COMPETITIVE ENTRY INTO LOCAL EXCHANGE MARKETS:
SURVEY OF STRATEGIC MODELS AND ECONOMETRIC TESTS

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Entry has important consequences for the structure and performance of an industry. The resurgence of research on entry over the last decade has focused on strategic aspects. A number of superb surveys have summarized the progress in this area (Geroski et al., 1989; Tirole, 1989; Wilson, 1987). While this paper attempts to collect together much of the same research, I concentrate on the application of strategic models to the realities of local exchange markets.

I can only hope to cover a fraction of this material, and so several important issues are skipped. The relationship between regulation and entry receives scant attention, in part because of the shortage of contributions in this area. I have also chosen not to delve into the extensive and increasingly arcane literature on entry under asymmetric information. Though clearly a factor in local exchange markets, uncertainty takes second place in importance behind such network features as the sunkness and lumpiness of investment, and scale and scope economies.

Presentation of the material is informal. In no way, however, is the sophistication of the supporting research compromised. The survey is organized around seven research questions. Several descriptive questions focus on the interaction between entry and the actions of incumbents, entrants and regulators. A couple of policy questions address the normative role of government in controlling entry. Finally, I review the limited research on empirical questions using strategic models.

*Work on this paper was undertaken in parallel with the research commissioned by the California Incremental Cost Task Force. Several issues regarding competitive entry into local exchange markets arose during the course of this project. In response, a workgroup that included Professor Robert Meyer of the University of California, Berkeley, Bridger Mitchell and Ed Park of The RAND Corporation, and myself conducted a preliminary investigation into these issues. No final report materialized out of our sessions, but this paper draws on those discussions and considerably extends our coverage of the entry literature.
THE ENTRY GAME

Bain (1956) was the first to carefully study the entry phenomenon. His approach drew on the Structure-Conduct-Performance paradigm pioneered by Mason (1939). The modern approach modifies this paradigm relying heavily on the concepts of game theory to capture the strategic interaction among firms.

The basic model starts with one or more established firms, and one or more potential entrants. Assuming incumbents and entrants are large, each one’s returns depend jointly on decisions of its rivals. For this reason their interaction is treated as a “game of strategy.”

Incumbents make their business decisions so as to maximize shareholders' return—fully aware of the threat to profits posed by new entrants. Potential entrants forecast the returns to entering the business, keeping in mind the likely responses of the incumbent. In equilibrium these expectations determine if and to what extent entry will occur.

Incumbent moves first:

- **Builds capacity and makes other investments**
  
  Before production, an incumbent must make certain investments such as ordinary plant and equipment. It also spends on advertising, research and development, and other forms of nonphysical capital.

- **Selects products**
  
  At some time before or after investments are made, the incumbent chooses which products and services it will deliver to the market. I adopt the distinction between *vertical* and *horizontal* product differentiation.

  Products are vertically (or quality) differentiated when they offer different amounts of the same characteristic. Horizontal differentiation refers to products that have different mixes of characteristics. For instance, a chardonnay and a cabernet sauvignon are horizontally different wines, while a given varietal may be vertically ranked by region and vintage.

  In telecommunications, horizontal positioning of a service could amount to geographic availability, time of day, and so on. Vertical positioning might involve varying degrees of service reliability or signal clarity.

- **Sets prices**
  
  In simple models, the good or service is homogeneous and the firm sets a uniform price. Given the option, the firm may wish to offer service according to a nonlinear tariff. If there are multiple goods—or a single good that is
vertically differentiated—then a rate structure must also be decided. Firms may choose to bundle several elementary products together. These packages may be the sole means to obtain certain services, or they may be offered along with individual services.

- **Entrant estimates the profitability of entry**

- **Observes current industry conditions**

To assess its prospects, a potential entrant first gathers information on current industry conditions. Crucial are the industry structure (number and size distribution of firms), its competitive practices (price or quality competition), and the existing regulatory institutions (rate regulation).

- **Forecasts post-entry equilibrium**

A forward-looking entrant will realize that current conditions need not persist. It attempts to predict how fiercely the incumbent will respond to its arrival. It must seriously question the wisdom of entering if it foresees an episode of cut-throat competition. Just the reverse will be true if the incumbent welcomes the new entrant into a cartel-like arrangement.

Naturally, the entrant's forecast relies on partial information, especially if it depends on cost and demand conditions facing incumbents. At a minimum, the entrant must form expectations regarding relevant parameters.

- **Compares expected profits against entry/exit costs**

Next the entrant weighs its forecasted profits against any unrecoverable expenses it must incur to enter the industry. Entry costs include any sunk costs in plant and equipment, specialized R & D, and nontransferable licenses. Costs of exiting the industry include breach-of-contract penalties, binding severance payments to workers, and any decommissioning costs or legal fees associated with abandonment.

The new firm will proceed to enter if the expected post-entry profits exceed the entry/exit costs. Others will follow until the next firm considering entry anticipates a loss.

**Standard Cournot Model**

The most popular framework to study the entry game is adapted from Cournot's (1838) model of duopoly competition. Rather than two actual competitors, one firm is already established while the other is a potential competitor. Should entry occur, the two firms compete over quantity, with price adjusting to clear the market. By assumption, each firm takes the other's output level as given.

Early approaches using the Cournot assumption fell into two categories. First, Modigliani (1958) and Sylos-Labini (1962), following the work of Bain, assumed the incumbent was aware of the possibility of entry and its effects. In turn, the entrant believed that the incumbent would produce at the same level before and after entry, so that it ignored its impact on industry equilibrium.
Alternatively, established firms could completely ignore the prospect of entry. Equilibrium output levels are achieved for a given number of incumbents. Then entry occurs and the industry adjusts to the additional firm. This approach produces a sequence of Cournot equilibria as each new firm is added, provided it makes positive profits.

Notice a basic asymmetry in behavior on both approaches. Actual competitors take each others' actions as fixed, beyond their control. However, when calculating its response to potential entrants, the incumbent assumes the position of a leader. Whether or not it expects an entrant to produce, the incumbent believes the entrant will react to its move. The implications of this asymmetry will become clear when I turn to strategic deterrence.
1. HOW IS THE INDUSTRY AFFECTED BY NEW ENTRY?

EFFECT ON PRICES AND QUANTITIES

Industry production expands, per-firm output falls

Intuitively, constant replication of Cournot firms expands industry output. Ruffin (1971) derived this formally under the condition that (market) marginal revenue falls quickly relative to marginal costs. At the same time, he showed that each firm produces a smaller absolute amount, and hence, its market share necessarily falls.

Prices fall to the competitive level

Expanded industry output pushes down market price. If all firms have the same cost function, Novshek (1980) gives conditions that guarantee the existence of a zero-profit equilibrium. Furthermore, he shows that the equilibrium approximates the competitive outcome.

Prices tend toward Ramsey prices

In a startling result, Baumol, Bailey and Willig (1977) discovered that an endless stream of new entrants is not needed to induce good industry performance. They show how the mere threat of hit-and-run entry induces the incumbent to adopt second-best prices even when it is natural monopoly. To prove this "invisible hand theorem," they require that firms share a common technology and sequentially choose price with customers flocking to the low-price supplier.

EFFECT ON INVESTMENT

Capacity expands

The industry's expanded output will generally require additional capacity. Moreover, each firm's capacity will expand to accommodate its additional production. Of course, there will be little need to expand capacity if a significant proportion of capital stock is currently idle. This is more likely if capacity comes in indivisible lumps.

Cost-reducing effort ambiguous

Unlike investment in conventional plant and equipment, the returns to R & D may spill over from one firm to another. Without any legal sanctions, perfect competitors—incumbents and entrants alike—will quickly adopt an innovation and slash prices down to cost, weakening R & D incentives.

When an innovation receives some protection, the conclusions change. Arrow (1962) demonstrated that a profit-maximizing inventor could earn more by licensing a cost-reducing invention to a competitive industry than to a monopolized one.
Reinterpreted, Arrow’s result suggests that barring entry will lower R&D expenditures. In contrast, Gilbert and Newbery (1982) argue that a monopoly incumbent can bid more for the innovation than a new entrant, since it stands to lose more in profits than the entrant can gain.

IMPACT ON PRODUCT CHOICE

Quality change is ambiguous

The impact of entry on product quality is indeterminate. To begin, models of vertical differentiation demonstrate repeatedly that, compared with the competitive solution, a monopoly may produce higher or lower quality. It depends on cross-elasticities between price and quality in both demand and cost.

With sufficient dispersion of consumer tastes and incomes, Shaked and Sutton (1985) find that oligopoly will naturally emerge in equilibrium, with firms producing different grades of the good. In this context, whether the market delivers higher quality under duopoly than under monopoly is not meaningful.

Variety may increase or may stay the same

The threat of new entry may cause an incumbent to expand its product offerings. Schmalensee (1978) and others showed how products tend to proliferate as entrants attempt to position themselves between existing offerings. In a model without any spatial orientation of products, Dixit and Stiglitz (1977) also concluded that free entry supported an excessive number of products relative to the social optimum, but for different reasons.

Two forces push in opposite directions. New products garner only a portion of the social surplus they create, yet they tend to siphon off competitors’ profits. In the first case, too little reward is offered for new product introductions, and in the latter, too much.

When new products simply imitate existing ones, no change in variety comes about. Judd (1985) notes a tendency for firms to avoid imitation in equilibrium. As long as exit costs are small, an incumbent will retreat when one of its products is threatened by an entrant. Meeting the entrant head on will dissipate much of the profit it had previously earned, and the lower prices will carve into profits of monopolized substitutes.
2. HOW MIGHT INCUMBENTS DETER ENTRY?

Bain's classification of the effectiveness of entry deterrence is useful. At one extreme monopoly may fail to attract any entry whatsoever: we then say that entry is "blockaded." At the other extreme, an entrant sets up business no matter what pre-entry moves the incumbent makes: entry is "easy." In between, the incumbent can cut off all entry and still break even: entry is "impeded." If, in addition, limiting all entry is more profitable than allowing it, then entry is "effectively" impeded. Barriers are "ineffective" if the incumbent finds it more profitable to allow some entry.

NATURAL BARRIERS TO ENTRY

Initial industry cost and demand conditions eventually put a stop to further entry. After examining these "natural barriers," I consider ways that firms can strategically alter these conditions to reduce the likelihood of entry. Of course, entry depends upon regulatory policy, and incumbents and entrants may exert some influence over the policy process. I will ignore this last aspect.

Production economies

- Scale economies

Bain and many others pointed to the importance of scale economies as an entry barrier: given limited demand and large fixed costs, only a finite number of firms can survive. Fixed cost is not the sole source of increasing returns. A more general formulation of this idea to handle multiple products was provided by Baumol et al. (1982). They showed that a product in a firm's product line was naturally immune from attack when the technology exhibits "decreasing average incremental cost." That is, the per-unit cost of adding that product fell as the scale at which it was introduced grows.

- Scope economies

When does a firm have a natural monopoly over two or more products? Naive extension of single product concepts—such as falling unit cost—fail to work when there are multiple products. In their place Baumol et. al. (1982) developed notions of "ray average cost" and "trans-ray convexity." Technical conditions, they say that a firm can provide combinations of the two products more cheaply than could two specialized firms.

- Absolute cost advantage

An obvious means of gaining a monopoly over a market is to achieve lower costs than any other firm. A firm could do so by securing exclusive rights to essential resources (e.g., a spectrum license) or facilities (e.g., rights of way for local distribution plant) or exclusive use of a process guaranteed through patent protection (e.g., the loading coil and audion for early long-distance transmission).
STRATEGIC BARRIERS TO ENTRY

Actions of an incumbent prior to entry are immaterial unless they somehow alter entrants' perception of post-entry profits. A correlation between pre-entry and post-entry equilibrium is created in one of two ways.

First, the incumbent's pre-entry actions may reveal something about the market that was previously unknown to the entrant. For instance, a low initial price may signal that the incumbent has low costs of production.

Second, the incumbent may be able to take actions that are irreversible but which alter post-entry competition. I focus entirely on this second set of strategic barriers.

Limit pricing

As mentioned, Bain and his colleagues allow the incumbent to commit to a post-entry production level. Whether it can exclude entrants depends on their behavior.

• Small-scale entry

When entrants take price as given, an incumbent will respond by acting as a dominant firm. It produces out to a level where price is too low to cover entrants' costs. Especially as technical information disseminates, an incumbent will cede a progressively larger share of the market to new entrants. With this in mind, Gaskins (1971) analyzed the tradeoff facing an incumbent between static monopoly profits and future entry growth.

• Large-scale entry

Large-scale entrants, on the other hand, take account of their effect on price when they decide to enter. The incumbent commits to output that, once again, leaves entrants with a residual demand too small to survive.

Vertical Practices

• Vertical "price squeeze"

When a firm holds a monopoly over the upstream market (e.g., local access and switching) but owns a subsidiary in the downstream market that competes with other firms (e.g., enhanced service providers), then it can increase its profitability by careful pricing of the two services. A vertically integrated monopoly can "squeeze" downstream competitors by selling the upstream service at a high price. Its downstream subsidiary enjoys a competitive advantage by setting a relatively low transfer price. Panzar (1980) analyzed this strategy in the context of local and long distance telephone service.
• Raising rivals' cost

An incumbent can affect competitors' cost of production in other ways. Especially if it is large, a dominant firm can drive up prices of necessary inputs that will be reflected in higher cost for potential entrants. In the limit, entrants cannot break even under the higher costs. Salop and Scheffman (1983) catalog different ways in which a strategic firm can "raise rivals' cost."

For example, cellular mobile carriers and personal communications networks need access to the electromagnetic spectrum. By driving up the price of licenses or by "warehousing" spectrum, late arrivals into this market can be handicapped.

Another way in which entry costs can be raised is through contracts between incumbents and their customers. Aghion and Bolton (1987) show how "take-or-pay" contracts can hold onto customers by giving them a stake in the profits of entry prevention. After entering into such an agreement, a customer can obtain service from the incumbent at a lower cost than if he switched suppliers.

Strategic Investment

In fact, Bain's limit pricing argument is erected on a shaky foundation. Suppose entry occurs even though one more firm cannot break even, given the residual demand left over after incumbents' sales. If an entrant produces, then the incumbent can make higher profit by cutting back on its planned output. Consequently its initial claim for post-entry production was not credible.

Caves and Porter (1977) and Spence (1977) note that an incumbent could credibly commit to a post-entry output level by installing a limited capacity prior to entry. Building upon the Cournot model, Dixit (1979) confirmed this intuition with a model that paid close attention to firms' incentives. He found that, when installed capacity was sunk, an incumbent could hold to an output level at least over some range of entry strategies. Having sunk the capital, the incumbent enjoyed lower (avoidable) cost than the entrant for output levels up to installed capacity.

Examples of sunk investment in local service provision are plentiful. Local distribution plant is highly immobile (e.g., buried cable). Some specialized know-how has limited value outside its intended use (e.g., software for switching). Firms also acquire reputation and brand recognition that are not easily transferable (e.g., Bell name and logo). Finally, LECs enter into contracts with suppliers which are binding, especially labor agreements (e.g., CWA contract).

The first-mover advantage may not allow the incumbent to exclude an entrant. A Stackelberg (1934) leader-follower outcome will often result with the incumbent gaining the lion's share of industry profits. Only if the entrant's share of operating profits is less than its fixed costs will it prefer to stay out. Whether or not entry is deflected, the mere threat induces the incumbent to invest more, produce more, and price less than if it had a secure monopoly.
In a model of price competition, Gelman and Salop (1983) show that the incumbent may find it profitable to accommodate some entry—provided that it occurs on a small scale. The incumbent has two options: extract monopoly profit from the residual demand or match the entrant’s price and preclude entry. If the entrant leaves a large enough overflow, the incumbent will find it best to accommodate entry even if the entrant has higher costs.

Deterrence may result in . . .

* Excess capacity

In Dixit’s framework, an incumbent relies on investment to improve its strategic position relative to new entrants. A similar reasoning is at the heart of the so-called “excess capacity hypothesis.” This conjecture claims that an incumbent will build more capacity than it will eventually use for the purpose of threatening entrants with high outputs (equivalently, low prices) should they choose to enter.

In fact, Dixit concludes that an incumbent will not hold idle capacity because entrants do not believe it will be used and it is costly. On the other hand, Bulow, Geanakopolis and Klemperer (1985) demonstrate that if firms’ products are “strategic complements,” a policy of excess capacity may successfully ward off competition.

* Monopoly pricing

Working within a world of price competition, Stiglitz (1987) shows that monopoly prices will result as long as any fraction of cost is sunk. Price competition will bid away all operating profits, and since the incumbent’s operating costs are lower by an amount equal to the sunk portion, he is willing and able to cut price below the entrant’s break-even level. This reasoning applies even if the industry is not a natural monopoly.

* Inefficient choice of technique

Stiglitz (1987) proceeds to show how an incumbent’s choice of techniques will be distorted. Presented with an array to choose from, it will gladly accept slightly higher total costs in exchange for a little sunkness, since then it can exclude all entry.

* Premature Introduction of new products and technologies

Entry conditions change over time in ways unrelated to firms’ actions. Demand grows and costs of production fall, making it possible for additional firms to survive in an industry.

Incumbents may have strong incentives to preempt new entrants. Profits foregone by incumbents will usually be larger than the profits available to new entrants. This asymmetry has been shown to speed up patenting of new processes (Gilbert and Newbery, 1982), capacity expansion (Gilbert and Harris 1984), and new product introductions (Eaton and Lipsey, 1979; Tirole, 1989).
In contrast, Aron and Lazear (1990) describe a situation in which a new entrant introduces a new product, and only afterwards does the incumbent elect to follow suit.

**Role of Lumpy Technology**

Highly capital-intensive production often has the property that capacity arrives in large, indivisible increments. As a result, a perpetual mismatch between current and ideal capacity.

- **Strategic properties**

Lumpiness displays two properties that were shown earlier to have strategic implications. The first lump acts like a fixed set-up cost, at least for production scales up to the size of the lump. Soon after an expansion there will be excess capacity. The opportunity cost of expanding production with the excess capacity will be negligible, and so should serve as a credible deterrent to new entrants.

As before, the fixed cost aspect of lumpiness raises a natural barrier to entry. If capacity is also sunk, then first-mover advantages arise. Schmalensee (1981) reexamined Dixit’s entry model when a minimum of output can be produced from an initial lump of capacity. He found that, while it enjoyed a first-mover advantage, the incumbent could earn no more than the cost of that lump.

- **Construction economies**

Lumpiness in capacity expansion derives from a scale economy in the construction of plant and equipment. The savings often makes it cheaper to build more capacity than is currently needed. The smaller unit costs of large projects simply outweighs the financing charges of holding idle capacity.

Lumpy capital usually has a long lifetime as well. Thus it may be the case that efficiency requires the firm to engage in “anticipatory investment” as Baumol et al. (1982) observed. As a by-product they can deter subsequent entry even if the market grows over time.

When it only pays to build capacity as it is needed, they find this may invite undercutting by late entrants. A new entrant can undercut the incumbent because its unit cost to build the capacity needed to serve the entire market is lower than the incumbent’s unit cost to serve the incremental demand.

- **Preemptive Investment**

Gilbert (1986) and Stiglitz (1987) study an incumbent which must expand its capacity to meet growing demand in a lumpy fashion. When competition is over price, the incumbent invests slightly before an entrant would find it profitable to do so. As a result, construction occurs too frequently relative to the social optimum, and capacity remains idle. Furthermore, the incumbent is able to earn positive profits.
When competition is over quantities, the conclusions change. Gilbert (1986) finds that, if lump sizes are small enough, entry will occur. Also the Cournot competition restricts output, causing capacity to grow slower than at the zero-profit rate.
3. HOW DO REGULATORY POLICIES AFFECT ENTRY?

RATE-OF-RETURN REGULATION

This traditional form of rate regulation prevents a public utility from earning a rate of return on its invested capital in excess of some prescribed level. Rates of local exchange companies, and AT&T until recently, are regulated in this manner. The pricing and production distortions caused by this policy have been extensively studied. Its consequences for the entry game have received far less attention, however.

Attracts Inefficient entry

When the allowed return exceeds the risk-adjusted competitive level, new entrants will be drawn to this industry. This can happen even if they may have higher production costs and even if the industry is a natural monopoly.

Encourages “cream skimming”

Despite equal access to the best practice technology, distortionary rates may encourage entry into the incumbent’s markets. Naturally, it will select those markets having the greatest return, ignoring any that fail to contribute to profitability. Such “cream skimming” will be most pronounced when rate-base regulation is applied to individual services rather than on a company-wide basis.

PRICING POLICIES

Fully Distributed Cost pricing

Invariably, efficiency requires several services to be provided using the same facilities. If the cost of facilities cannot be attributable to the different services, then they must jointly defray this expense. Regulators typically divide up the common costs using some rule of thumb; then price is set for each service to recover its assigned share. Though the rules appeal to some intuition, they are entirely arbitrary. Braeutigam (1980) demonstrates that the most popular fully distributed cost pricing schemes deviate from efficient Ramsey prices that are free of any subsidy. On a more positive note, Spulber (1989) shows that, as long as variable costs are allocated in a subsidy-free manner, prices can arbitrarily allocate fixed costs without creating a cross-subsidy.

Flat rates, geographic averaging

Rates should reflect the incremental cost of providing a service. In contrast, local service pricing is typically insensitive to distance, duration and timing of calls. Exceptions to this practice include extended area service and measured service, which have received little application outside New York and California.
When service is offered at a flat rate, those individuals and businesses requiring far less than the average level of service are disadvantaged. This opens wide the opportunity for entrants to undercut the incumbent provider (Wenders, 1989).

ACCOUNTING PRACTICES

Depreciation schedules

Under rate-of-return regulation, the regulated firm benefits from slow depreciation of assets since it maintains a hefty rate base. Not surprisingly, the Bell Operating Companies attempted to persuade the FCC to stretch out depreciation schedules, and not without some success (Faulhaber, 1987).

When entry occurs, anticipated returns for the remaining lifetime of installed equipment will drop off. Lower returns from an asset translate into lower asset values, as economic depreciation outpaces accounting depreciation. When fully anticipated, entry will shift more depreciation to early years of an investment’s lifetime. If accounting depreciation schedules do not similarly frontload capital recovery, then an incumbent will attempt to earn a return in excess of the market rate, placing it at a disadvantage.

Separations procedures

Joint use of local exchange facilities by intrastate and interstate calls have led federal and state regulators to devise schemes for allocating their cost. The result was a substantial subsidy flowing from toll users to local users, and from business to residential. Furthermore, the size of the subsidy was geared to usage even though costs were not traffic sensitive. Naturally, this encouraged entrants to target markets, which provide the subsidies.
4. SHOULD REGULATORS ALLOW ENTRY?

WELFARE IMPLICATIONS OF FREE ENTRY

Profits fall, aggregate and per firm

The simple Cournot model implies that the incumbent gives up some of its monopoly profits whether or not the entrant is successful. In most cases total industry profits will fall from the monopoly level; necessarily the incumbent’s profits will fall. This may hold even if entry can be impeded. Dixit (1980) showed that the incumbent retains more than half of industry profits when it was able to impede entry through sunk investments.

Consumer surplus rises most of the time

- **Prices fall, though not for everyone**

  Expanded production does not automatically guarantee lower prices, and hence higher welfare, for everyone. Adjustment from a regulated outcome or unregulated monopoly will alter the rate structure. Roughly speaking, cross subsidies will be eliminated, and recipients of the subsidy will face higher prices.

- **Product offerings may improve, but maybe not**

  Consumers generally prefer products of higher quality and a wider selection. But we saw that the effect of entry on vertical and horizontal product differentiation depends on specific assumptions on demand and cost of products.

**Total welfare . . .**

To assess the overall impact on society, the combined effect of entry on owners and customers must be calculated. When some means of costless redistribution is available, this is done by simply summing profits and consumer surplus.

- **Rises with first entrant . . . usually**

  Each entrant tends to move the industry a little closer to the competitive solution, but not always. Schmalensee (1976) found that total welfare could fall as a second firm entered because the increase in consumer surplus was cancelled by lower aggregate profits.

- **Lower in the limit**

  How does society fare if entry is allowed to continue unrestricted? Surprisingly, Perry (1984), Mankiw and Whinston (1986), and others found that in general too much entry occurred. The reason lies in the fact that Cournot quantity competition contains an element of collusion. Cournot
competitors tend to restrict output relative to the efficient level. The corresponding higher prices attract additional entrants, and these entrants will raise overall industry cost as long as there is a fixed cost component.

REASONS TO ALLOW FREE ENTRY

Though we learned that at least some entry is usually beneficial, strategic entry deterrence can be a good thing. Invariably, in its attempt to deter entry, an incumbent must expand output and lower price. Should the established firm accommodate entry, there may be little change in output and price. As a result, it is not clear that entry should be encouraged. This should come as little surprise: the ambiguous welfare effects of entry yield ambiguous policy prescriptions.

Unleash the power of potential entry

When it is credible, the threat of entry can police incumbent behavior effectively. This argument is made forcefully by Willig (1980). It is formally and meticulously spelled out in the contestable markets paradigm by Baumol et al. (1982). In addition to their “invisible hand theorem” mentioned earlier, they show that a contestable market will eliminate any cross-subsidies and sustain the cost-minimizing industry configuration.

Undermine cartel behavior

If an industry engages in explicit or tacit collusion, then entry offers the prospect of upsetting the cartel. A new entrant free rides on the cartel prices at the expense of current members.

Expand product offerings

As mentioned above, new entry generally makes a new offering available to consumers, and since greater variety raises consumer welfare, society is made better off.

REASONS TO BAR ENTRY

Sustain natural monopoly

Faulhaber (1975) constructed an example in which entry into one of an incumbent’s markets was inevitable even though it is the least-cost provider of the complete collection of products. In that case the natural monopoly was “unsustainable.” If entry could be blocked without fostering monopoly practices by the incumbent, then social surplus could be increased.

Reward Innovation with temporary monopoly profit

Offered the reward of monopoly profits, candidates will compete fiercely for rights to a market. Their desire to enter is directly related to the exclusion of future entrants. (Indeed, Sherman and Willett (1967) demonstrate that a potential entrant
might balk at the opportunity knowing that subsequent entrants will wipe out any initial profits.) In contrast incumbents have a strong inducement to develop innovative technologies and products as long as they receive intellectual property protection.

Schumpeter (1945) saw the static efficiency loss caused by the succession of temporary monopolies as a small price to pay for the dynamic efficiency provided through process and product innovations. Of course, permanent monopoly has its own drawbacks, so rules must be devised to allow subsequent entry.

Support politically motivated cross-subsidies

Members of a society may choose to subsidize some groups at others’ expense. In the telephone industry there is a tradition of subsidizing rural, low-income and elderly customers, usually at the expense of urban and business users. Posner (1971) argued that, if for some reason the tax system cannot be employed for redistribution, public utility pricing could do the job. Unfortunately, free entry will unravel any attempt to redistribute wealth in this way.

Avoid “death spiral” caused by cost-plus ratemaking

In a similar way, the viability of cost-based pricing such as rate-of-return regulation is threatened. Klass (1975) noted that entry would peel off the most lucrative business, leaving behind a shrinking customer base to cover costs. As long as the cost-plus ratemaking persists, this “death spiral” can be broken only by barring further entry.
5. HOW SHOULD REGULATORS CONTROL ENTRY?

FOSTER “COMPETITION FOR THE FIELD”

Before any firm has entered a business, it may be possible to arrange competition among firms vying for the market dominance so as to capture the entire social gain. Though a single firm will eventually occupy the market, all rents could be bid away at the award stage. Long ago Chadwick (1859) promoted the creation of such “competition for the field.”

FRANCHISE AUCTIONS

Demsetz (1968) proposed that franchises be awarded to the lowest-price bidder. Telser (1969) criticized the average-cost pricing that resulted as inefficient. Loeb and Magat (1979) suggested that the franchise be given to the highest lump-sum bid. This gives the successful firm the incentive to extract all social surplus, and equally important, to inject its private information about demand and cost into the bidding process.

Williamson (1976) noted that franchise agreements were not always executed as planned. True, if suppliers and customers wrote contracts that exhaustively specified their respective obligations prior to any investment, many of the failures of markets—and regulatory policies—could be avoided. But Williamson was not convinced that franchising could do away with the need for a regulatory authority. Goldberg (1977, 1979) viewed the regulatory agency as an administrator of “implicit regulatory contract” between the firm and its customers. It protects utilities’ “right to serve” as well as ratepayers’ “right to be served.”

PRIVATE CONTRACTING

Rather than placing a franchise on the auction block in the usual way, Posner (1972) proposed that the firms solicit business from customers first. Then whichever one gathers the greatest number of customers or volume of traffic will be awarded the franchise. Grossman (1981) studied this same procedure requiring competitors enter into only those contracts that they can actually fulfill. He found that it displayed attractive efficiency properties even with large fixed costs.

Users and suppliers might also negotiate service rates directly. Willig (1980b) and Morris and Preece (1982) report on the efficacy of such private negotiations in the context of local network access.

REDUCE ENTRY/EXIT COSTS

Bailey (1981) and Baumol and Bailey (1984) have called upon regulators to concentrate their efforts on the removal of entry barriers. The first task is to eliminate any regulation-induced entry costs. The next is to carve out that portion of the business that necessitates large sunk costs and open the remaining contestable markets to competition.
Streamline licensing, certification

The time consumed while arriving at a regulatory decision affects its impact. Reducing regulatory lag can keep regulated prices and investment closer in line with efficient levels. One goal of price cap plans is to streamline the regulatory process in this way.

Relax abandonment restrictions

Regulations that raise the cost to a firm when it chooses to leave a market raise entry barriers into that market. Abandonment restrictions as part of common carrier obligations have the effect of reducing the contestability of a market.

FINE-TUNE ACCESS PRICES

As in many network industries, entrants require connection to the public network. Design of open network pricing plans for telecommunications services currently underway in the U.S. will have a significant impact on conditions of entry into the local exchange by enhanced service providers.

Ensure nondiscriminatory access to sunk facilities

Since sunkness of essential facilities is at the source of most entry barriers, it has been proposed that they be monopolized but that they be made available to other suppliers at regulated rates. Baumol and Bailey (1984) took this approach stressing that tariffs must be nondiscriminatory so as to establish a level playing field. Like open network architecture schemes, entrants could arrange for use of these facilities according to a standard tariff.

Price floors to Inhibit post-entry predation

We saw that the prospect that an incumbent could credibly cut price down to avoidable cost had a chilling effect on entry. For this reason Stiglitz (1987) suggested that a price floor would have the effect of promoting entry and actually lowering price.
6. WHAT ARE THE DETERMINANTS OF ENTRY?

The standard Structure-Conduct-Performance paradigm holds that, together with entry barriers, an industry's demand and cost conditions determine prices and sales which, in turn, determine consumer surplus and profits.

Market demand is a function of consumer incomes, population growth and density. Cost depends on factor prices through the current technology; here scale and scope economies play a crucial role.

It is far less clear how to measure entry barriers. Bain promoted a profit-based definition. Stigler (1968) simply required a discrepancy in costs facing the incumbents and the entrants at the time of entry. Von Weiszacker (1980) included the impact of entry on consumer welfare.

In his study of U.S. manufacturing industries, Bain (1951) calculated the height of entry barriers in several ways. His paper spawned a stream of empirical studies. This early work was loosely tied to reduced-form models. More recent investigations have attempted to test hypotheses using structural models of industry equilibrium. Of these, only a very few draw on the strategic analyses discussed above.

Summarizing studies from hundreds of industries taken from several western economies, Geroski, Gilbert and Jacquemin (1989) conclude that the incidence of entry is widespread. At the same time, the data clearly demonstrate that entrants' survival rate and market penetration are meager at best.

Could effectiveness of entry deterrence be responsible for these results? In a survey of 293 U.S. firms, Smiley (1988) found only a quarter employed standard entry-deterring tactics, such as installation of excess capacity and the practice of limit pricing. On the other hand, he found over half claimed to use advertising and patent policy to discourage entrants.

Most of the studies listed below are based on intra-industry econometric models. Whenever possible I have selected those which have been informed by strategic entry models.

- Hannan (1983) found that de novo entry of Pennsylvania branch banks was more likely in geographic markets with higher loan rates, lower deposit rates and smaller installed capacity.

- Examining seven isolated retail and professional markets, Bresnahan and Reiss (1987) discovered that demand must increase 2.3-4.2 times to support a second firm. If it can survive, the entrant earns 59.3-92.0% of monopoly operating profits.

- Berry (1989) attempted to find determinants for the likelihood of entry. Using the airline industry, he found that entry into a city-pair route increases with the extent of the airline's "presence" at the airports.
• Kessides (1983) uses advertising expenditures as a measure of incumbents' sunk cost. He estimates an expression for entry determinants using a cross-section of all 4-digit manufacturing industries in 1972 and 1977. He finds the hypothesis that advertising poses barriers for new entrants cannot be rejected.

• In a series of papers, Lieberman (1987a, b) examined incumbents' and entrants' investment behavior in the U.S. chemical processing industry. He found that plant construction was less frequent for those chemicals having a lumpier technology. At the same time incumbents and entrants did not differ in terms of the pace at which they added lumps. Curiously, incumbents respond to new entry by expanding capacity, but they contract when existing firms build new plants.
7. WHAT ARE THE OBSERVED CONSEQUENCES OF ENTRY?

To isolate the effects of new entry, it helps to have a controlled experiment. Many entry studies look to changes in regulatory policy to make before-and-after comparisons. Regulatory policy has a large impact on the ease of entry. Sometimes regulation is direct as in the case of the duopoly rule for cellular mobile phones. More often it is indirect as when restrictions on pricing freedom limit attractiveness of entry and the ability of incumbents to respond to competition.

The bulk of the entry studies to date examine changes in prices, profits, and other indicators caused by deregulation of some industry. Sometimes different regulatory treatment of industries is exploited. Less often industries are compared across states or countries to ferret out the consequences of decontrolled entry.

Feedback between regulation and industry behavior may also occur: firms may temper their business decisions or engage in political activities to turn entry policies in their favor. A large body of literature examines the supply of and demand for regulation, much of it empirical. This topic will not be covered here.

STUDIES OF DEREGULATED AIRLINE MARKETS

Even before their deregulation, airline markets were raised as a prime example of an industry having strong competitive pressure through entry. The fact that aircraft could be cheaply redeployed to another city-pair market held out the promise of swift entry and exit. Other inputs are needed to provide service, however, and some of them—gate space, landing slots, reservation systems—proved to be much less fungible.

- Morrison and Winston (1987) classified U.S. domestic airline markets by the extent of the "potentialness" of competition. They found that an actual entrant on a city-pair route raised consumer surplus 0.44 cents/mile. Classifying a potential entrant as an airline currently serving one of the two cities, they found that one or more potential entrants raised surplus by only 0.15 cents/mile.

- Whinston and Collins (1989) estimated the financial effects of entry by a single company. They found that an incumbent airlines' operating profit fell 24-41% on routes entered by People's Express.

- A city-pair may be served by direct or indirect air service. Reiss and Spiller (1989) find that, in the absence of a direct carrier, competition between indirect suppliers is weak, and the presence of a direct carrier greatly intensifies their rivalry. They also find the fixed costs of the two types of flights and their substitutability are important determinants of direct entry.
STUDIES OF DEREGULATED PHONE MARKETS:

Decontrol of telecommunications has occurred on a significant scale only recently. Even where entry is permitted, vestiges of regulation through tariff filings and construction certification remain.

- Hausman and Tardiff (1989) measured the impact on business use of long-distance caused by entry of Teleport, Inc., Manhattan Cable, and others into the toll access market in New York City. They found that connection to alternative carriers reduced usage of MTS and WATS of New York Telephone's large customers by 36% in 1986.

- Mathios and Rogers (1989) examined the effect of state regulation of entry into the intraLATA toll market. They found that a state ban on facilities-based entry and resellers increased the average price of an intraLATA toll call by 7.5%. When these rules were supplemented with other restrictions and fines, add an additional 2.8%.

CRITICAL REMARKS ON THE EMPIRICAL STUDIES

The opportunity for economic profit signals that an industry is out of equilibrium. Through new entry, the industry takes a step toward a new equilibrium. Entry may occur naturally as when lower costs of production permit additional firms to survive. Similarly new firms will meet larger demand caused by population or income growth. Alternatively, the occurrence of entry, or its absence, may be the product of strategic interaction between incumbents and potential entrants.

Unfortunately, firms' perception of profit is unobservable. Nevertheless it seems plausible to infer profitability from entry decisions.

A more challenging empirical issue is to separate technological causes from strategic behavior. How can we determine what portion of a capacity expansion is warranted by demand growth, and what portion by strategic maneuvering? Is entry a response to lower costs or does the cost shift weaken a collusive arrangement among incumbents, and hence their ability to deflect potential entrants?

To answer such questions, more elaborate empirical specifications are needed to describe entry. First of all, because the entry phenomenon is inherently dynamic, intertemporal models are needed. To estimate such a model requires longitudinal data that tracks events of entry. In contrast, existing studies are predominantly static that are estimated with cross-sectional data. Only with richer data sets and new econometric specifications will we be able to accurately assess the strategic elements of the entry game.
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