# What do we know about entry?

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**Abstract**

This paper is a brief survey of recent empirical work on entry. It is organized as a series of stylized facts and a series of stylized results which together summarize much of what is generally understood – or believed – about what drives entry, and about the effects that entry has on markets.

*Keywords:* Entry; Exit; Market dynamics

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## 1. Introduction

When theory-minded economists say that they 'know' something, they often mean that they have a model which has an equilibrium displaying certain features in common with that something. Economists who think this way know quite a lot about entry, particularly those who have moved beyond the simple limit price models of the 1950s and 1960s to the models of strategic competition which came into prominence in the 1970s and 1980s. On the other hand, more empirically-minded economists will only say that they 'know' something if that something is a well-documented fact or a robust, interpretable correlation. Economists who think this way have learned a lot over the last decade as large-scale, census-based tabulations of entry and exit flaws have become available. However, empirically-minded economists know less about entry than their theory-minded colleagues, and some of what they do know is a little surprising.

My goal in this essay is to try to summarize what empirically-minded

economists know about entry. Needless to say, not all of us know the same thing, and some of us know more than others. There is, however, a fairly solid core of knowledge about entry which I think is shared by most empirically-minded economists (and, of course, by many theory-minded ones as well), and what follows is my description of that core. I propose to proceed in three steps. In Section 2, I shall start out by discussing seven stylized facts about entry which emerge from simple tabulations of data on entry, or from case studies. This is followed in Section 3 by eight stylized results which seem to me to have a (more or less) solid basis of support in the empirical literature. Section 4 tries to pull all the pieces together by answering the question: "So, what do we know about entry?".

## 2. Some stylized facts about entry

Stylized facts can be a useful way of organizing one's thinking about phenomena of interest, giving a broad direction to theorizing and mapping out an agenda for empirical work. Needless to say, working with stylizations can be risky, and some stylized factors are softer than others. Keeping these caveats firmly in mind, there are at least seven stylized facts about entry which are worth highlighting.[1]

*Stylized fact 1.* Entry is common. Large numbers of firms enter most markets in most years, but entry rates are far higher than market penetration rates.

Comparisons of the Census of Production at three, four and five-digit levels usually reveals a large flow of firms into most markets. In the UK, for example, an average of between 18 and 96 new firms entered each of 87 three-digit manufacturing industries per annum over the period 1974 to 1979, with a range extending from zero to well over 100. The rate of entry (defined as the number of new firms divided by the total number of incumbent and entrant firms producing in that year) is typically also fairly high (it ranged from 2.5% to 14.5% in the UK), but the rate of entry penetration (gross sales by entrants divided by total industry sales) is usually much more modest (it ranged from 1.45% to 6.36% in the UK). The difference between entry rates and entry penetration arises from the fact

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[1] A fuller documentation of the data underlying stylized facts 1 to 5 for a variety of countries can be found in studies like Boeri and Cramer (1992) for West Germany; Hause and Du Reitz (1984) for Sweden; Mata (1993) for Portugal; the individual papers in Geroski and Schwalbach (1991), and in the cross-country comparison by Cable and Schwalbach (1991); Geroski (1991b, chapter 2) contains a more extensive survey of the material discussed in this section.

that entrants are much smaller than incumbents. Dividing entry penetration by the entry rate yields an estimate of the average size of entrants relative to that of all firms, and these ratios are usually fairly small (entrants averaged 33–50% of the average size of firm in the UK). To take a second example, over five-year census periods in the US between 1963 and 1982, for example, entry rates averaged between 41.4% and 51.8%, while the collective market shares of entrants ranged between 13.9% and 18.8% (see Dunne et al., 1988). All of this is consistent with the view that small-scale entry is relatively easy, but that large-scale entry is not.

*Stylized fact 2.* Although there is a very large cross-section variation in entry, differences in entry between industries do not persist for very long. In fact, most of the total variation in entry across industries and over time is 'within' industry variation rather than 'between' industry variation.

Rates of entry are rarely high or persistently low over time in particular industries, but, rather, entry seems to come in bursts that are not highly synchronized across industries. This is particularly true of entry penetration, which displays much lower partial and rank correlations across successive cross-sections than do entry rates, and (needless to say) it is more obviously true in the medium to long run than in the very short run. For example, correlations between entry rates across successive five-year cross-sections in the US varied between 0.6 and 0.8 (between rates of entry penetration, the same correlations were about 0.3). Nevertheless, only 43.2% of the total variation in entry rates was 'between' industry variation, and the percentage of 'between' variation in entry penetration was even lower. This observation is interesting because most other structural measures of industry competitiveness, which might be used instead of entry rates to describe the intensity of rivalry in markets, display very little 'within' industry variation: the level of market concentration differs across industries but these differences are extremely persistent over time, and entry barriers are stable, structural features of particular industries which (many people believe) do not vary much over time. The moral here may be that we ought to be more careful in distinguishing between 'stock' variables and 'flow' variables when describing market structures.

*Stylized fact 3.* Entry and exit rates are highly positively correlated, and net entry rates and penetration are modest fractions of gross entry rates and penetration.

The common view that entry occurs when super-normal profits are positive and exit when they are negative suggests that the number of firms in an industry should vary over time if a substantial amount of entry and exit

occurs in response to super and sub-normal profits. Further, entry and exit rates should be negatively correlated across industries (particularly over very short time intervals). This view is difficult to reconcile with the fact that a typical three digit industry in the UK gained an average of 50 new firms *per year* over the period 1974–1979 and lost an average of 38, experiencing a net entry rate of just over 1% and a negative net penetration rate of −0.42%. This pattern is commonly found in industries defined at the three and four-digit level in a large number of advanced economies: during the 1970s in Canada, for example, entry rates averaged 5% and exit rates averaged 6.5%, leaving a net entry rate of −1.5%. Further, the correlation between entry and exit in Canada ranged between 0.5 and 0.7 (see Baldwin and Gorecki, 1991a). In short, entry and exit seem to be part of a process of change in which large numbers of new firms displace large numbers of older firms without changing the total number of firms in operation at any given time by very much.

*Stylized fact 4.* The survival rate of most entrants is low, and even successful entrants may take more than a decade to achieve a size comparable to the average incumbent.

The mechanism of displacement, which seems to be the most palpable consequence of entry, affects young, new firms most severely. In the US, for example, the market share of each cohort of entrants over the period 1963–1982 declined by about 50% during its first ten years post-entry, largely because 61.5% of all entrant firms exited within five years of entry and 79.6% exited within ten years of entry (see also Dunne et al., 1989). In Canada, the hazard rate for the 1971 cohort of de novo entrants building new plants was about 10% at the end of one year, falling to between 5% and 7% per annum after a decade, some 1–3 percentage points above the hazard rate for firms which were established before 1971. The estimated average life of an entrant was about 13 years, and only 40.2% of the 1971 cohort of entrants were still alive in 1982. If one accepts the proposition that the barriers to entry facing small entrants are generally rather modest, then these observations suggest the existence of substantial 'barriers to survival' of some type. Alternatively, the data suggest that experience may be crucial determinant of survival rates, but that it is not quickly acquired. Further, there is some evidence to suggest that survival rates vary more across industries than entry rates (see Audretsch, 1991; Mata and Portugal, 1994; Wagner, 1994, and others).

*Stylized fact 5.* De novo entry is more common but less successful than entry by diversification.

It is not hard to believe that some types of firm are more likely to survive and prosper in their host markets than others, and, in particular, that having access to the deep pockets of a corporate parent operating in some other market can be an advantage to a new entrant. In the US, for example, entry rates for de novo entrants varied between 15.4% and 22.5% over five-year censuses between 1963 and 1982, while entry rates for diversifying firms creating new plants varied between 2.8% and 5.3.%. Entry penetration was between 6% and 9.7% for de novo entrants, and between 1.5% and 3.9% for diversifying firms. However, while the mean market share of each cohort of both types of entrant declined over time, those of diversifying firms showed a much smaller decline. They typically entered at a scale larger than the average incumbent, grew to a size of about 2.5 times the size of the average incumbent over ten years post-entry, and they were somewhat less likely to fail during their first five to ten-years post-entry than de novo firms were (there is, however, some evidence to suggest that diversified firms may close particular plants more readily than specialized firms).

*Stylized fact 6.* Entry rates vary over time, coming in waves which often peak early in the life of many markets. Different waves tend to contain different types of entrant.

The evidence which comes from studies of specific products or markets (and is usually not easy to discern at higher levels of aggregation) seems to suggest that entry has a major effect on markets only at certain times in the product life cycle. The clearest example of this was reported by Gort and Klepper (1982), who examined 46 products in the US over most of their life cycle. Starting from commercial introduction, many of these markets experienced rapid entry (averaging a net increase of about six new firms per year) over a period of about ten years, a levelling off of net entry, and then a contraction phase averaging about five exiting firms per year and lasting an average of about five years. For 19 products whose life had extended well into maturity, Gort and Klepper calculated that the number of producers eliminated through rationalization averaged 40% of the industry population. That the effects of entry are most marked at the birth of new markets is consistent with the fact that most markets are subject to enormous waves or bursts of entry in their early days: to take just a few examples, the UK aircraft industry had 200 producers in 1914, 771 in 1917 and 1529 in 1918 (Fearan, 1969); the UK car industry had 400 competing products prior to 1914 (Saul, 1962); the US car industry had at least that number offering a bewildering variety of different cars (e.g. Clark, 1983); and, finally, no less than 48 variants of the second-generation transistorized computer appeared in the five years following its first introduction in 1958 (Katz and Phillips, 1982).

These waves of entry early in the life of markets are often (but not always) ordered by industry of origin, with entrants following different routes into the market from vertically integrated sectors up or downstream, horizontally linked markets in other geographical areas or other sectors on a similar technological trajectory to the host market. For example, at least two generations of entrant appeared in the US computer industry (see Brock, 1975): the first were major business machine firms whose existing activities were threatened by the new technology (e.g. IBM, Remington, NCR, Burroughs), while the second were new, specialized firms interested in developing and exploiting the new technology (e.g. Philco, GE, CDC and DEC). Similarly, receiving tube producers (e.g. General Electric, RCA, Sylvania and others) were the first to colonize the US semiconductor industry, followed more slowly by other producers in the electronics sector, in-house producers and new high-tech specialists (e.g. Tilton, 1971).

*Stylized fact 7.* Costs of adjustment seem to penalize large-scale initial entry and very rapid post-entry penetration rates.

This proposition is a relatively recurrent feature of many case studies, and is almost certainly part of the explanation of the observations summarized in stylized fact 4 above. More direct evidence on costs of adjustment was uncovered by Biggadike (1976), who examined the experiences of 40 diversifying entrants in the US in the late 1960s and early 1970s. Most of these firms experienced major losses through their first four (and more) years of life despite reporting positive gross margins, largely because of high marketing and R&D expenditures (each of which averaged 40–50% of revenue). About a third of his sample achieved annual increases in market share of 50% or so (on average, entrants recorded no increase in market penetration over their first eight years of life), but these firms were (on the whole) of very modest initial size. The 10% of the sample that lost market share typically had very large initial sizes. Further, those firms whose market shares increased fastest typically suffered short-run erosions in their rate of return of the order of 35 percentage points or so (this may also reflect penetration pricing strategies, or investments in learning by doing).[2]

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[2] Also consistent with stylized fact 7 are unpublished tabulations tracking the life experiences of new establishments in the UK during the late 1970s and early 1980s which have suggested (rather unusually) that smaller entrants (less than 99 employees) had rather higher survival rates (about 70%) than larger entrants (more than 500 employees, with survival rates of 60%). Further, smaller entrants expanded in size over their first five years post-entry (by between 8% and 20%) while larger entrants contracted (by between 11% and 26%). The ratio of the average initial size of surviving firms (over five years) to that of failures varied between 43% and 80%.

## 3. Some stylized empirical results

Facts are facts, hard and clear, but stylized facts are inevitably a little fuzzy at the edges. Stylized results are even more murky. At best, they reflect robust associations between variables of interest, and they can be useful in providing a rough stylization of the relationship which seems to exist between these variables. However, in many circumstances it is difficult to ascertain just how robust stylized results really are, and, in any case, because they are something of an average, stylized results can be very imprecise. Keeping these caveats firmly in mind, there are (at least) eight stylized results which seem to have emerged from the empirical literature on entry.[3]

*Stylized result 1.* Entry seems to be slow to react to high profits.

There are a number of empirical models which have been used in the literature to account for variations in entry rates across industries (and, less frequently, over time). Virtually all of these presume that entry will be proportional to expected post-entry profits defined net of the costs of entry. A typical (and particularly simple) example of this kind of model is

$$E = \beta \{ \pi^e - F \} + \mu , \qquad (1)$$

where $E$ is entry into some industry at some particular period of time, $\pi^e$ is expected post-entry profits, $F$ is the costs of entry (including absolute cost or product differences between entrants and incumbents), and $\beta$ is an unknown parameter which measures the speed of entry in response to profitable opportunities. Expected post-entry profits have typically been proxied by lagged profitability (or, even less satisfactorily, by using observables like current period growth rates or industry concentration which are thought to be important determinants of profitability), while $F$ has usually been proxied as a linear function of a number of observable proxies for barriers to entry (like capital intensity, advertising intensity, minimum efficient scale, and so on). $F$ is interesting because it measures the level of profits at which entry is cut off (often called the level of 'limit profits'), and, as a consequence, (1) is often used to generate estimates of the height of barriers to entry overall (as well as to assess the importance of particular barriers to entry).

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[3] Much of what follows is drawn from surveys of the empirical work in Geroski (1991b, chapters 3 and 4), Cable and Schwalbach (1991), and Evans and Siegfried (1994). The model of entry discussed in Eq. (1) was first used by Orr (1974), and has been extended and developed by Geroski (1991b) and others.

Much of the work using (1) has proxied $\pi^e$ by using lagged profitability, and most of the estimates of $\beta$ which have been reported in the literature are rather small and imprecisely measured. Read literally, they suggest that differences in profits between industries would have to be much larger than we typically observe them to be to account for observed inter-industry differences in entry. This is a puzzling result which some have claimed to be inconsistent with the theory that entry depends on expected profits. It may, however, simply be a consequence of mis-measuring expected post-entry profits (or entry costs, $F$). A small amount of work has been reported using extrapolative or rational expectations predictors of $\pi^e$, and these studies almost invariably produce much larger and more precise estimates of $\beta$ (which is exactly what one would expect if pre-entry profits measured $\pi^e$ with error). Small and imprecisely estimated values of $\beta$ may also be a consequence of specification error, since most of these studies are cross-sections which (implausibly) assume that $\beta$ is the same in all industries. Nevertheless, the response of entry to expected profits does seem to be fairly slow, and this is a conclusion which is not dependent on the use of (1): Bresnahan and Reiss (1988) also observed a very slow response by entrants to profitable opportunities using a rather different model, and numerous case studies suggest similar conclusions (e.g. Caves et al., 1991).

What may also lie behind this result is a rather odd statistical incongruence between industry profitability and entry. Differences in profitability between industries are extremely stable and persistent (much the same applies to differences in profitability between firms), meaning that most of the variation in profitability across industries and over time is 'between' industry variation. Entry, on the other hand, varies much more over time and differences in entry rates between industries are unstable and do not persist for very long. This means that entry exhibits far more 'within' industry variation than profits do. For example, in the UK between 1970 and 1979, 80% of the total variation in average industry price–cost margins across three-digit industries and over time was 'between' industry variation, while only 24% of the total variation in entry rates over the period 1974–1979 was 'between' industry variation. That is, profit differences between industries are relatively stable over time, while differences in entry rates between industries at any one point of time do not persist for very long. The consequence of this statistical incongruence is, of course, that cross-section correlations between entry and average industry profitability are likely to be weak and unstable over time. To explain profitability, one needs to identify stable structural features of markets that vary across industries but not over time (barriers to entry seem to be an obvious candidate in this context); to explain entry, one needs to identify much more transitory, time-varying features of markets that do not necessarily differ across industries.

*Stylized result 2.* Econometric estimates of the height of entry barriers suggest that they are high.

Broadly speaking, the results reported in studies of the determinants of entry which use (1) or similar models suggest that $F$ rises in industry advertising intensity, capital intensity and minimum efficient scale (frequently measured by the median plant size of the industry), and falls with industry size and (less clearly) industry growth.[4] This pattern of results is widely interpreted as suggesting that advertising and capital-raising requirements are important barriers to entry, and that scale economies inhibit entry in small, shrinking markets. It is now widely recognized that fixed costs must be sunk if they are to deter entry credibly, and some progress has been made in adjusting estimates of the stock of assets such as machinery, building and advertising goodwill for depreciation and for their resale value (see Kessides, 1986; Mata, 1991; Sutton, 1991). These sunk cost proxies 'work' in the sense of being correlated with entry rates, but it is not evident that they much affect the pattern of correlations or overall fit achieved by these models of entry. Finally, industry concentration levels are frequently included in these regressions, but display mixed and often rather imprecisely estimated effects on entry. This is slightly surprising: it is generally argued that firms in highly concentrated markets are more likely to overcome the free-rider problem associated with deterring entry (which is that only one firm needs do it, but all will benefit) and, therefore, most scholars expect to uncover a negative correlation between concentration and entry.

A few estimates of the height of 'limit profits' have appeared in the literature. Limit profits are defined as the value of $\pi^e$ at which $E$ goes to zero in (1), and they are, therefore, dependent on the size of the estimated value of $F$. Masson and Shaanan (1982) calculated that the level of limit profits was 8.4% (where $\pi^e$ was measured as a return on equity) on average across a sample of industries in the US in the late 1950s, while Geroski (1991a) estimated limit profits to be in the range of 15–20% (where $\pi^e$ was measured as a price-average cost margin) for a sample of industries in the UK in the late 1970s. Both of these studies suggest that the height of limit

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[4] Empirical work using other (generally more sophisticated) models of entry has produced results generally consistent with those cited in the text. Bresnahan and Reiss (1988), examined market size as a determinant of entry, establishing limits to the range of market sizes which are populated by monopolists, duopolists and so on for a range of professional services. Hause and Du Reitz (1984) uncovered a positive but non-linear relation between entry and market growth, and between the variability of entry and growth. Geroski and Murfin (1991a, 1991b) examined the link between advertising and entry, identifying a positive correlation between entry and the advertising share claimed by entrants, and a negative correlation between the total advertising done by incumbents and entry; Kessides (1986) also found pro and anti competitive effects of advertising on entry.

profits varies considerably across industries. Estimates like these imply that, on average, incumbents are able to maintain prices well above their average costs in the long run, without attracting serious competition from new entrant firms.

*Stylized result 3.* Entry rates are hard to explain using conventional measures of profitability and entry barriers.

Virtually all of the regressions designed to explain variations in entry across industries and over time have reported very low $R^2$s (even by the standards of inter-industry cross-section regressions), indicating that only a very modest amount of the variation in entry across industries in a single year has been accounted for by use of a model like (1). The usual proxies for $\pi^e$ and those for $F$ often have very little times series variation (industry growth rates being the most notable exception to this rule), and this means that the degree of explanation achieved in studies of entry over time is often more disappointing than that achieved in cross-section studies. Even panel data models which use fixed effects to make a relatively complete correction for variations in fixed entry costs across industries produce quite low $R^2$s. Although autoregressive models of entry suggest that previous entry deters current entry, these models do not provide much of an improved fit over equations like (1). It follows, then, that transitory variations in the unobserved factors summarized by $\mu$ seem to account for far more of the variation in entry than variations in observables which proxy expected post-entry profits, $\pi^e$, or entry costs, $F$.

*Stylized result 4.* Entry seems to have only modest effects on average industry price–cost margins.

Entry has traditionally been thought of as an error-correction process, occurring when excess profits are high and causing them to fall subsequently. This view carries a fairly strong implication for the dynamics of market performance, namely that profits are likely to be autocorrelated over time: high profits will be bid down by entrants until they reach a long-run equilibrium level which depends, inter alia, on the height of entry barriers (e.g. see Geroski and Jacquemin, 1988). A rather large literature has grown up estimating 'persistence of profits' regressions which are, effectively, first order autocorregressions of profitability (measured in various ways). There is a wide measure of agreement across these studies that the short-run dynamics of profits are fairly smooth, and that profits are not equalized even across firms within the same industry in the long run (e.g. see Mueller, 1986, 1990). Profit differences are very stable over time within and between industries. Similarly, structural models which track the effects of entry on

profits which occur through entry-induced changes in the market share of incumbents find that entry has only modest effects on profits (e.g. Geroski, 1990; Jeong and Masson, 1991, and others.)[5]

*Stylized result 5.* High rates of entry are often associated with high rates of innovation and increases in efficiency.

The effects of entry may actually be more profound than just correcting displacements from static equilibria, since entry may also stimulate growth and development in markets. Numerous case studies have suggested that entry is often used as a vehicle for introducing new innovations (frequently because incumbents are more interested in protecting existing rents than in seeking out new profit opportunities), and many show that entry often encourages incumbents to drastically cut slack from their operations (this is particularly the case in newly deregulated industries). More formal statistical analyses of these phenomena are, however, rather rare. Acs and Audretsch (1990) and Geroski (1989a) have documented positive correlations between entry and innovation rates, while Baldwin and Gorecki (1991b) compared the productivity of new entrants and existing firms and observed that entry accounted for about 24% of productivity growth of the typical Canadian industry. Geroski (1989b), uncovered correlations running from both entry and innovation to productivity growth rates in a sample of UK three-digit industries, concluding that the effects of foreign-based entry were much smaller than those originating from domestic entry or, even more clearly, innovation. Needless to say, if entry or the threat of entry is a major determinant of innovative activity, it is likely to be difficult to entangle the respective contributions of the two in stimulating productivity and reducing costs. It is also worth noting that high correlations between entry and innovative activity do not imply that entrants are always, or even often, the major source of innovation in markets. Many case studies show that entry stimulates incumbents to introduce new products and processes which they had been holding back.

*Stylized result 6.* The response by incumbents to entry is selective.

Monopoly pricing is built upon the creation of an artificial scarcity: output

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[5] Of course, modest variations in profits associated with entry are consistent with the proposition that entry can have large effects on prices if it leads incumbents to cut their costs savagely, and a number of case studies indicate that the response to entry can often be a tightening of belts. Further, work using accounting measures of profitability may not reveal much useful information about economic profits, although persistence of high accounting profits is consistent with persistently high economic profits (see Edwards et al., 1987).

is restricted by the monopolist and buyers bid up prices. The basic entry deterrence problem which incumbents must solve is that of preserving scarcity without undermining the high prices which it creates. Limit pricing illustrates many of the major issues involved. Incumbents using this strategy choose higher than monopoly output levels pre-entry in the hope of deterring entrants. If economies of scale require entrants to achieve at least a minimum market share, and if they believe that incumbents will not change their pre-entry output levels post-entry (this is the 'Sylos Postulate'), then a judicious choice of pre-entry output levels by the incumbent will ensure non-positive post-entry profits for the entrant. The strategy makes sense for incumbents if the loss of profits pre-entry (relative to monopoly profits) exceeds the present discounted value of the entire stream of post-entry profits (relative to what incumbents would have earned if entry had occurred), a calculation which turns on the speed with which entrants penetrate the market, on market growth, on the likelihood of future entry and, perhaps above all, on the height of entry barriers. If barriers to entry are high, firms will not have to set a limit price much below monopoly levels to deter entry (entry will be 'effectively impeded' in the terminology of Bain), while if barriers are low then the market is effectively competitive (or contestable) and the right strategy for incumbents to follow is to reap the maximum monopoly profits they can in the short run (entry is 'ineffectively impeded'). The major problem with this limit price strategy is that of credibility. While it may make sense to threaten to produce relatively high levels of output, an incumbent faced with the actual fact of entry will wish to restrict output (jointly with the entrant) post-entry. That is, the threat to maintain high pre-entry output levels indefinitely in the post-entry future may not be persuasive to a sophisticated entrant.

In fact, the evidence from a number of studies suggests that the immediate response of incumbents to entry is, at best, selective.[6] Of the sample of diversifying entrants studied by Biggadike (1976), 46% perceived no response by incumbents to their entry whatsoever, while almost none of the entrants studied by Yip (1982) and by Robinson (1988) attracted a response from incumbents. Similarly, Cubbin and Domberger (1988) studied entry into 42 advertising-intensive UK industries, and observed a change in the advertising behaviour of incumbent firms timed with entry in 40% of their sample. Smiley (1988) questioned 293 US firms, finding that nearly half felt decisions about responses to entry were as important as other

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[6] The case study literature is replete with examples of incumbents attacking entrants in a variety of ways using a variety of tools (see Geroski, 1991b, chapters 4 and 5, for a survey). However, since most of these cases were chosen as subjects of study precisely because they illustrated interesting examples of strategic entry deterrence, this body of literature is not very informative on whether (and how) incumbents typically try to deter entry.

types of strategic decisions, while 40% of the respondents in a similar survey done in the UK said that they would frequently take no action against an entrant (Singh et al., 1991). Cubbin and Domberger found responses to be more likely in static markets dominated by a single firm, and Bunch and Smiley (1992) found them to be more likely in highly concentrated markets where barriers to entry are not too high.

Interpreting these findings is a little tricky. Although, on the face of it, the evidence suggests that the Sylos Postulate describes a typical response to entry, the obvious alternative hypothesis is that incumbents ignore entrants (at least until they are well established). This hypothesis also predicts that incumbents will not change their output (or, say, their advertising) post-entry from levels that prevail pre-entry and it is, therefore, hard to distinguish empirically from the Sylos Postulate. The problem is that the Sylos Postulate describes what is, in fact, a fairly aggressive response to entry, but one that occurs prior to entry. Without knowing whether pre-entry behaviour involves some pre-exemption of entrants, it is impossible to decide whether no apparent response to the fact of entry arises because incumbents take an aggressive or a passive stance towards new competitors in their markets.

*Stylized result 7.* Prices are not usually used by incumbents to block entry.

There has been a long tradition of theorizing about the effects of entry, and it has, for the most part, focused on the effects that entry has on prices (and, therefore, on profits, all else held constant). Early contributions to this tradition focused on pre-entry limit pricing designed to block entry, a theme which has re-emerged in the recent contestability literature. Other contributions have concentrated on studying what is sometimes referred to as 'dynamic limit pricing', meaning the post-entry regulation of prices to slow entry.

In fact, the evidence suggests that price is not frequently used by incumbents to deter entry, but that marketing activities are. Of Biggadike's sample of entrants, 93% noted price cuts of less than 5% attendant upon entry, but 32% did perceive a rise in marketing expenditures post-entry (similar to the 40% figure found by Cubbin and Domberger). Incumbents' capacity rose by less than 10% in almost all cases. Of Smiley's respondents who were defending new markets, 32% indicated that they used advertising frequently, 31% used R&D and patent protection frequently, and almost none used excess capacity or learning curve strategies. Learning curve strategies, space packing (i.e. filling all viable market niches with a customized version of the basic product) and hiding profits were, however, used by between 25% and 30% of the respondents defending existing or established markets, while only 7–11% of them used either R&D or pricing

strategies to deter entry. The UK survey by Singh et al. (1991) found a similar reliance on R&D, but a rather weaker reliance on the use of advertising to deter entry (possibly because UK firms typically advertise heavily to launch products, but advertise much less heavily thereafter). Pricing and the strategic use of capacity to deter entry were used rather infrequently, but the strategic use of distribution systems and the practice of signing long-term contracts with buyers were both considered to be important in both the US and the UK.[7]

The apparently heavy use by incumbents of marketing-related responses to entry is reminiscent of old and familiar arguments which suggest that advertising may be an important barrier to entry. This has always been difficult to accept conceptually, not least because advertising is hardly an exogenous structural feature of markets and it sometimes appears to facilitate entry. Nevertheless, there seems to be little doubt that heavy advertising makes entry more difficult for many new firms. It is certainly the case that advertising can inflate the fixed costs faced by entrants or second movers (e.g. see Alemson, 1970; Brown, 1978; Schmalensee, 1978; Urban et al., 1984; Geroski and Murfin, 1991a, and others), and its effects are often complementary with that of some other strategic choice variable such as product quality (see Leffer, 1981; Rizzo and Zeckhauser, 1990).

*Stylized result 8.* Both firm size and age are correlated with the survival and growth of entrants.

One of the clearest features of the data on entry discussed in Section 2 above is that most entry results in exit, first by recent entrants and then, in all likelihood, by the current entrant itself. This raises the interesting question of what it is that determines which entrants survive, and for how long. One view is that turnover and displacement are a by-product of the process by which firms attempt to transform their activities in the face of environmental challenges. Since the process of information acquisition is costly and time consuming, many new entrants are likely to under-invest in information gathering. Further, to the extent that market opportunities change post-entry, the types of actions which entrants need to undertake in order to survive and prosper are also likely to change. The implication is that the growth and survival prospects of new firms will depend on their

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[7] For work that has tried to test for the presence of limit pricing (and, in general, has produced somewhat ambiguous results), see Hannan (1979); Masson and Shaanan (1982), Sengupta et al. (1983); Yamawaki (1985); Lieberman (1988); and others. Studies of the strategic use of excess capacity to block entry have also generally produced weak and fairly unpersuasive evidence on its importance; see Lieberman (1987); Hilke (1984); Masson and Shaanan (1986); Reynolds (1986); and others.

ability to learn about their environment, and to link changes in their strategy choices to the changing configuration of that environment. The slower is the process of learning and the more turbulent is the market environment, the more likely it is that firms will fail to cope.[8] If the process of entry continually throws up new aspirants for market places, then slow learning coupled with a turbulent environment means that high entry rates will be observed jointly with high failure rates.

Selection criteria based on learning abilities are extremely difficult to collect systematic empirical evidence on, mainly because it is difficult to link the accumulation of knowledge or experience with easily observable characteristics of firms. However, several studies have documented a clear positive correlation between survival rates and both age and firm size for small firms (see Evans, 1987; Hall, 1987; Audretsch and Mahmood, 1995; Dunne et al., 1989; Mata and Portugal, 1994; Wagner, 1994, and others). These results are loosely consistent with the view that learning (measured by chronological age) and the accumulation of basic competitive assets or skills (quite imperfectly reflected by firm size) may be an important part of the explanation of which entrants survive and which ones fail. These results are also interesting because they suggest that the growth patterns of small and large firms differ. As is well known, the growth rates of well-established corporations are, roughly speaking, random (for some recent work and references, see Geroski and Machin, 1993), and do not seem to vary in any stable or systematic way with firm size (although large firms often exhibit a lower variance of growth rates over time than smaller ones).

## 4. So, what do we know about entry?

Perhaps the most striking thing that we know about entry is that small-scale, de novo entry seems to be relatively common in most industries, but that small-scale, de novo entrants generally have a rather short life expectancy. That is, entry appears to be relatively easy, but survival is not. The most palpable consequence of entry is exit, and industries that exhibit high entry rates often also exhibit a high degree of churn at the bottom of the size distribution. Since entry is easy but survival is not, it is not difficult

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[8] A distinction is often made between 'active' and 'passive' learning in this context (see Jovanovic, 1982; Ericson and Pakes, 1987a,b, and others). Passive learning arises when pre-entry strategy choices are fixed, and profit realizations enable firms to discover whether they have made the right choice (in which case they survive and prosper) or not (in which case they exit). Active learning arises when firms change their pre-entry strategy choices in response to market feedback. It is extremely difficult to distinguish empirically between these two learning processes in the absence of direct observations of the corporate learning process.

to believe that the response by most incumbents to entry is likely to be rather selective. If most entry attempts are doomed to failure and if most entrants take five or ten years before they are able to compete on a par with incumbents, then few incumbents will find that costly attempts to deter entry at or before the time it occurs are profitable. What is more, the fact that many entrants fail and surviving entrants require five or ten years to reach a competitive par with incumbents suggests that the short-run effects of entry are likely to be much less than the long-run effects. Most of the techniques used in the empirical research discussed above are better at measuring short-run than long-run effects associated with entry, and, as a consequence, it is not too surprising to find the literature suggesting that entry has only modest effects on profitability.

The puzzle in all of this is that most estimates of barriers to entry suggest that they are rather high. There are, of course, a number of reasons for thinking that estimates of entry barriers are often biased upwards, and overstate the difficulties which face truly innovative firms seeking to enter a new market. Nonetheless, it is a little difficult to reconcile high entry barriers with high entry rates, not least because entry barriers are commonly thought of as an obstacle which prevents firms from entering a market. If, however, barriers to entry are thought of as an obstacle which prevents new firms from surviving long in a market, then the data present less of a puzzle. In this alternate view, barriers to entry appear similar in character to costs of adjustment, and they are particularly pressing for those entrants who have only a limited time in which to prove themselves. What results is a kind of a time-cost trade-off, in which entry is more expensive (for a given level of entry barriers) the more quickly an entrant attempts to penetrate the market. If this is indeed the case, then the nature of entry barriers means that entry contests may take on the character of a war of attrition.

We also know that entry can be episodic in character, playing an important role in shaping industry structure in certain phases of the product life cycle and a more minor role at other times. Furthermore, the role that entry plays in shaping industry structure seems to be bound up with the fact that entry is often used as a vehicle for introducing new innovations (particularly in early phases of industry evolution), while the absence of entry is often associated with technological stagnation (particularly in mature phases of industry evolution). It is worth speculating a little on what might underlie these associations.

New products based on new inventions or innovations are often supply driven, following a 'technological trajectory' which continually opens up new possibilities for developing new products and new processes (e.g. see Rosenburg, 1974; Dosi, 1988). The more important of these can form the basis of a new market. However, the characteristics of a supply-driven new

product must be matched to the needs of potential users if a market for it is going to develop. Consumers must learn about the new product and what to use it for, and, in the process, they come to discover which of its characteristics are of most value. This learning by experimentation can occur through a comparison of the new products which appear in the market, and, almost by definition, entry is the major source of this proliferation of new product varieties. That is, entrants are often important in the early evolution of a market because they provide the grist from which the mill of selection eventually produces a product (or product range) valued by consumers.

However, at some point in the development of a new market, consumer preferences become reasonably well formed and coalesce around a small subset of products (or a 'dominant design') containing a particular range of attributes. At this stage of industry development, competitive rivalry often shifts from competition between competing product designs to competition based on prices and costs to supply a particular design. Early movers rush to exploit economies of scale and trundle down the learning curve; distribution systems are set up, and marketing campaigns try to create brand loyalty and lock in buyers in a variety of ways. New entrants are often at a severe disadvantage in this type of competitive process (which tends to create high entry barriers based on scale economies, absolute cost advantages and product differentiation advantages), and, as a consequence, their role in shaping industry structure and affecting industry performance is much diminished. As long as entry barriers remain high, this will almost certainly remain the case. However, exogenous shifts in costs or demand undermine entry barriers, and, when incumbents fail to exploit these exogenous changes (say because the required innovations would be rent-displacing), entry is likely to re-emerge as an important determinant of industry structure and performance.

What all of this adds up to is a presumption that entry is generally a poor substitute for active rivalry amongst incumbent firms in a market. Entry can be (but is not always) too slow, too small scale and too erratic to matter much in many circumstances. Although the current anti-trust emphasis on entry barriers as the important determinant of market structure is welcome (and long overdue), it is nevertheless the case that the pro-competitive effects of entry seem to be easy to exaggerate. While we know that entry can be an important influence on the evolution of industry structure and performance, we also know that it is so only selectively. Further, entry seems to play an important role in stimulating industry evolution at precisely those times when the current activities of incumbent firms are most out of line with exogenous changes in costs and demand. In short, not only is entry an (imperfect) mechanism for getting prices right in markets, it is a mechanism for getting product and process specifications right.

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