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Is Entrepreneurship Only About Entering A New Business

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I. Introduction

To most people entrepreneurship is solely about innovation and entering a new venture. For example, Hisrich and Peters (2002) define entrepreneurship as “the process of creating something new with value by devoting the necessary time and effort, assuming the accompanying financial, psychic, and social risks, and receiving the resulting rewards of monetary and personal satisfaction and independence.” According to Kuratko and Welsch (1994) “Many people now regard entrepreneurship as ‘pioneership’ on the business frontier.” Bygrave (1994) begins with Schumpeter’s definition of an entrepreneur and continues to argue that only a few businesses would have the potential to fit Schumpeterian definition on entrepreneurship, destroying the existing economic order by introducing new product and services. Instead, he argues that “the vast majority of new businesses enter existing markets.” To him, an entrepreneur is “someone who perceives an opportunity and creates an organization to pursue it” and the entrepreneurship involves “all the functions, activities, and actions associated with perceiving opportunities and creating organizations to pursue them.”

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In all these discussions, exiting from a market is not considered as part of entrepreneurial activities.

In our beliefs, entrepreneurship is in general about *changing course* before the rest of the market. In addition to innovation and entering a new business, the definition of entrepreneurship should also include a timely exit from a market that is about to decline. How should a firm, operating in a competitive environment, decide whether to invest in a new project, terminate an existing project, or even exit the industry and enter another industry? A typical approach to the problem (offered by the finance discipline) is to calculate present values for various alternatives and select the one with the highest present value. As discussed by Dixit and Pindyck (1994) this approach assumes, albeit implicitly, that either the decisions are reversible, or they are of the "now or never" type.

On the other hand, in a typical discussion of the issue in economics, firms are believed to enter or exit competitive industries as they detect an opportunity for *abnormal* economic profits or a possibility for *abnormal* losses. However, given identical cost functions and technology, this model is not able to identify marginal firms and explain why some firms decide to exit (enter) the industry while other seemingly identical firms stay in (remain outside). The distinction would be possible only after we consider the differences among people who make these exit/entry decisions. Assuming identical firms with respect to initial wealth, technology, and preferences, Chavas, Pope, and Leather (1988) investigate the properties of the long run equilibrium under price uncertainty and costless entry and exit. Although they obtain a number of interesting findings, their results regarding the entry/exit issue is similar to the results obtained by deterministic economics models; they do not identify marginal firms.¹

Not being convinced by any of the two approaches, taken by traditional economists and financial analysts, many researchers have offered other explanations. For example, Brennan and Schwartz (1985) present a model of joint decision in investment and abandonment. In this model, they consider the decision to open, close, or mothball a mine at the same time and obtain the ratio of entry and exit threshold prices. A complicating factor in their model is the fact that the mine reserves are finite. Dixit (1989) and Dixit and Pindyck (1994) isolate the exit and entry decisions in order to take into account the present value of separate options to invest or abandon. Using the option model allows them to consider the problem as the optimal timing of switching from one alternative (for example staying in business) to another (for example leaving the industry). Each switch is considered an option, which, if exercised, will create an asset with a series of payoffs, and another option to switch to other alternatives in the future. Thus the value of a decision in this regard is indeed equivalent to the price of a compound option.

Some researchers apply behavioral models under uncertainty to analyze the issue. For example, Flacco (1983) and Fooladi (1981 and 1986) develop models of a firm's behavior under uncertainty that explains exit/entry decisions in a competitive environment through differences in the degree of risk aversion amongst firms' managers.

In this paper, we consider the exit/entry problem from an entrepreneurial point of view. A model of predictable behavior, originally developed by Ronald Heiner (1983, 1985) is used to explain the entry exit behavior of the competitive firm facing uncertainty. This behavioral

¹ For a good understanding of the effect of uncertainty on a competitive firm's decisions, see Robison and Barry (1987).

model has its roots in the gap between an individual's *competence* in making an optimum decision and the *difficulty* of decision process (named “C-D gap” by Heiner). We argue that this aspect of a firm's behavior can be better analysed by considering differences among managers' abilities in quickly understanding new circumstances in their environment than by standard models assuming an optimising behavior on the firm's part.

The exit-entry model presented in this paper is different from previous models, which were developed based on standard Bayesian theories, in the sense that it explains how greater uncertainty will cause inflexibility in behavior. Hence, it explains why firms with low perceptual ability act with a lag (or do not act at all) in response to an information, that implies a change in the future profitability while the same information induces other firms to act.

One of the implications of this model is that as complexity of the information increases (uncertainty increases) a lower number of firms are able to decipher and act upon it. Hence, other things being equal, the higher the uncertainty, the greater the range of changes in expected price over which no action is taken.

Another implication is that managers of marginal firms (those who take a lead in exiting or entering the industry) are often more informed (or more competent in recognizing the situation) than the rest of the industry. This of course would also mean that, other things being equal, those firms that stay longer without exiting and entering back to business in a competitive industry, have some shortcoming in interpreting the signals. Assuming no exit/entry cost, conclusion can be made that they pay the price for this shortcoming by suffering occasional losses for staying in the market when they should exit, and hence lowering their long run profitability. With cost associated to exit and entry, this conclusion should be modified but still holds. The model also provides us with more flexibility since we do not have to specify the sources of uncertainty or any limit to output price.

The paper is organized as follows: In Section II we briefly explain a relatively new behavioral model, which was originally developed by Ronald Heiner in 1983. In this section, we also mention some applications of the model. In Section III, we briefly discuss earlier theoretical developments of Exit/Entry model, paying a particular attention to the “Real Option Approach.” In section IV, we present our model, developed within the framework established in Heiner's behavioral model. We argue that exit and entry behavior of competitive firms can be better explained by the “reliability condition” introduced in Heiner's model than by standard optimizing models. Finally, concluding remarks are made in section V.

II. A New Behavioral Model

Ronald A. Heiner (1983, 1985) has developed a model of predictable behavior, which has its roots in the gap between an individual's *competence* in making an optimum decision and the *difficulty* of the decision process (the *C-D* gap). According to this model, often economic agents must make decisions in complex environments in which the difficulty of the problem and complexity of the available information exceed their abilities to decipher this information correctly, and to react to it “optimally.” This *C-D* gap, therefore, results in the creation of uncertainty in the decision making process which, as Heiner argues, becomes “the basic source of predictable behavior” (1983, p. 575).

As the *C-D* gap widens, uncertainty in making an appropriate decision increases and, to avoid this uncertainty, the economic agent becomes increasingly reluctant to react to new information, and leans toward a rule-governed behavior which could be easily handled by the agent. In many occasions, this rule-governed behavior is suboptimal, and an optimizing

behavior calls for a deviation from it. Nevertheless, often all possible deviations are ignored ‘because of uncertainty about when to deviate from these regulation’ (Heiner 1983, p. 585). However, as economic agents interact with each other and with their surrounding environments, their understanding of these environments (competence) and the complexity of the environments themselves undergo evolutionary changes. Although they narrow the *C-D* gap, yet in some cases these changes are not sufficient to induce any behavioral change, which may affect the agent’s performance. In other cases, these evolutionary adjustments result, at some point, in sudden change of behavior and a new persistent movement in another direction.

The standard decision models, which assume individuals act *perfectly* on information, and have no uncertainty in choosing the most appropriate action, are therefore considered to be explaining only exceptional cases.

Heiner’s model could be applied to various economic problems. Some of its applications are introduced to us in his various papers (1983, 1985, 1988, and 1989) and some are presented by other writers. For example, Kaen and Rosenman (1986) use Heiner’s model to explain and test the efficiency of the market for individual securities. McInish and Wood (1989) use this model to explain how the behavior of decision makers (who imperfectly understand and respond to information) is a more important determinant of the well-known first order autocorrelation of return indexes than market frictions which were traditionally believed to be mainly responsible for this autocorrelations.² Gowdy and Yestilada (1988) apply Heiner’s model to explain behavior of firms operating in concentrated markets.

III. Exit/Entry Problem In Competitive Industries

Another interesting application of Heiner’s model is in analyzing the behavior of firms facing uncertainty as they enter and/or exit a competitive industry. A typical approach by the “traditional” finance discipline is to compare the present value of staying in business with the present value of abandonment and select the option with higher present value. Dixit and Pindyck (1994) bring our attention to the fact that this approach implicitly assumes that either the decisions are reversible, or they are of the “now or never” type.

Alternatively, in a deterministic economic framework, firms decisions about entering (or exiting) a competitive industry is analyzed through their reaction to opportunities for obtaining an excess return or an abnormal loss. These expected benefits and losses usually arise due to movements of output price from their original equilibrium levels. However, the characteristics of these marginal firms, those who enter or exist the market, are not discussed. This is because, given identical cost functions and technology, it is impossible to identify these firms in a deterministic economic model. Similarly, Chavas, Pope, and Leather (1988) who investigate the properties of the long run equilibrium under price uncertainty fail to identify these marginal firms.

Another alternative is to separate original investment decision from the exit/entry decision in order to take into account the values of the abandonment and re-entry options. This idea is best developed and explained by Dixit and Pindyck (1994). In their model, the uncertainty over future cash flows arises by an uncertain output price, which is generated by the following stochastic process:

² For information about the first order autocorrelation see Fisher (1966), Cunningham (1973), Scholes and Williams (1977), and Schwartz and Whitcomb (1977).

$$dP = \alpha P dt + \sigma P dz \quad (1)$$

Here, P denotes the output price, α denotes the expected rate of return per unit of product, σ is the standard deviation of return, and dz is the standard Wiener Process.

In the *simplest case*, the model postulates that a firm with negative cash flows – caused by a random output price – can suspend its operation without cost and resume again on a later date when the cash flow becomes positive, without bearing any cost for re-entry. In this case, a project is perceived as a sequence of options. If exercised, each option will create an asset with a series of payoffs and another option to move in a different direction (suspension or re-entry) in the future. Thus, the value of a project is equal to the sum of the discounted values of all these options.

In an extreme *opposite case*, the model rules out temporary suspension and assumes that any termination is indeed an outright abandonment. This is because the capital is assumed to be useless immediately after the suspension (it rusts immediately). Thus, re-entry in the future will require the entire investment cost again. This means that, since restarting is costly, the firm will not close down the operation immediately after cash flows become negative. Therefore, keeping the operation alive is an option with a positive value, and unless the loss is of sufficient magnitude to outweigh this value, the firm will tolerate some losses to stay alive. In this model, Dixit and Pindyck assume that the firm will retain its prior-to-abandonment market power and will not “lose its *right*” to reenter after it abandons operation.

However, except in a few cases, neither of the two models accurately picture real world situations. The process of capital deterioration in real world is gradual, and can be slowed down or, in some cases, even stopped by maintenance. This means that the restarting cost is not as high as new investment cost but is not negligible either, and is a function of duration of suspension. This of course adds another possibility to the firm’s choices (and additional complication from modeling perspective). The firm now can consider keeping capital in shape without producing output.

Dixit and Pindyck (1994) analyze this more realistic case by adding a second *discrete* state variable to their model with a value of zero to represent the possibility of maintaining capital but *not operating* and with a value of one to represent the possibility of *operating*. They maintain that “in each discrete state the firm has a call option on the other. An idle firm can exercise the option to invest. This gets it the flow of operating profits, plus an option to abandon.”³ If the option to abandon is exercised, the firm becomes idle again, and acquires an option to invest which has a positive value. Therefore the value of an idle firm ($V_0(P)$) is linked to its value as an operating firm ($V_1(P)$), and these values should be determined simultaneously.

Denoting the two threshold prices for abandonment and investment by P_L and P_H ($P_L < P_H$), and denoting the investment and abandonment costs by I and E , respectively, Dixit and Pindyck argue that a unique (but not in closed form) solution exists for the exit and entry thresholds. Magnitudes of these threshold prices are function of investment and abandonment costs as well as the volatility parameter (σ). The essence of this model is that *all* firms become idle (abandon their projects) as long as the output price (P) is below P_L , and invest to produce output as long as $P > P_H$. When $P_L < P < P_H$, the optimal strategy is to maintain status quo, i.e., idle firms remain idle and active firms remain active.

³ Dixit and Pindyck (1994) page 215.

Although Dixit and Pindyck never claim that all firms in the industry are identical, to some extent their model may explain why, within certain price range, some firms produce output while other (seemingly identical) firms remain idle. A firm will produce output in the price range of P_L and P_H if it was operating in the industry prior to the time when price fell in that range, and will stay out if it was in idle state prior to that time. However, if the firms are identical, it is not at all clear why some were operating prior to the time when price moved in the range of P_L and P_H , and some were not. Moreover, it does not explain why, given identical firms and environments, some firms decide to exit the industry and some continue with their operations.

By an entirely different approach and building on Sandmo's original work (1971), Flacco (1983) and Fooladi (1981 and 1986) develop models of a firm's behavior facing uncertainty in a competitive environment which suggest the following:

1. *Given identical cost functions and probability beliefs, a firm with a smaller aversion to risk enters the market at a lower expected price than a firm with a larger aversion to risk.*
2. *When both kinds of firms are in the market, the less risk averse firm will produce more than the most risk average firm.*

Although they provide plausible explanations for the differences amongst firms as it relates to their exit/entry behavior, their explanations are offered by using optimizing models that ignore individual differences in their abilities to understand the exact nature of their environment.

Following Heiner's model, our work considers these differences to explain the exit/entry behavior of competitive firms under uncertainty. It is argued that this aspect of a firm's behavior can be better analyzed by the "reliability condition" introduced in Heiner's model than by standard optimizing models assuming *flawless* decision makers.

IV. A Formal Statement of the Model

Assume a competitive market in which all the firms are identical in every respect (cost function, output level, size, and so forth) except that their managers do not have the same capacity to process and interpret information. With this assumption of nonhomogeneous interpretation skills, it is logical to assume that managers may react differently to the same piece of information. This in turn establishes conditions under which we can analyze the entry-exit behavior of these firms within the framework established in Heiner's model.

In this model, uncertainty in making a right move (u) is a decreasing function of the agent's 'perceptual abilities' (p) and an increasing function of the complexity of the decision environment (e), which in turn is affected by news (n). That is, we have

$$u = u(p, e(n)). \quad (2)$$

The news (n) could be defined as previously unavailable information on the distribution of output or input prices, or on any other factors affecting future profitability of the firm such as new government regulations, new inventions, and so forth. As maintained by Kaen and Rosenman (1986), it could be argued that news decreases environmental complexity because it provides information, which could potentially be used, to correctly revise previously held

expectations. Therefore, (e) could be assumed to be always a decreasing function of (n) . For this reason, without losing generality, we may eliminate the argument (n) from equation (2) and introduce u as simply a function of p and e as follows:

$$u=u(p,e). \quad (3)$$

Here $u_p < 0$ and $u_e > 0$.

To apply Heiner's model, it is *not* necessary to specify the source of uncertainty or limit the uncertainty to only one factor. However, in order to make our point and simplify the argument, let us focus on the exit-entry decision of firms for which the only unknown variable is the output price. Therefore, assume firms' decisions regarding the output level and their decisions as to whether or not they should stay in the market are based on their estimation of the expected long-run price. This means that the new information, which reduces the complexity of their decision, environment (e) relates to the probability density of output price. Also, following Heiner's notation, let $\pi(e)$ be the probability that a firm's action (for example, exiting the market in response to perceived negative news about the distribution of price) is correct. Hence, $(1-\pi(e))$ is the probability that the firm's action would be wrong.

It should be noted that, due to uncertainty, the firm may not necessarily take action when it is the right time to do so. Therefore, the probability that the firm will take action when it should be taken depends on this uncertainty. The higher the uncertainty, the lower the probability of taking the right action and the higher the probability of taking the wrong action. Let $r(u)$ denote the conditional probability of taking action when it should be taken, and $w(u)$ denote the conditional probability of taking action when it should not be taken.

Assume $r'(u) < 0$ and $w'(u) > 0$. That is, as uncertainty increases, r will decrease and w will increase, thereby lowering r/w .

The correct time for action is defined as the time when action, if taken, results in a gain $(g(e))$ and an incorrect time is when action results in a loss $(l(e))$.

In this framework, the firm will take the action (exit the market, for example) if the expected gain from such action is greater than the expected loss, i.e., if

$$g(e)r(u)\pi(e) > l(e)w(u)(1-\pi(e)), \quad (4)$$

which could be rearranged in terms of

$$r(u)/w(u) > l(e)(1-\pi(e))/g(e)\pi(e) = T(e). \quad (5)$$

Heiner refers to r/w as the 'reliability ratio.' This is, in effect, a measure for reliability of the agent in responding to a piece of information correctly; for our case, exiting the market at the right time. It also shows how an agent's $C-D$ gap affects the relative probability of taking correct action versus taking incorrect action. The right hand side, $T(e)$, is called the 'tolerance limit,' which is the minimum required reliability that must be satisfied in order for the action to be of benefit to the agent. This is the ratio of unconditional expected loss to unconditional expected gain from an action. Its value increases with the complexity of the decision environment.

Thus, in order for new information to result in an action, inequality (5) must be satisfied. This provides us with the foundation necessary to explain the exit-entry activities of competitive firms in a risky environment by the following theorem:

Theorem. *Given environmental complexity (e) and hence the tolerance limit ($T(e)$), a firm with a higher perceptual ability will exit (enter) the market no later than a firm with a lower perceptual ability.*

Proof. Consider two firms ($I = 1,2$) where firm 1 has a lower perceptual ability than 2, i.e., for any level of environmental complexity, $p_1 < p_2$. Then, given $u_p < 0$, $p_1 < p_2$ implies $u_1 > u_2$. This in turn, given $r'(u) < 0$ and $w'(u) > 0$, implies that $r_1(u) < r_2(u)$ and $w_1(u) > w_2(u)$ and hence $(r/w)_1 < (r/w)_2$. This means that for any $T(e)$, inequality (5) is satisfied for firm 2 no later than firm 1. \square

Note that the above theorem does not imply that one firm *always* reacts to the news which results in a less complex environment. Other possibilities such as reaction by both or none of the firms are quite compatible with the theorem so long as the order by which firms react is maintained.

For our exit-entry case, assuming negative news on profitability of the firm (for example, a shift in probability distribution of output price toward a lower mean), $\pi(e)$ represents the probability of being the right time for the firm's action, (exiting the market), which presumably provides the firm with a net gain, (avoiding a loss). Unlike the standard optimization theory in which, given the available information, firms make an optimum *ex ante* decision, which maximizes their expected utility, here the model allows for suboptimal decisions. Once suboptimal decisions are allowed, actions are not fully reliable, and immediate response to information may not necessarily be of any benefit. Therefore firms may, in response to a new piece of information in a complex environment, take no action at all.⁴

In technical terms, the action may potentially be beneficial but, due to difficulty of understanding the new information, the reliability condition ($r/w > T$) is violated for all firms and hence no action is taken. More information usually increases the reliability ratio and reduces the 'tolerance limit.' Therefore, at some point for some firms (which have smaller than average *C-D* gaps), the former surpasses the latter and hence the action will be taken; that is, these firms will exit the market.

Because firms with lower *C-D* gap have a lower uncertainty and hence a higher reliability ratio, they exit the market first. Their action, in turn, sends more information to the market, hence narrowing the *C-D* gap for other firms in the industry. Accordingly, the reliability condition (5) will be satisfied for some of the other firms and they too exit the market.

As the movement continues, the market condition (the demand-supply situation, equilibrium price, and so forth) will change. This, in turn, results in sending new signals to the

⁴ Note that while optimizing models do not allow for suboptimal decisions, they do allow for mistakes. A firm may make an *ex ante* expected utility maximizing decision based upon its subjective estimate of the probability density of the uncertain factor (e.g., output price). After the true value of the factor is realized, the firm may discover that it has made a wrong (money-losing) decision. However, this is different from a wrong (suboptimal) *ex ante* decision. We are grateful to an anonymous referee for pointing out this point to us.

market until, at some point, an exit may no longer be the appropriate action. Instead, the time may be right for re-entering the market.

Again, so long as complexity of the new information is beyond information processing skills of all the outside firms, no reversal action will be taken. But as more signals are arriving and hence uncertainty is reduced, reliability condition for the right action, entering the market, will be satisfied for some firms. These are again marginal firms with superior information processing skills and *C-D* gaps narrower than the average.

Thus, even though information is equally available to all firms, their reactions to the news are different. While some firms exit or enter the market based on information they receive, most firms remain inactive. The marginal firms are identified by their ability in deciphering the information.

This is a much more general model of exit-entry behavior than the earlier standard Bayesian models. Note that, as Kaen and Rosenman (1986, fn. 4) mention, the ranking of *C-D* gaps varies over time and by the source and type of the news. Therefore, it would not be possible for the industry to identify a leader (or a group leader) whose action may always be followed.

V. Conclusion

The exit-entry model presented in this paper is different from previous models, which were based on standard Bayesian theories, in a sense that it views the problem from an entrepreneurial point of view and that considers differences among managers in their abilities in understanding their decision environment. Our model explains how greater uncertainty may cause inflexibility in behavior. Hence, it explains why some firms with lower perceptual abilities act with a lag or do not act at all upon receiving information that implies a change in their future profitability while other firms act quickly. Practitioners should understand the intuition behind these principles. We hope that the theoretical development in this paper will enhance the use of individual differences in the future academic models.

One of the implications of this model is that as complexity of the environment increases (uncertainty increases) a lower number of firms are able to decipher and act upon information. Hence, other things being equal, the higher the uncertainty, the greater the range of changes in expected price within which no action is motivated.

Another implication is that managers of marginal firms (those who take a lead in exiting or entering an industry) are often more competent in recognizing the situation than the rest of the industry. This may mean that, other things being equal, those firms that stay put for a longer time without exiting and entering back in a business have some shortcoming in interpreting the signals, and will have a lower than average long run profitabilities. The model also provides us with more flexibility since we do not have to specify the sources of uncertainty or limit it to output price.

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