"FROM BARRIERS TO ENTRY TO BARRIERS TO SURVIVAL"

by

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From Barriers to Entry to Barriers to Survival

Abstract

Mounting evidence of a weak relationship between traditional measures of entry barriers and inter-industries variation in the actual rate of entry is the paper's starting point. Distinguishing new, independent firms from plant addition by existing mutiplant operators or diversifiers only partially addresses this inadequacy. We therefore develop the concept of *barriers to survival* (BTS) as a structural phenomenon operating alongside, but substantially independent of, traditional entry barriers. It is postulated that BTS depend on the importance of industry-specific, experience-based assets. Empirical testing on a sample of 160,000 entrants across 120 US industries supports the relevance of the BTS concept.

From Barriers to Entry to Barriers to Survival

*Paul J. Verdin and Peter J. Williamson**

Competitive Analysis and the Threat of Entry

No competitive analysis is now complete without an examination of entry conditions. Since the "threat of entry" was allocated a slot as one of Porter's [1980] familiar "five forces" -- his key drivers of industry profitability -- it has featured in countless industry analyses and business strategy documents. The relationship hypothesized by theory suggests that the stronger the threat of new entry, the lower the average profitability of an industry, other things equal. This relationship should be even more significant if we look at actual entry, rather than only the threat of new competitors. Yet, despite widespread acceptance of these effects, empirical studies have found little or no correlation between the gross rate of entry and profitability across different industries (Baldwin and Gorecki [1983,1987]). Instead, we find large numbers of new entrants as the norm in most markets, be they highly profitable or not. Entry rates (expressed as a percentage of the initial stock) of 40.8% were recorded in a cross-industry sample for the U.S. between 1978 and 1982 (Dunne *et. al.* [1989]), for example, while the corresponding figure over a 10 year period in Canada was 37.2% (Baldwin & Gorecki [1987]).

At the same time, we also observe large numbers of firms exiting most industries, even those which are growing strongly. Our own sample of 134 industries, based on Dun and Bradstreet data for the US between 1978 and 1984, exhibits average exit rates equivalent to 39% of the initial stock (measured by number of firms) over the period. The fact that in reality firms are entering and exiting most industries with high frequency must lead us to question the traditional interpretation of barriers to entry and their practical relevance as a determinant of competition and industry profitability. The industry membrane appears to be permeable, as illustrated in Figure 1.

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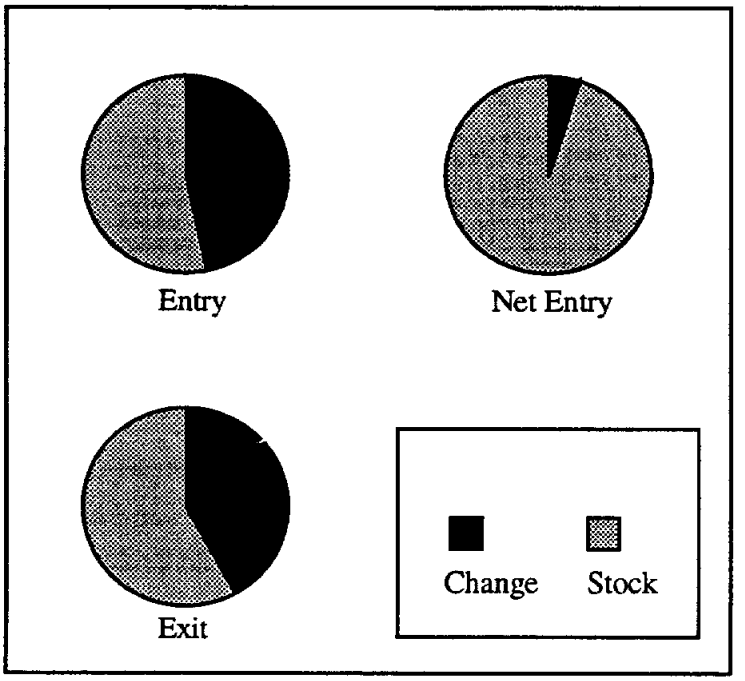
Figure 1: A Large Number of Firms Entering and Exiting Is The Norm



Source: Computed From the Dun & Bradstreet database covering 134 industries

Linking entry and exit, however, reveals that a high percentage of those leaving the industry are relatively young firms. Dunne *et. al.* [1988], for example, find that 64% of their sample of new U.S. firms had exited within 5 years after entry, while a full 79% had ceased trading 10 years after commencing operations. Survival, rather than entry then, appears to be the real challenge.

Based on these observations, this paper reassesses the role a entry barriers as critical feature of industry structure. Within a sample of 160,000 independent firms who entered one of 134 US 3 digit SIC industries between 1978 and 1984, we find that traditional proxies of barriers to entry are able to explain only 16% of the cross industry variance in entry rates. Rather than barriers to entry alone, the practical effect of entry appears to depend on the *barriers to survival* which new firms face post-entry. Successful entrants generally bring to the industry assets which are in short supply relative to current demand for the customer benefits these assets can deliver. These

assets may embody new technology or systems for providing differentiation which some segment of customers value. But they lack other, industry-specific assets like brand reputation on a reliable service network which, in some industries, can only be accumulated through experience (Dierickx and Cool [1989]). Without these assets, they face a handicap relative to well established incumbents. As a result, young firms are forced to run an uncertain, middle distance race for survival. They must attempt to accumulate the necessary industry-specific assets to reinforce their position before the incumbents destroy their differentiation, hence rationale for existence.

We conclude that it is equally important to for strategic analyses to take into account the barriers to survival which we find new entrants face for up to 10 years after they are first established in an industry. This means looking beyond traditional scale, differentiation and absolute cost barriers in assessing the potential effect of new entrants on competition and profitability. More attention must be given to those product and buying characteristics which determine the importance of past experience in the market as a source of competitive advantage. Where industry-specific experience is critical and slow and costly to accumulate, barriers to survival rise and the competitive pressures associated with entry are substantially reduced.

Barriers to Entry: The Walled City

In his seminal book, Bain [1956, p3] argued that the condition of entry was primarily a structural phenomenon, roughly akin to a wall the height of which could be evaluated by:

> *"the advantages of established sellers in an industry over potential entrant sellers, these advantages being reflected in the extent to which established sellers can persistently raise their prices above the competitive level without attracting new firms to enter the industry."*

For those industries where barriers to entry were "great" or "substantial" Bain went on to predict that these industries would enjoy: *"Relatively stable industry structures with very little entry occurring over time (unless occasionally through major innovations in product.)"* (Bain [*op. cit.*, p 176]).

The group of firms who were the first to take advantage of the preferred sources of inputs in terms of absolute costs, first reaped the advantages of large scale operations, established the dominant brands and built a business infrastructure which would require

large lump sums of capital for entrants to replicate quickly, would have effectively constructed for themselves a walled city. Within its shelter a concentrated group of sellers who recognized the dangers of ruinous competition could jointly enjoy the benefits of monopoly rents.

Potential entrants would compute the likely profits to be had by sharing in this cosy enclave and the costs of putting in place the infrastructure rapidly enough to allow them to be competitive with the incumbents, who many have spent years building their positions when the industry was emerging. In "blockaded" industries (Bain [1956], p22), they would conclude that the game was not worth the candle before even starting down the fruitless path of actual entry. In industries where the barriers were moderate, judicious management of the incentives to enter at prevailing prices in the form form of entry limit pricing could dissuade potential entrants from attempting to scale the wall while still maintaining a degree of super-normal profit (Modigliani [1958],Sylos-Labini [1962]). In low entry barrier industries either opportunities to enjoy monopoly rents would be competed away as actual entry occurred or the threat of entry would result in such a low limit price that profits would be kept down to the level of "normal returns".

Various proxies for the height of entry barriers have been deployed in tests of their impact on industry performance in a large number of studies (See, for example, the review by Gilbert [1989]). These tests generally use "reduced form" equations which link entry barrier proxies to industry profitability. However this approach sidesteps a fundamental precondition: that the threat of entry is actually lower among those industries with structural characteristics which are supposed to imply higher barriers to entry. As we have seen above, the data on actual entry must cause us to question this proposition. Specifically, if the threat of entry is actually low in industries with characteristics like scale, advertising and capital intensity, why then do we observe high levels of actual entry into these industries?

Barriers to Entry and the Rate of Entry

In this section we examine the existing evidence regarding the relationship between the height of barriers to entry and that observed rate of entry and present a re-estimation of the traditional entry barrier equation which makes a clear distinction between new firm entry and the addition of plants or establishments by incumbents and diversifiers where there are strong reasons to believe the implications of entry barriers will be markedly different.

Existing Evidence

The first group of studies examining the relationship between entry barriers and observed entry focussed on the *net* number of firms entering the industry based on the change in counts of firms at two points in time. Using Canadian data, and excluding industries where the net number of firms had declined, Orr [1974] found a significant negative impact for the capital required for a minimum efficient scale plant, advertising intensity and concentration. R&D intensity proved to be less clear an indicator of barriers. On the incentive to enter, industry growth and past profitability had a positive impact, albeit rather weak, and a measure of risk based on the variance of industry profit over time tended to act as a disincentive. Using a similar design with US data but examining industries with net increases or decreases in their populations, Duetsch [1974], however, failed to find a significant result for the traditional proxies for entry barriers used by Orr. Only the absolute capital cost barrier appeared to act as a barrier to a net expansion of the number of firms.

Both previous studies found that the larger the industry, in terms of the total number of firms, the more firms entering net. Hirschey [1981] therefore standardized by the total number of incumbent firms to compute the percentage rate of net entry. When this correction was applied, none of the traditional proxies for entry barriers appeared to explain this measure of the magnitude of entry relative to the existing stock of firms. On the contrary, he discovered a significant positive, "entry promoting" effect for advertising intensity.

During the first half of the 1980's improved data on entry began to become available to researchers, allowing net entry to be separated into its underlying components: gross entry and gross exit. It rapidly became apparent that the net figure used in previous work had concealed much larger shifts of firms into and out of industries. As noted above, entry over a decade equivalent to almost 40% of the initial stock of firms is common. Meanwhile, studies like Baldwin and Gorecki [1987] also found that 43% of their initial population had disappeared ten years later. Even more problematic, the gross entry figures were found to be unrelated to either traditional barriers to entry proxies or past industry profitability in a systematic way.

Further exploring the behaviour of gross entry, Khemani and Shapiro [1986] found a negative effect for advertising intensity, minimum efficient scale relative to market size, and capital requirements using Canadian data 1972-76. Kessides [1986], on the other

hand confirmed Hirschey's earlier finding of an 'entry promoting' impact of advertising intensity in US data. MacDonald [1986] using a sample of all establishments of over 20 employees in 4 digit food industries finds only a systematic impact of capital cost barriers. Highfield and Smiley [1987] using the Small Business Data Base of the SBA find the predicted negative signs on each of the traditional barrier proxies as well as a measure of preemptive capacity expansion by incumbents, but none are significant at accepted confidence levels. In other variations of their base model R&D intensity appears as a factor significantly encouraging gross entry. Among these studies higher industry growth was the sole consistent explanator of higher gross entry.

A Further Empirical Test

One dimension of gross entry which has been less than fully explored in the literature is the question of its source (Hamilton [1985] and Baldwin and Gorecki [1987] are notable exceptions). In particular, a good deal of theoretical weight suggesting the need to distinguish carefully between entry by new, independent firms, establishment of new operating entities by firms already in the industry, and diversification into the business by firms with bases in other industries.

First, because of their ability to take advantage of multiplant economies (See, for example, Scherer *et. al.* [1975]), incumbents establishing new plants or operating units will be able to avoid most of the impact of the kinds of barriers to entry which the original literature postulated new entrants would face. In fact, the decision by an incumbent to construct new plants or establishments is more appropriately viewed as an alternative to expanding the capacity of existing sites as a way of meeting expected growth. It is likely to be impacted by the efficient plant scale for the relevant technology rather than barriers to entry. The inclusion of plant investments by incumbents as "entry" within the gross figure used as a dependent variable would therefore bias the results, understating the importance of the deterrent effect of barriers on new entrants.

Second, diversifying firms may have a similar ability to bypass at least some of the traditional entry barriers. It has been argued and empirically supported that diversification entry by firms already established in other industries is a possible means of overcoming barriers to entry by drawing on firm specific assets and will thus more frequently occur in high-barrier industries (e.g. Hines [1957], Gorecki [1975] Yip [1982], Montgomery and Hariharan[1988]). Again, therefore, if this diversification is included in the figures there is likely to be more observed gross entry than the traditional barriers to entry model based on newly established firms would suggest.

These considerations imply that the traditional barriers to entry model is most properly viewed as a hypothesis about the relationship between gross entry by single plant firms and the height of entry barriers[1]. This proposition can be tested by means of the following specification:

$$eni_i = a_0 + \sum_{k=1}^{m} b_k BTE_{ik} + g_0 GRO_i + e \qquad (1)$$

Where eni_i is the number of new, single plant firms entering industry i during the period relative to the total number of establishments in the industry at the start of the period. BTE_{ik} are k indicators of barriers to entry for each industry 'i.'. GRO_i is the total growth in the industry during the period.

Data for entry were secured by extraction from the plant-based USEEM file of the U.S. Small Business Administration[2], on the composition of 134 3-digit manufacturing industries in terms of single-plant firms (i.e. 'independent establishments') separating plants belonging to multi-plant or diversified firms ('dependent establishments'). Since this information was available over the years 1978-1984 and establishments could be tracked over time from one point of observation to another, we were also able to derive establishment-based entry measures for each industry by identifying those firms and dependent establishments who were in existence in 1984 but not in 1978.

Following Bain's *op. cit.* original hypotheses, three proxies for barriers to entry BTE_{ik} were tested:

> *SCALE*: scale economies, relative to the size of the market. These are measured on the basis of the minimum efficient scale, estimated by the average shipments of plants accounting for the top 50% of industry value added, divided by the total industry shipments. This is then multiplied by the ratio of average value

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[1] We also tested the corollary that the number of new plants established by incumbent firms will depend on efficient plant scale and expected growth in demand, while the creation of establishments by diversifying firms will vary with the size of the benefits offered by access to firm specific assets. We found that *SCALE* tended to reduce the creation of new dependent establishments while *GRO* increased it. *KCOST* and *ADV* became insignificant for plant expansion by existing firms. In fact, the best predictor of how many new plants will be constructed by those already in business was a straightforward regression of plant expansion by existing firms on industry growth and the average size of existing plants.

[2] For a full description of this file, characteristics of the data, manipulation and editing applied by the SBA and ourselves, see MacDonald [1985] and Phillips [1985].

added per employee for the largest 50% of plants in the industry over value added per employee of the smallest 50% of plants. (US Dept. of Commerce [1982]);

KCOST: a measure of the capital cost as a potential barrier to entry, equal to the minimum efficient scale (measured as above) multiplied by the ratio of total investment in plant and equipment (US Dept. of Commerce [1982]) to total employment in the industry (US Small Business Administration [1988]);

ADV : the advertising (traceable media advertising expense) to sales ratio (US Federal Trade Commission [1976]).

Industry growth (*GRO*) was measured by the growth in total employment in the industry between 1978 and 1984 (US Small Business Administration, op. cit.)

The results for equation (1), gross entry by new firms, is shown in Table 1. *SCALE* and *KCOST* have the expected negative signs, suggesting they do act as barriers to entry, but their significance is relatively weak. Industry growth, *GRO*, exhibits the predicted positive sign. As in a number of the previous studies reviewed above, however, *ADV* (our proxy for differentiation) as a barrier to entry, shows a positive and significant sign suggesting that prevalent use of advertising actually encourages new firms to enter.

Table 1: Single Plant Firm Entry (eni_i)Versus Barriers to Entry

Variable	Coefficient	t-Statistic
Intercept	0.010	....
SCALE	-0.042	1.640
KCOST	-0.0001	1.496
ADV	0.001	2.848
GRO	0.009	2.095

$R^2 = 0.163$ Adjusted $R^2 = 0.131$

The data therefore provide some support for the predictions of the traditional barriers to entry model in the case of new firms once these are distinguished from plant expansion by incumbents. On the other hand the low overall explanatory power of the equation (explaining 16% of the total variation) and the relatively high variances associated with the estimated coefficients suggests there is a good deal more to the story than traditional barriers to entry models suggest, even when we are examining actual, rather than potential entry.

One important refinement to the basic model has come in the form of dynamic limit pricing (eg Gaskins [1971], and Judd and Peterson [1986]). While this literature has little directly to say about inter-industry variation, it has the significant implication that it is the rate at which new entrants take market share from incumbents which is critical, rather than the "in or out" effect of entry itself. In what follows we take this logic a further step to examine the potential impact of how many entrants survive and prosper for what length of time on the both on number of new firms who decide to enter and performance of long term survivors.

Barriers To Survival: The Minefield

A central assumption of traditional entry theory and classical limit pricing is that the entrants expect incumbents will not reduce their output following new entry. The "Sylos postulate" (Sylos-Labini [1962]), for example, is that established firms maintain their pre-entry output volumes, set a a level to make entry unprofitable. Exactly what happens if a new firm does enter contrary to rational expectation is not explicit. Presumably, however, it discovers that it has sales insufficient to cover its average costs and promptly exits. In other words, the classic analysis makes no distinction between barriers to entry and barriers to survival (after entry) since there is a zero probability of survival for an entrant in an industry subject to limit pricing.

The survival assumption adopted by dynamic limit pricing models generally lies at the opposite pole. Once a firm enters it stays. The incumbents' decisions revolve around how rapidly to cede share by holding price up and the feedback this will have on the rate of entry in the future.

In reality, of course, even among those firms who successfully enter the industry for a finite period only some proportion of new entrants will remain in the industry for an extended period. This proportion would not be a relevant measure of involuntary exit if

the market was to be perfectly contestable making "hit and run" entry viable (Baumol [1982]). Market contestability theory therefore alerts us to the fact that low survival rates do not necessarily imply a disadvantage on the part of new entrants relative to incumbents. Indeed, it may be that a low tenure rate among entrants were matched by a high rate of exit among older, established firms reflecting the fact of easy to entry and exit, allowing firms to opportunistically take advantage of the relative attractiveness of temporary potential in that particular industry versus elsewhere (Mills and Schumann [1985]).

Actual experience, however, suggests that successful "hit and run" entry is not a widespread phenomenon, even in supposedly contestable markets such as air transport (Scherer and Ross [1990]). Instead, we generally observe a substantially higher probability of new firms leaving the industry during some significant period after entry compared with the probability that a long established incumbent will exit during the same period. Rather than simply suggesting high firm turnover associated with hit and run strategies, this would lead an entrant to suspect that new firms faced disadvantages which might force it to exit the industry due to lack of profitability, instead of by choice. Such a recognition of the risk of involuntary exit after some period of operation, in turn, can be expected to influence entry decisions so long as there are any net costs were associated with entry and forced exit.

The phenomenon of successful entry followed by risk of involuntary exit, possibly after a period of operation extending into years, may be explained by the concurrent existence of four basic conditions: temporary scarcity of certain firm-specific assets among incumbents relative to uncertain demand from a segment of customers for the product of these assets; a significant role in the long run production function for industry-specific assets; that a significant proportion of both firm and industry specific assets can only be accumulated through experience; and uncertainty as to the rate at which both types of assets can be accumulated as well as the demand for them.

Disequilibrium in the market between the array of types and quantities of output supplied by incumbents and that demanded by customers offers scope for new entrants to attempt to fill this gap by bringing asset bundles new to the industry. This disequilibrium may arise from development of new and potentially relevant technology outside the industry which would better satisfy some segment of customers' needs, or a change in customer tastes. The "Body Shop" chain, for example, entered on the basis of growing market demand for "environmentally friendly" cosmetics which was undersupplied by incumbents. It brought into the industry various recipes for creating

cosmetics from natural ingredients. The asset bundles which the entrants bring with them may have been accumulated by operation in another industry or by the experience of the individual entrepreneurs behind the entrant. The startup of "Next" computer is a case in point.

New entrants who bring assets which are temporarily scarce in the industry, however, will have little direct experience operating in the market. Their asset bundles, while containing some attractive jewels, will be incomplete because they lack assets which can only be accumulated through experience and are subject to "diseconomies of time compression" (Dierickx and Cool [1989]). Customer loyalty, or the capabilities and infrastructure required to manage a product-specific distribution and service network would be examples.

Potential customers are then faced with a choice between alternatives which incompletely satisfy their needs. If they buy from the new entrant, they enjoy the advantage of the differentiated attributes which are offered by entrants, based on the new assets they have brought into the industry. However, this means foregoing the benefits which accumulated, experience assets would provide, since entrants' stock of these is negligible. If they buy from incumbents, who have a rich stock of experience-based assets and hence can provide the attributes which these underpin, they forego the innovative benefits offered by the entrants' new assets.

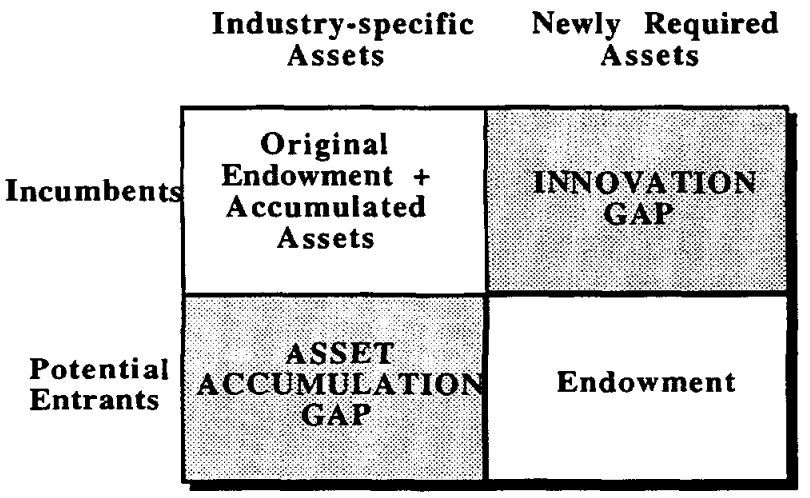
The race for survival

Over time, the choice set available to the customer will change. Successful entrants will improve their stock of industry-specific assets as they accumulate experience. Simultaneously, incumbents will seek to extend their asset bases by incorporating the new types of assets deployed by successful entrants into their own asset bases. Incumbents' effectiveness deploying these new types of assets and integrating them with their existing asset stocks will also improve with time and experience.

If incumbents were rapidly able to obtain and effectively integrate the new types of assets with their formidable stock of industry experience, the customer would no longer have to forgo the benefits of buying from a supplier with a large stock of accumulated assets. The new entrants' offerings would be dominated and their *raison d'etre* eliminated. Alternatively, if the new entrants rapidly accumulated industry-specific assets they could become strong, long term competitors.

Uncertainty as to the speed with which both firm and industry specific assets can be accumulated over an extended period would mean that the entrants are engaged in a risky race for survival against incumbents who are seeking to eliminate these entrants' initial differentiation. This competitive race between incumbents and new entrants is illustrated in Figure 2.

Figure 2: The Race For Survival



Incumbents face an "innovation gap" between what their existing assets and capabilities can deliver and what a changed market is beginning to demand -- a gap being filled, albeit imperfectly, by new entrants. To close this innovation gap involves incumbents in a potentially costly and slow process of internal change. New entrants, meanwhile, are faced with an "asset accumulation gap" between what their initial endowments can deliver and other product features, information and and service support that incumbents have been able to offer based on assets like process experience, established brands, and distribution and service infrastructure built up in the course of their history of supplying the market. Not all of these assets will be relevant to changed market conditions, but many will underpin attributes which are still demanded by consumers. The product may be new, for example, but many of the same supporting attributes such as convenience or reliable after-sales service will still be required. To close this gap entrants will generally need to replicate some of the asset stocks held by the established firms. Where these assets are not specific to the industry, they may be acquired elsewhere or transferred as part of the entrants initial

elsewhere or transferred as part of the entrants initial endowment, reducing the asset accumulation gap. The more of these assets are highly specific to the particular industry, by contrast, the wider will be the asset accumulation gap.

The relative handicaps in the race to fill these gaps will depend on two sets of factors. First, the size of the gaps opened up by a change in the market. Specifically, how much of the historic, industry-specific asset stocks continue to be relevant (determining the size of the asset accumulation gap) and how significant the innovations introduced by entrants (determining the size of the innovation gap).

The second important set of factors is the difficulty of replicating the assets required to close these respective gaps. For incumbents the magnitude of the problem will generally depend on the amount of change required and the degree to which change is unfamiliar to incumbents rather than routine. For entrants the difficulty of the task depends on the process by which industry-specific assets must be replicated. Theoretical work has suggested that this process is subject to a number of important frictions: diseconomies associated with attempts to speed up the rate of accumulation; delays caused by interconnectedness of assets limiting the rate of accumulation to the slowest "critical path", causal ambiguity as to how to go about replicating intangibles, and so on (Dierickx and Cool, *op. cit.*).

In some industries, therefore, industry-specific, experience-based assets will be both important and slow and costly for entrants to accumulate. In this case, more of the new entrants are likely to lose the race against incumbents. By the time they overcome the constraints and costs of replicating the necessary industry-specific assets, incumbents will have already closed the innovation gap and undermined the differentiation entrants initially enjoyed. We define these industries as having high *barriers to survival*.

In what follows, we propose to measure the barriers to survival faced by new entrants in terms of the increased probability of exit during an extended period after entry compared with the exit probability of than incumbent firms. Our indicator is the ratio of the probability of exit of a new entrant relative to the probability of exit by an incumbent during a given period[3].

[3] The definition of when a firm moves from being a young 'entrant' to an established 'incumbent' is by necessity a grey area. Our data suggest, however, that the decline in probability of exit in most industries tend to flatten out about 6 years after entry so that firms who pass this age are indistinguishable from substantially older firms in terms of their probability of survival. We therefore choose this age as the cutoff between young entrants and established incumbents.

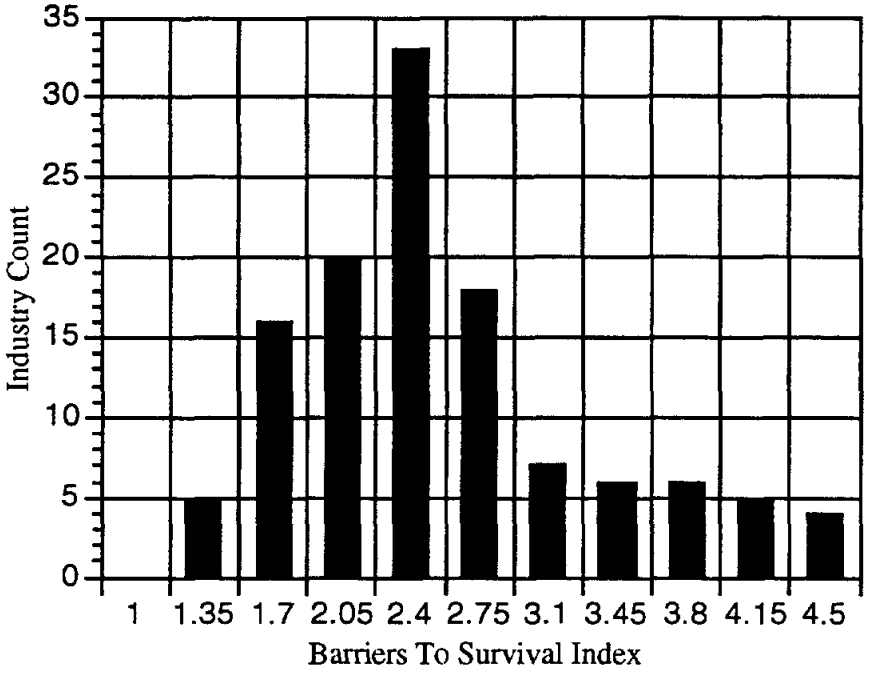
Barriers to survival are likely to be an important factor in determining how many new firms are willing to enter. The higher the barriers to survival, the greater the importance of sunk costs in deterring entry since the lower the probability of staying in business long enough and profitably enough to recoup these sunk investments. The observed success of past entrants, meanwhile, will feed back through expectations about the barriers to survival and hence to the rate at which entry occurs in the future.

To the extent that the height of barriers to survival differ across industries, they should therefore help to explain inter-industry variation in entry rates. Moreover, barriers to survival may be influenced by a different, or wider set of features of structure and conduct that those included in the traditional entry barrier theory. In this case the distinction between barriers to entry and barriers to survival would lead to new hypotheses about the relationships between industry structure, the threat of new and effective competition and the relative attractiveness of different strategies.

An Empirical Test of Barriers to Survival

Drawing on the same USEEM data file described above, but restricting the analysis to single plant firms, we computed a measure of the barrier to survival associated with each 3 digit industry by taking the ratio of the probability of exit between 1978 and 1984 for firms who were 0-2 years old in 1978, divided by the corresponding probability of exit for firms who were between 6 and 9 years old in 1978 (BTS). We thus have a statistic capturing the relative survival disadvantage faced by new entrants early in their lives compared with the turnover rate of well established incumbents which is assumed to be voluntary. The distribution of this barrier to survival statistic across our sample of industries is illustrated in Figure 3, which indicates a variation from industries where firms who have newly entered have almost no higher probability of exit than established incumbents (BTS close to 1.0) through to those industries where newly entered firms are more than four times as likely to exit as established incumbents.

Figure 3: Cross-industry Distribution of Barriers to Survival



The next step is to test the impact of the BTS measure in our equation seeking to explain the rate of entry. Recall, however, that the deterrent effect of barriers to survival is expected to be greater the higher are the sunk costs associated with entering the industry. If sunk costs are insignificant then the losses associated with involuntary exit are likely to be small. In this case there is probably little to be lost by entry even if forced exit is the result. We therefore test two specifications in which the standard entry barriers equation has been augmented by the inclusion of barriers to survival variables:

$$eni_i = a_3 + \sum_{k=1}^{m} b_k BTE_{ik} + g_3 GRO_i + h_0 BTS_i + \xi \qquad (2)$$

$$eni_i = a_3 + \sum_{k=1}^{m} b_k BTE_{ik} + g_3 GRO_i + h_0 BTS*RD_i + h_1 BTS*UN_i + h_2 BTS*ADV_i + h_3 BTS*KE_i + \nu \qquad (3)$$

Equation (2) simply adds the barriers to survival variable (BTS) to the traditional barriers to entry equation (1). In equation (3) we seek to capture the joint effects of barriers to survival operating in conjunction with various proxies for sunk costs associated with entry and exit through a series of variables in which BTS is multiplied by proxies representing research and development expenditure, redundancy costs, advertising investment, and expenditure on capital equipment which may have to be resold at a discount. These sunk/exit cost measures are as follows.

RD: the ratio of total R&D expenditures to net sales (National Science Foundation, [1978])

UN: the percentage of workers who are union members (Kokkelenberg and Sockell [1985]) on the expectation that redundancy costs are likely to be less avoidable when labour is unionized.

ADV: the ratio of traceable media advertising expenses to net sales (US Federal Trade Commission [1976]).

KE: the total investment in plant and equipment (US Dept of Labor [1979]) divided by the total employment in the industry (US Dept of Commerce [1982]).

We expect all of the BTS related variables to discourage entry and hence to exhibit negative signs. The results of OLS estimation of equations (4) and (5) are presented in Table 2 (below).

Our barriers to survival statistic enters equation 2 with a negative and strongly significant sign. Moreover, the traditional barriers to entry measures maintain their earlier signs and improve their statistical significance while the proportion of inter-industry variation in entry rates of new firms explained by the regression improves substantially. These results suggest that the flow of entry is influenced both by the scale and capital cost barriers associated with initially establishing the capacity to supply (entering the industry by climbing a wall) and surviving after entry (crossing the minefield) and that these two influences are significantly independent.

The results of equation 3, meanwhile, suggest that the deterrent effect of these barriers to survival are magnified by the level of sunk investments which would have to be abandoned in the event of involuntary exit as well as the redundancy costs involved.

Barriers to survival appear to reduce the flow of entry most systematically when the industry is characterised by the need for investment in R&D to compete with incumbents and labour is unionized, a probable signal of redundancy costs (negative and significant coefficients on BTS*RD and BTS*UN).

Table 2: Single Plant Firm Entry (eni_i)Versus BTE and BTS

	Equation (2)		Equation (3)	
Variable	**Coefficient**	**t-Statistic**	**Coefficient**	**t-Statistic**
Intercept	0.028	2.750	0.020	2.100
SCALE	-0.066	2.477	-0.037	1.368
KCOST	-0.00006	2.143	-0.00002	0.629
ADV	0.001	2.507	0.002	1.442
GRO	0.006	1.416	0.013	2.569
BTS	-0.006	3.911		
BTS*RD			-0.001	3.060
BTS*UN			-0.007	2.228
BTS*ADV			-0.0005	1.234
BTS*KE			-0.0004	0.176
R^2	0.293		0.351	
Adj. R^2	0.253		0.286	

Barriers to survival in combination with the need to invest in advertising (BTS*ADV) also appear to have a negative impact on the number of entrants for any given industry population. Although this effect is of lower statistical significance it is of particular interest in the light of the frequent finding of a positive impact on entry. While our results confirm the overall entry attracting effect of advertising intensity, they also point to advertising acting as a sunk costs which deters entry when barriers to survival are high.

Capital intensity, although with a negative sign, is far from acceptable levels for a statistically significant result. This may suggest that capital intensity does little to increase the deterrent effect of barriers to survival, a finding which is consistent with the contention that the resale value of many capital goods allows allows a high proportion of initial investment to be recouped if a new entrant is forced to exit involuntarily during the first few years. On the other hand, its lack of significance may reflect the weakness of our proxy in ignoring cross-industry variations in discount associated with disposal of the particular capital goods involved (Kessides [1990]).

When these sunk cost effects are added in combination with the barriers to survival in equation (3), the significance of the traditional barriers to entry variables is substantially reduced.

Implications For Industry and Competitive Analysis

A key conclusion of our results is that the "threat of entry" faced by competitors in an industry is determined by two, at least partially independent, factors: barriers to entry and barriers to survival post-entry. Barriers to entry relate to an entrant's ability to establish the capacity to profitably supply the market immediately after entry, possibly in the face of instantaneous price attack by incumbents. Barriers to survival relate to the entrant's ability to maintain competitiveness over an extended period of time in the face of pressure for involuntary exit.

In a relatively few industries, high barriers to entry mean that actual entry rates are low and likewise the threat of entry is muted. In the majority of industries, however, barriers to entry are insufficient to deter significant numbers of entrants. In some markets this flow of entry results in established firms facing new and powerful, long-term competition. In other industries, however, entry has little or no sustained impact on rivalry because new entrants face high barriers to survival. Here, entrants lose the race for survival against incumbents who are intent on eliminating any attractive differentiation which entrants initially enjoy. Handicapped by lack of industry-specific assets, the new firms are unable to accumulate these fast enough to maintain a competitive edge against established firms who are able to exploit the benefits of assets like consumer franchises, distribution and service infrastructure and process experience built up through operating in the market.

These findings have important implications for analyses of industry structure, market attractiveness and business strategies where the "threat of entry" plays a role. They

suggest that we need to look well beyond traditional indicators like scale economies, capital intensity, and advertising intensity in assessing the likely practical impact of entry and threat of entry on a market. Competitive analyses need to closely examine new features of market structure, those which determine the barriers to survival which entrants face. These include market characteristics which indicate the need for industry-specific assets which are slow and costly to accumulate, such as customer loyalty, intimate knowledge of customer needs, specialised process experience and marketing and distribution infrastructure in order for a firm to compete effectively. In further work various general indicators such as purchase frequency, customer fragmentation, channel dependence and employee skill requirements have been shown to predict the level of barriers to survival (Williamson and Verdin [1992]). Perhaps even more importantly, however, the concept of barriers to survival can improve understanding of the real threat of entry on a case-by-case basis. Rather than simply measuring the height of the industry wall it directs analysts to consider the nature of the critical minefield beyond.

REFERENCES

Baldwin, J. R., and Gorecki, P. K., (1983), *Entry and Exit to the Canadian Manufacturing Sector: 1970-79,* Economic Council of Canada, Discussion Paper no. 225, February .

_____(1987), "Plant Creation Versus Plant Acquisition: The Entry Process in Canadian Manufacturing", *International Journal of Industrial Organization,* March, pp27-42.

Bain, J., (1956), Barriers to New Competition, (Cambridge: Harvard University Press).

Baumol, W.J., 1982, "Contestable Markets: An Uprising in the Theory of Industry Structure", *American Economic Review* **72**, pp1-15.

Dierickx, I., and Cool, K., (1989),"Asset Stock Accumulation and Sustainability of Competitive Advantage", *Management Science,* December , pp1504-1514

Duetsch, L., (1974), "Entry and the Extent of Multiplant Operations", *Journal of Industrial Economics,* June , pp477-487.

Dunne, T. , M.J. Roberts and L. Samuelson, 1989, "The Growth and Failure of U.S. Manufacturing Plants", *Quarterly Journal of Economics*, No. 4, pp 671-698.

Gaskins, D. (1971), Dynamic Limit Pricing: Optimal Pricing Under Threat of Entry", *Journal of Economic Theory*, 2, pp 306-322.

Gilbert, R. (1989), "The Role of Potential Competition in Industrial Organisation", *Journal of Economic Perspectives*, pp 107-127

Gorecki, P. K, (1975), "The Determinants of Entry by New and Diversifying Enterprises in the U.K. Manufacturing Sector 1958-1963: Some Tentative Results", *Applied Economics,* 139-147

Hamilton, R.T., (1985), "Interindustry Variation in Gross Entry Rates of 'Independent' and 'Dependent' Businesses", *Applied Economics,* 271-280

Highfield, R., and Smiley, R., (1987), "New Business Starts and Economic Activity: An Empirical Investigation", *International Journal of Industrial Organisation,* March 1987, 51-66

Hines, H. H., (1957), "Effectiveness of "Entry" by Already Established Firms", *Quarterly Journal of Economics,* 132-150

Hirschey M., (1981), "The Effect of Advertising on Industrial Mobility, 1947-72", *Journal of Business,* 329-339

Judd, K. and B Petersen , (1986), "Dynamic Limit Pricing and Internal Finance", *Journal of Economic Theory,* 39, pp368-399.

Kessides, I. N., (1986) "Advertising, Sunk Costs, and Barriers to Entry",*Review of Economics and Statistics,* pp84-95

Kessides, I. N., (1990) "Market Concentration, Contestability and Sunk Costs",*Review of Economics and Statistics,* **72**, pp614-622

Khemani, R.S., and Shapiro, D.M., (1986) "The Determinants of New Plant Entry in Canada", *Applied Economics,* Nov., pp1243-1257.

Kokkelenberg, E. C., and Sockell, D. R., (1985) "Union Membership in the U.S. 1973-1981", *Industrial and Labor Relations Review,* July , pp497-543

MacDonald, J. M., (1985), "Dun & Bradstreet Business Microdata", *Journal of Economic and Social Measurement,* 173-185

MacDonald, J. M., (1986), "Entry and Exit on the Competitive Fringe", (1986), *Southern Economic Journal,* pp640-652.

Mills, D. E., and Schumann, L., (1985) "Industry Structure with Fluctuating Demand", *American Economic Review,* September, 758-767

Modigliani, F., (1958), "New Developments on the Oligopoly Front", Journal of Political Economy, 66, pp 215-232.

Montgomery, C. A., and Hariharan, S., (1987), *Diversified Entry by Established Firms,* Northwestern Univ.: J.L. Kellogg Graduate School of Management & Univ. of Michigan:Graduate School of Business Administration, April , Draft.

National Science Foundation, (1978), *Research and Development in Industry,* Technical Notes and Detailed Statistical Tables, Washington D.C.

Orr, D., (1974), "The Determinants of Entry: A Study of the Canadian Manufacturing Industries", *Review of Economics and Statistics,* pp58-66

Phillips, B. D., (1985),*The Development of the Small Business Data Base of the U.S. Small Business Administration: A Working Bibliography,* November.

Porter, M.E., 1980, *Competitive Strategy,* (New York: Free Press)

Scherer, F.M., A Beckenstein, E Kaufer and R. Murphy, (1975), *The Economics of Multi-plant Operation: An International Comparisons Study,* (Cambridge, Mass.: Harvard University Press)

Scherer, F.M. and D. Ross, 1990, *Industrial Market Structure and Economic Performance*, 3rd ed. (Boston: Houghton Mifflin)

Shapiro, D. and Khemani, R.S.,(1987), "The Determinants of Entry and Exit Reconsidered", *International Journal of Industrial Organisation,* March , pp15-26

Sylos-Labini, P., (1962), Oligopoly and Technical Progress, (Cambridge, Mass.: Harvard University Press)

U.S. Department of Commerce, Bureau Industry Economics (1982), *Census of Manufactures,* (Washington D.C.: US Government Printing Office)

U.S. Department of Labor, Bureau of Labor Statistics (1979), *Capital Stock Estimates for Input-Output Industries: Methods and Data,* Bulletin #2034

U.S. Federal Trade Commission, (1976), *Annual Line of Business Report 1976,* Report of the Bureau of Economics, Washington D.C.

Williamson, P.J. and P.J. Verdin, 1992, "Age, Experience and Corporate Synergy: When Are They Sources of Business Unit Advantage?", *British Journal of Management*, Vol 3. pp1-16.

Yip. George S., (1982), "Gateways to Entry", *Harvard Business Review*, Sept-Oct., 85-92.