two distinct elements of risk perceived by the prospective entrepreneur. In his words, entrepreneurs ". . . 'risk their reputation,' at least in relation to the safe alternative, as well as risking their capital. The two risks can indeed be separated out for conceptual or analytical purposes, not least because the opportunity cost of the capital will, in general, be different from the opportunity cost of entrepreneurial effort, and it is relative to these opportunity costs that gains and losses, and hence risks, have to be conceptualised." (1980, p. 493) Moreover, Kanbur argues that the risk to the entrepreneur's reputation appears to be greater the greater one doubts his or her ability as an entrepreneur. In terms of the profile of the entrepreneur presented in this paper, individuals with the weakest locus of internal control beliefs, will perceive the greatest risks to their reputation and so be least likely to undertake an entrepreneurial venture.
5. Casson (1982, pp. 327-46), however, has recently provided a model of the economywide market for the "stock" of entrepreneurs. The model developed in this paper differs substantially from Casson's by focusing on the "flow" of

entrepreneurial activity as measured by entrepreneurial expenditures per period. As demonstrated below, this facilitates modeling the pattern of entrepreneurial decisions pertaining to a particular class of potential products as such products emerge and evolve over time.

6. One might legitimately ask: If demand represents the "expected" rather than the "actual" rate of return, then how can it be taken as a measure of social benefit? The answer becomes apparent when we consider the evolution of the entrepreneurial process. As explained in the remainder of this section, one of the entrepreneur's initial tasks is to convert potential demand for a new class of products into actual demand. When the entrepreneur succeeds in creating a market, then, *ex post*, the marginal social value of entrepreneurial expenditures on the new and still evolving class of products becomes manifest; as consumers support the process of market creation, they confirm that the entrepreneur's expenditures are valued by society.
7. This analysis is consistent both with the characterization of the entrepreneur presented above and the observation that in the initial stages of a venture the entrepreneur typically captures a very low rate of return on his/her investment. Assuming the prospective entrepreneur possesses critical knowledge and talent pertaining to a new venture, and typically is willing to take moderate rather than high risk, the dominant factor in the decision to undertake a new venture is likely to be a strong desire for autonomy and independence. The economic implication, of course, is that the entrepreneur will accept a relatively low rate of return to pay for the autonomy and independence provided by the new venture. This is not meant to suggest, however, that entrepreneurs are not concerned with monetary returns. In this regard, the human capital model applies; they expect the benefits of an entrepreneurial venture that accrue over the longer run to provide a substantial positive return when compared to the high costs that are incurred during the initial stages of the venture.
8. This scenario will not take place if growth of product demand does not occur, which would preclude the creation of a new market. In this event the entrepreneur will incur a loss and consequently cease to invest further in the venture. In other words, it would become clear that the marginal social benefit of entrepreneurial expenditures is less than the marginal social cost, hence entrepreneurial expenditures would be curtailed.
9. Ziegler (1985) argues that spin-off firms are typically created by entrepreneurs who previously held key positions within a parent firm (the first to introduce a new product). He provides a detailed analysis of this "fissioning" process as it took place in a science-based industry.
10. This characterization of the entrepreneurial process is supported by the empirical literature. Kamien and Schwartz (1982, p. 103) conclude their survey of empirical studies of the Schumpeterian hypotheses with the following comment: "A picture of the relationship between resource allocation and technical advance, though fuzzy, does emerge from these studies. The quest for profit and the devotion of resources do influence the rate and direction of inventive activity despite the large role of serendipity and other goals motivating discovery. Moreover, the relationship appears to be bidirectional, with the state of knowledge shaping and being shaped by profit opportunities and availability of resources."
11. In a recent study Acs and Audretsch (1988, pp. 133-34) observed a positive association between the ratio of research and development expenditures to sales and a direct measure of innovative activity over a sample of major industrial categories.
12. As simple as the example seems, one should recognize that as well as providing better capital equipment, new inputs, and new processes, agricultural research has also made possible the introduction of new products by farmers.

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