From Closed to Contestable Markets:

Product Differentiation in Indian Durable

Consumer Goods Industry

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Abstract:

We examine the most likely strategy of product differentiation by newly entering multinational firms when market reforms begin in a developing economy. We argue that incumbents in a non-contestable protected market do not have the usual advantages of an incumbent as in a standard sequential entry model of contestable markets. In this context we use a model of vertical product differentiation to argue that a new entrant will choose a higher quality product and a higher price given the income distribution profile brought in by the market reforms. We test the propositions empirically on the basis of firm level panel data for five Indian durable consumer goods industries.

From Closed to Contestable Markets: Product Differentiation in Indian Durable Consumer Goods Industry[2]

1 Introduction

The industrial and trade policy reforms introduced in India since the mid-eighties caused entry of quite a few multinational corporations (MNCs) with new technology and differentiated products into several Indian industries. Entry of MNCs into the markets of developing economies that used to be non-contestable until recently, poses interesting questions on the issue of incumbency advantage (or disadvantage) of local firms and corresponding strategies of MNCs.

In the literature on sequential entry, the incumbent is taken to have advantage over new entrants owing to a low cost position and to lower demand elasticity for its product relative to new entrants. Low cost advantage arises from possible learning economies in production internalized by the incumbent and lower demand elasticity arises from consumer inertia, switching costs in consumption, and advertising-induced brand allegiance. Incumbents' advantage is further enhanced by their pre-emptive activities that constrain the entry decision and subsequent moves of later entrants. For example in Schmalensee's (1978) classic analysis of the breakfast cereals market, product diversification by incumbents leaves little room for later entrants. Likewise in Donnenfeld and Weber (1992) incumbents occupy strategic positions along the quality spectrum in anticipation of possible later entry by potential players. We should note that the markets analyzed in this literature are not only contestable, but are taken to have been contestable always in the past.

Though our paper is also concerned with sequential entry, its context differs in one important respect. Indian markets have become contestable only recently as a result of market

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reforms. Until the reforms, incumbents in these markets were protected by an industrial licensing regime that insulated them from contest (Bhagwati, and Desai, 1970). Incumbents in domestic industries thus worked without much concern for potential entrants. Their prices or product position in the quality space were not typical of incumbents who fear potential entry, but were more akin to monopolists or cartelized oligopolies (Patibandla, 1998). As a result, they had not made the usual entry deterrent investments and later when licensing was abolished and markets made contestable, they were at a disadvantage. Besides, the pre-reform import-substituting package of the government of India had protected domestic producers from imports as well, generally leading to product quality below international standards. Thus, even though the brands of the incumbent firms were widely sold and bought over the whole country, they had not generated significant brand loyalty that could be used against potential entrants in the post-reform era. On the other hand given the large size of the Indian market, incumbents had significant sunk costs in production capacity that would act as an inertial force against quick changes in product quality or product innovation in the post-reform competitive phase.

In this situation, potential new entrants are not as seriously handicapped as is the case in standard models of sequential entry. Also new entrants in our case are MNCs who, in some other countries, have already developed and marketed the range of products that they are considering for the newly opened Indian market.[3] This introduces an asymmetry to the advantage of potential entrants. For changing product specification or improving quality, an incumbent has to grapple with significant sunk costs in the existing product. On the other hand an MNC contemplating entry looks at the range of qualities in the product market as an *ex ante* choice without any sunk costs constraining this choice.

The purpose of our paper is to use these specifications to explain some developments in the consumer durables market in India in the post-reform period. In Section 2 we examine the choices regarding product differentiation available to a new entrant using a vertical product differentiation model, and isolate the most likely strategy they are expected to choose. This discussion is influenced by the insights developed by Shaked and Sutton (1982, 1987), and further elaborated in Sutton (1989, 1992), namely that R&D and advertising can be thought of

[3] Given all other things equal, a first mover will always have an advantage over late movers in standard sequential entry models. In our paper, the incumbent is a local firm in a developing economy and the new entrant is an

as sunk costs. However, given the specific context of the Indian market, we try to utilize these insights in a somewhat different way. Normally these insights lead to models that seek to endogenize these expenditures as solutions to an oligopolistic game. But in a market that features incumbents who have been only recently exposed to contestability, the sunk costs of the former become exogenous to the subsequent game that ensues in the competitive phase. We analyze the potential entrants' decisions on the assumption that they know that the incumbents are saddled with efficient future choice consequence of pre-existing investments (sunk cost). We should add, however, that we make no attempt to model the equilibrium of the industry under our set of specifications. Rather, we are interested in explaining recent developments in durable goods markets as the outcome of MNCs extant choices, and there is no presumption that the present state represents an equilibrium structure.

Thereafter, Section 3 uses firm level panel data for five industries, namely motor cycles, refrigerators, television sets, washing machines and air-conditioners to test the implications of probable choice discussed in Section 2. Finally Section 4 concludes the discussion.

2.1 A Stylized Presentation Of The Indian Scene

Consider the generic market for a durable consumer item. Suppose the hedonic attributes underlying each product in this market are summarized in a scalar measure q called quality. Such a measure is now commonly used following Mussa and Rosen, 1978, and the logic of comparing differentiated products by going back to more fundamental measurable attributes has been discussed in Rosen, 1974.

Assume that potential consumers have identical preferences but are differentiated in terms of income, y. They buy one unit of the product or none at all[4]. If one unit of the product of quality q is sold at price p, we will denote the consumer surplus of a buyer of income y as $S = yq - p$. The surplus function implies that consumers are vertically differentiated. Utility functions that permit such differentiation were introduced by Gabszewicz and Thisse, 1979 and issues related to vertical differentiation have been extensively discussed in Gabszewicz and Thisse, 1986.

MNC from an advanced economy. Incumbency becomes a disadvantage rather than a governing factor in this context.

[4] It is quite natural to assume this for a durable goods market. For some discussion see Gabszewicz and Thisse, 1979.

Assume that y is continuously distributed with a density function $f(y)$ over a range $(\underline{y}, Y)$. When quality q_0 is offered on the market at price p_0, all buyers for whom $S = yq_0 - p_0 \geq 0$, are expected to buy the product. Thus all potential buyers for whom $y \geq p_0/q_0$ are expected to make a purchase, unless there is another product offering higher S.

We can describe the pre-reform scene as a single producer or cartel, referred to as the incumbent, selling a given product of quality q_0 at price p_0. It faces a market size

$$\int_{p_0/q_0}^{Y} f(y)dy, \text{ and is assumed to have adequate capacity to meet this demand.}$$

Assume that average cost of production is an increasing function of quality and is constant for each quality. The incumbent's average cost, denoted $c_1(q)$ for producing one unit of each quality is shown by the curve C1 in figure 1. Average cost increases at q_0 but is quite flat up to some $q_a > q_0$, and thereafter becomes very steep. This is to take account of the fact that given its technology and plant capacity, the incumbent can make neighbourhood variations in the product quality without much additional cost. However beyond this limit q_a, average cost for higher quality products increases steeply. The sale price p_0 in the protected pre-reform stage is shown in the figure as higher than the incumbent's average cost c_0 for quality q_0, implying positive economic profit.

A potential newcomer's average cost curve is shown in Figure 1 as C2, and the function will be denoted by $c_2(q)$. At the *ex ante* or capacity planning stage, potential entrant's average cost curve is the envelope of average cost curves corresponding to different qualities, and is thus flatter than the incumbent's, except in a close neighborhood of q_0. Relative positions of C_1 and C_2 close to q_0 reflects the advantage in selling costs, marketing and some internalized economies of scale achieved by the incumbent before the newcomer's entry, which the newcomer cannot avail himself of.

A potential entrant's decision concerns the most appropriate position or range on the quality axis for building production capacity. More specifically, what is the range where the best pricing strategy can provide the largest possible share of the generic product's market? In this decision the potential firm has to take advantage of the short run inflexibility of the incumbent's quality range (or identically, the steeply rising average cost beyond q_a).

We can partition the quality axis into three segments, presenting qualitatively different possibilities: $q < q_0$; $q_0 \pounds q \pounds q_a$; $q_a < q$. Since quality q_0 is below international standards for the

generic product, the segment $q < q_0$ is ruled out in the non-monopoly phase of the market because there is no more protection from imports. Also products below q_0 can not be exported, and thus reduce the marketing options for the newcomer in the future. In the next segment, $q_0 \pounds q \pounds q_a$, the incumbent has a short run cost advantage. The incumbent in this segment will prove to be a strong competitor. Thus the newcomer is left with the third segment, $q_a < q$. A potential entrant has to build capacity in this range, if at all.

2.2 Pricing considerations

However, in a vertically differentiated market, the firm's share of it depends on the price used with quality q to partition the market. To assess the potential market size, therefore, the entrant has to explore the best (p,q) combination for qualities in the range $q_a < q$.

When considering pricing, the newcomer should assume that if it enters the market, the incumbent would compete in the short run by reducing its product price from the monopoly level. The lowest price the incumbent can afford is $c_0 = c_1(q_0)$ and that should be taken as the incumbent's price in case there appear more sellers in the market. At price c_0, the incumbent's product has non-negative consumer surplus for all buyers with $y \geq c_0 / q_0$. Given this, two qualitatively different pricing options emerge for the newcomer, discussed as Cases 1 and 2 below.

Case 1: $p/q > c_0/q_0$

In this situation the new product offered by the newcomer breaks even with buyers at $y = p/q$,which is higher than c_0/q_0. However, consumer surplus from the incumbent's product remains higher than that of the newcomer until a higher income level given by $y' = (p-p_0)/(q-q_0)$. Therefore, the market will be partitioned at this latter point (see Figure 2, left panel.) The market share of the incumbent and the newcomer are given by respectively:

$\int_{c_0/q_0}^{y'} f(y)dy$ and $\int_{y'}^{Y} f(y)dy$ (see Figure 3).

Case 2: $p/q < c_0/q_0$

In this case, for the newcomer's product, $S \geq 0$ for all $y \geq p/q$. But, $p/q < c_0/q_0$. Therefore all buyers with y value between p/q and c_0/q_0 who were outside the market for the

product offered by the incumbent are now part of the market of the new entrant. Also, we can check that $qy - p > q_0 y - c_0$ for all $y > p/q$ (see right panel, Figure 2). It means that the newcomer can replace the incumbent's product completely. This latter obviously then is a better strategy than the one in Case 1, unless the newcomer is interested only in a niche at the top end of the market.

From Figure 1, we can see that given its *ex ante* cost function, the newcomer can afford to sell at the configuration $p/q < c_0/q_0$ only for the range of qualities between q_a and q_b. Any point on the newcomer's average cost curve between these points has an average cost to quality ratio less than that of the line L. The qualities beyond q_b have an average cost that does not allow them to be sold at any price satisfying $p/q < c_0/q_0$ without making a loss. Thus while the newcomer positions its product away from the neighbourhood (q_a) of the incumbent's quality, presumably it does not go on very far along the quality axis.

2.3 The Income Distribution

This discussion, however, remains incomplete without considering the density function $f(y)$. It is easy to see, for example, that in Case 1 above a newcomer can look forward to a fairly large market for a very high quality and high priced product, away from the incumbent's product, if the area under $f(y)$ is large between y' and Y. Thus the shape of $f(y)$ is an important element in the exercise. Rather than examining any general relation between pricing, quality choice and the distribution $f(y)$, we will focus on the specific empirical situation in the Indian market.

The part relevant for consumer durables market in India comprises only relatively high-income households (top 8 to 10 per cent of income earners). Over this range income distribution is relatively denser towards the lower end. The higher end featuring very high income has relatively lower density. Also households with very high income often buy their durables from outside the domestic market, reducing the effective density of this part further. Thus in the Indian market at this stage Case 2 would represent a better strategy for MNCs with long run interest in market share rather than in niche marketing.

There is a second reason why this configuration should be popular to new entrants. Over the last decade GDP in India has been growing rapidly at an annual average rate of 5.5 per cent. Most of this income increase has swelled the size of the Indian middle class, which is

located at the lower end of the consumer durables market (Natarajan, 1998)[5]. This implies that over time *f(y)* has been increasing faster for lower values of *y* in our range. This trend is expected to continue in the medium run.

Thus though $\frac{\partial f(y)}{\partial t}$ is conceivably > 0 for all y in the range, we have $\frac{\partial f(y)}{\partial y \partial t} < 0$. Since the potential entrant has a horizon longer than a unit period, the object of its interest is some time integral like, $\int_0^T \int_{y_1}^{y_2} f(y) dy dt$ where y_1 and y_2 are the two income limits for its potential market. An entrant who positions products at the relatively lower end of the durables market is expected to enjoy a faster growth rate for its demand as overall income increases. Particularly, in Case 2, the newcomer, if it has not already displaced the incumbent, will experience a higher income elasticity of demand over time than the incumbent

If new entrants actually behave as outlined above, then there are two empirically observable outcomes:

(1) In the market for the same generic product new entrants will have a higher unit price realization compared to incumbents, after controlling for other relevant variables. This follows from the fact that in the contestable phase, the incumbent's price is expected to be $c_1(q_0)$ while the newcomer's price p is at least $c_2(q)$. Since $c_2(q)$ is an increasing function, and $c_2(q_0) > c_1(q_0)$ and $q > q_0$, price realized per unit by the newcomer is higher.

(2) The income elasticity of demand with respect to an aggregate income measure like the GNP or per capita GNP for the newcomer's product will be higher than that for the incumbent's. This is, of course, trivially true if the newcomer completely replaces the incumbent by building capacity that caters to the whole market. In reality, the newcomer is expected to build capacity in steps, and the incumbent hangs on to the rest of the market. But since $p/q < c_0/q_0$, the newcomer is selling its products to buyers with lower *y* compared to the incumbent. As GDP increases with time, number of customers in the newcomer's segment increases faster because of the change in income distribution described earlier. Assuming that the newcomer follows up this demand by increasing production and capacity, it will enjoy a higher income elasticity of demand.

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[5] This study of National Council for Applied Economic Research (NCAER), which surveyed a sample size of 300,000 households in India, shows that the number of households with an annual income exceeding Rs. 0.5 million at 1995-6 prices increased from 0.2 million in 1993-94 to 0.35 million in 1995-6 with a 33.8 per cent

However, these conclusions are contingent on the extent of disadvantage of the incumbents. Among the industries studied below, the motorcycle industry is a very well established industry with incumbent firms having large amount of sunk costs in product development. They also completely depend on indigenous supply of engines and other components, implying that for them the cost of changing product specification is large. The model described above is, therefore, expected to describe this industry well. On the other extreme is the colour television industry, where not only are the incumbents relatively young, but they also use imported picture tubes. Thus new entrants do not enjoy significant advantage over incumbents in this industry. In terms of Figure 1, there may not be much difference between the average cost curves of incumbents and newcomers. The situations in other industries fall between these extremes.

3. The Empirical Analysis

The hypotheses have been empirically tested by three exercises:

1. Estimating log linear inverse demand functions for the five industries listed earlier to test if new entrant MNCs realize a higher unit price in the same generic market compared to incumbents.
2. Further, a Probit equation on the basis of firm level panel data for these industries is estimated to test if the likelihood of a firm being a new entrant MNC is greater if the price and advertising intensity are higher (Maddala, 1983).
3. Estimating log linear demand functions to test if the new entrants enjoy significantly higher income elasticity of demand.

Quite expectedly, the motor cycle industry does well with the first two tests while colour television does not with either. Other industries present a mixed scene. In the case of the third test about income elasticity all industries weakly conform to the test, while refrigerators and air conditioners do well.

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growth. The number of households with an income of Rs. 1 million doubled while Rs. 5 million-a-year households increased by two and half times.

3.1. Data

The data is collected for five consumer durable industries for the time period of 1990 to 1996 from the publications of the Centre for Monitoring Indian Economy (CMIE) on the Indian corporate sector. These industries are Refrigerators (R), Colour Televisions (CT), Washing Machines (W), Air-conditioners (A) and Motor Cycles (M). One reason for selecting these industries is that their products are produced almost entirely by large public limited companies, and production by informal sector assembly units is minimal. Since the CMIE data presents a complete coverage of the corporate sector the data for these industries virtually represents the whole population. Table 1 provides information on the number of firms and new entrant MNCs in these industries.

The panel data has several advantages as it utilizes information on both the inter-temporal dynamics and the individuality of the entities being investigated (Cheng, 1986). In order to control for firm-specific unobserved variables eg various fixed effects, we have introduced dummy variables that separate firms in each industry sample.

3.2. The Variables

Given the data set, we have measured price (P) as (Sales turn-over / Quantity of sales). This measure has an inherent weakness, which could result in a certain degree of noise in econometric estimations. Also it may not be able to capture the quality dimension accurately. As an example, consider the refrigerator industry that produces refrigerators of different sizes. Generally each firm produces all the sizes but vary the quality specification within each size segment. Ideally we should have classified each size as a separate generic product and derive an appropriate price measure. We do not have adequate data for this type of finer classification of generic products. Because of this limitation of the price variable, we have included, in one of the exercises, advertising intensity of firms (ADS = Total advertising expenditure / sales) to capture our arguments about product differentiation. The implicit presumption is that higher the advertising intensity higher is the product differentiation of a firm (Sutton,1992).

P	Unit price as defined above
Q	Quantity of sales
Y	Income (per capita net national product)
D	Dummy variable that takes a value of 1 for new entrant MNCs and 0 for incumbents
D1, D2 D3, D4	Firm specific dummies for capturing the fixed effects
ADS	Total advertising expenditure/sales

3.3. The Results

Table 2 presents the results for the estimated log linear inverse demand functions. Except in the case of air-conditioners, the inverse demand functions are well identified with appropriate signs for the estimated coefficients of *Q* (negative sign) and *Y* (positive sign). Our first hypothesis can be verified by observing the sign of the estimated coefficient of the dummy variable (*D*) in the inverse demand function of Table 2. A positive coefficient implies new entrant MNCs realize higher price for their product. The sign of the estimated coefficient of *D* is positive in the cases of M, W, and A and it is statistically significant only in the case of M. In the case of R and CT, the sign is negative and it is statistically significant for R. Thus the hypothesis is not rejected for the motor cycle industry and clearly rejected for refrigerators.

In view of the limitation of the price variable discussed earlier, the question is further probed by a Probit function, reported in Table 3. The dummy variable D is regressed against price and advertising intensity variable. The Probit function tests whether the likelihood of a firm being a new entrant MNC is greater if the price and advertising intensity are higher (Maddala, 1983). The results are not very different from those reported in Table 2. They show positive signs for the estimated coefficient of P in all cases except for the industry, R. But it is statistically significant only in the case of M. In the case of advertising intensity variable, the estimated coefficient is positive and statistically significant in three cases, R, W, and A, implying new entrant MNCs tend to have higher advertising intensity than incumbents. In the other two industries it is negative and statistically significant in the case of colour television industry.

In order to test our second hypothesis that new entrant MNCs will have higher income elasticity for their products, we estimate a log linear demand function reported in Table 4. Besides log P and log Y, it features an interactive term $D^{*}\log Y$. Positive sign of the estimated coefficient of the interactive variable implies that new entrant MNCs realize higher income elasticity. From Table 4, its sign is positive in all cases and is statistically significant in the cases of refrigerators and air-conditioners. Also the value of income elasticity of demand is significantly greater than 1 in all cases.

4. Conclusion

In this paper, we have conjectured about a possible strategy of new entrant MNCs in a market recently made contestable. Obviously the scenario discussed is contingent on a critical amount of disadvantage of incumbents, which may or may not obtain in a given industry. Also the conjecture about income elasticity of demand is based on a very specific pattern of income growth characterizing the Indian situation since reforms. Our empirical analysis shows some evidence that the scenario may actually prevail in some industries.

We have already remarked in Section 2 that the conclusions primarily hinge on the extent of incumbency disadvantage, partly captured by the difference in cost conditions faced by incumbents and newcomers. Incumbency disadvantage would differ between industries not only because of the technical nature of products but also because of the history of a particular industry. An old and established industry is likely to have incumbents with significant fixed costs tied to their customary product lines, while incumbents in a young industry may not have much disadvantage. Secondly, the pre-entry level of indigenization of an industry also accounts for the difference. A newcomer may not have much cost advantage over an incumbent who uses mostly imported components. Colour television industry is a good example of this situation. In this industry the costs of changing product specification is not high for incumbents as they generally import the picture tubes and assemble them in-house and also most incumbent firms are relatively new having started their production in the 80s. In these circumstances a newcomer has to use some other strategy. For example in very recent years, the South Korean MNC, Akai entered the Indian market through intense price competition, so much so that it caused a general fall in colour television prices. On the other hand, the costs of changing product differentiation in the motor cycle industry is expected to be high given that incumbent firms have been operating for a considerable period and use mostly indigenous

components. In other words, the short run inflexibility of the incumbents' quality range is more dominant in this industry.

Though this discussion implies that we should expect to find mixed results across industries, the results of the present exercise may have been influenced by our choice of the price variable. A better alternative is to use a variable that can distinguish prices of different size classes of the same generic product. This would require more detailed data, but the effort may be worthwhile.

Finally, apart from the specific model presented here, the paper tries to make a general point. Industrial behaviour in third world countries may often diverge from what is expected in the context of institutions characterizing a developed market economy, and it may be useful to model and test behaviour with country-specific institutional assumptions.

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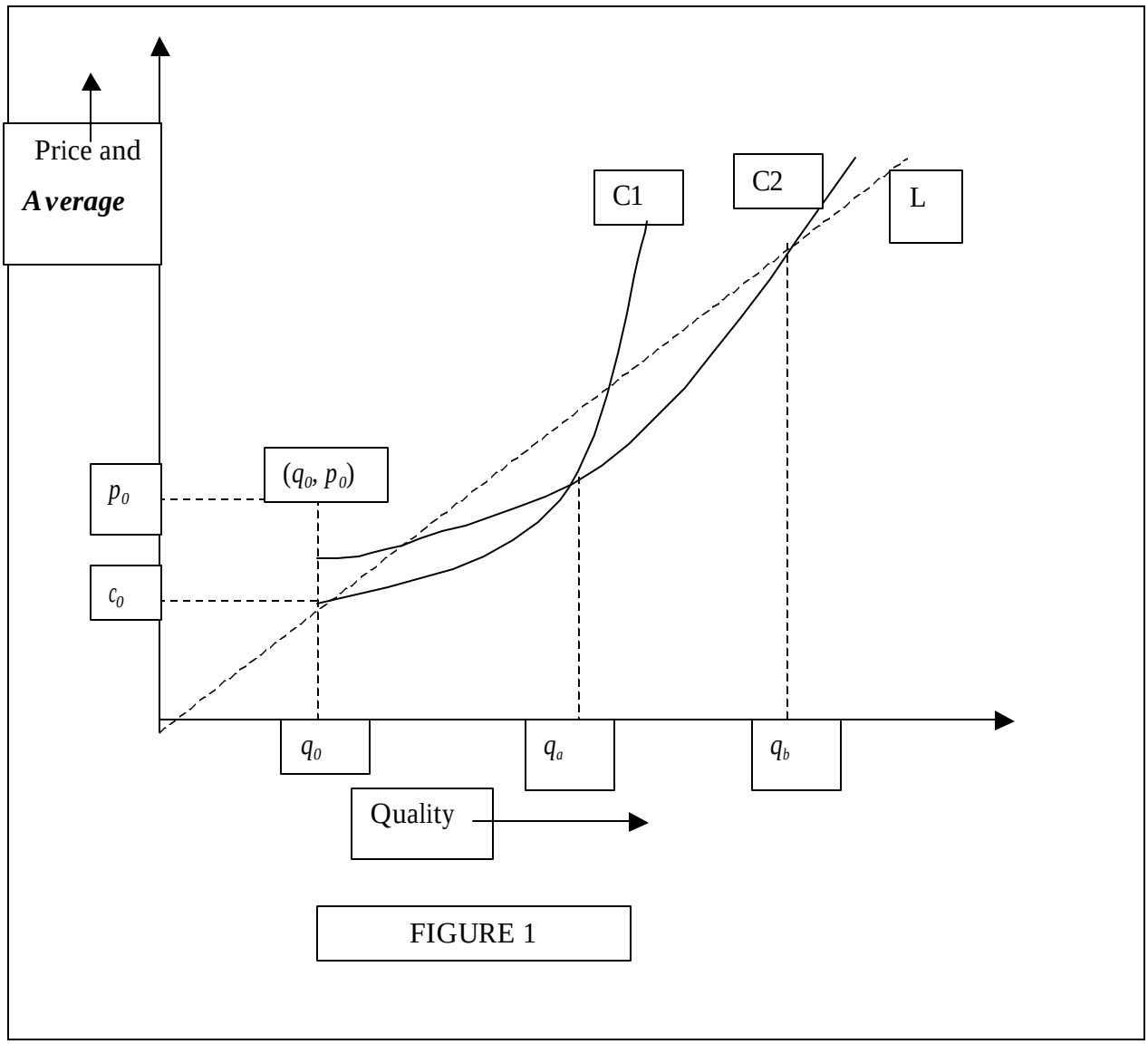


FIGURE 1

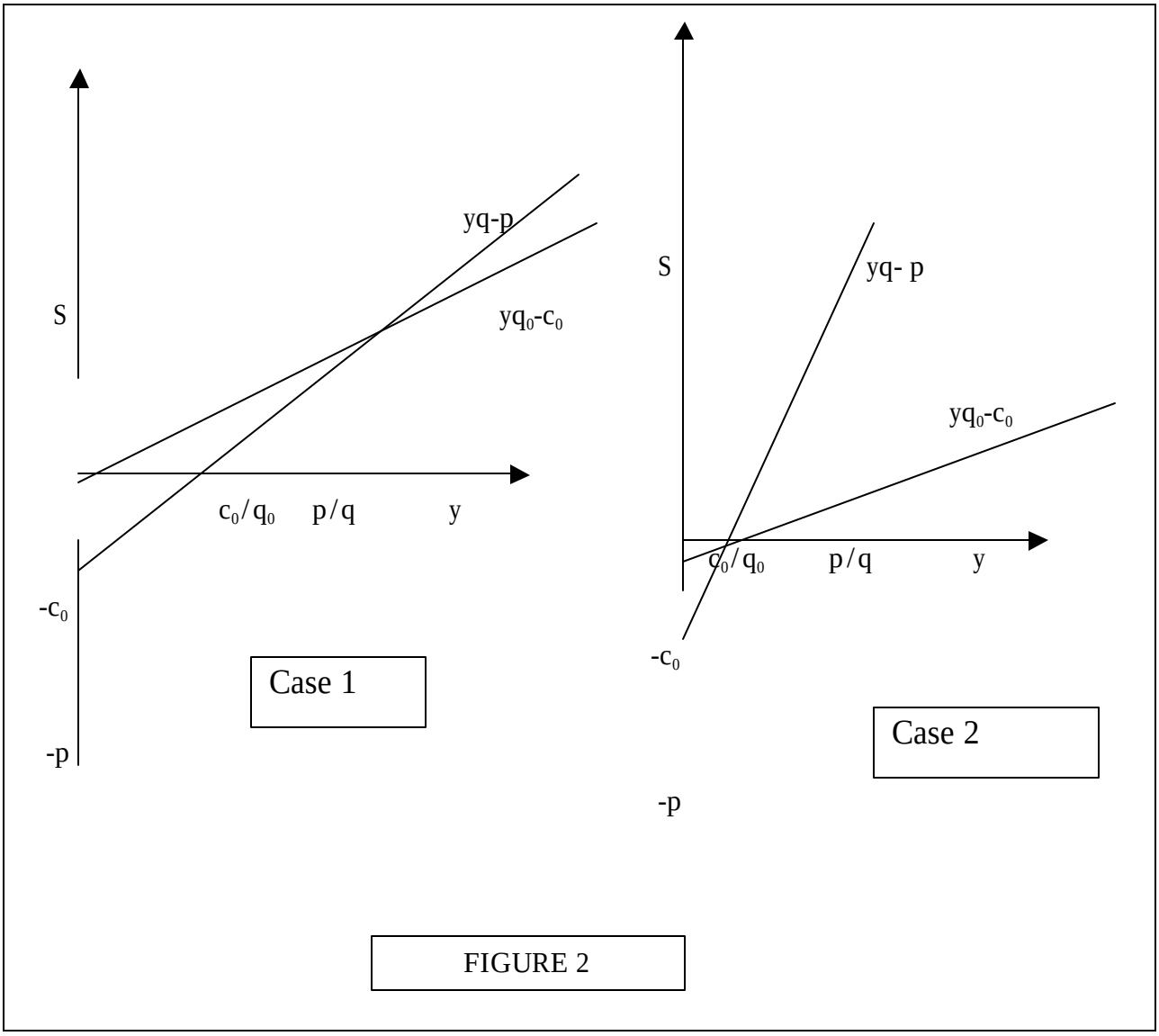
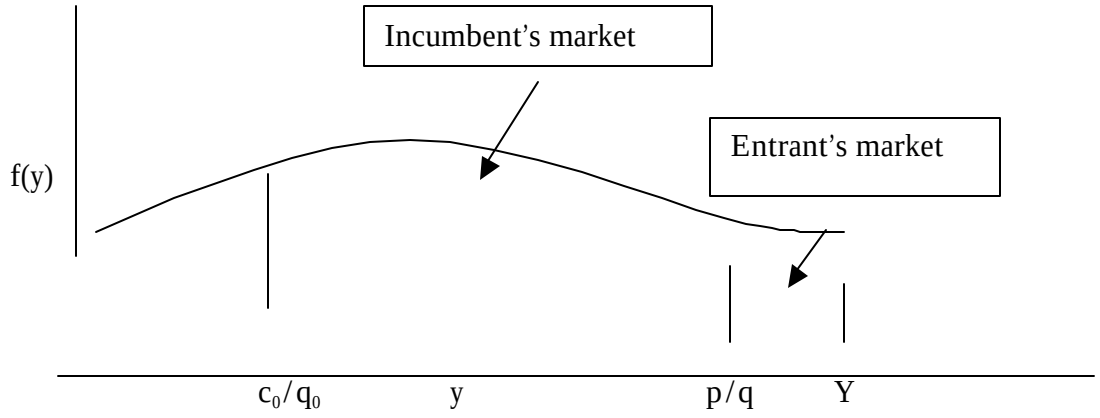


FIGURE 2



Share of incumbent and new entrant's markets in Case 1

FIGURE 3

Table 1. The Sample

Industry	Total Number of firms	Number of New MNCs
M	5	2
R	5	1
CT	7	1
W	5	2
A	4	1

Table 2. Estimated Log Linear Inverse Demand Function (log P)

Industry	Constant	Log Q	Log Y	D	D1	D2	D3	D4	Adjusted R^2	F	N
M	-6.6 (8.5)*	-0.02 (0.5)	3 (8.2)*	0.03 (1.78)**	-0.02 (0.8)	-0.06 (1.2)	-	-	0.77	27	32
R	-3.9 (2.9)*	-0.2 (4.4)*	1.92 (3.2)8	-0.47 (6.9)*	-0.16 (4.2)*	-0.11 (2.4)*	-	-	0.73	14	25
CT	-2.3 (1.3)	-0.2 (2.3)	1.15 (1.7)	-0.03 (0.4)	0.2 (2.5)*	0.12 (1.64)	0.14 (2.2)*	-0.3 (4.3)*	0.60	12	52
W	-6.3 (2)*	-0.28 (5.8)*	2.91 (2)*	0.01 (1)	0.13 (1.3)	-0.14 (1.6)	-	-	0.85	23	20
A	3.45 (2.4)*	0.021 (0.4)	0.35 (0.6)	0.09 (1.3)	-0.07 (0.9)	0.01 (1)	-	-	0.33	3.8	24

Figures in the parantheses are *t* values.

*significant at 0.01 and ** significant at 0.05 levels

Table 3. Probit Estimates

Dependent Variable (*D*)

Industry	Constant	P	ADS	Log likelihood	R^2
M	-1.19 (1.06)	1.07 (1.78)**	-2.2 (0.8)	-20	0.09
R	0.63 (0.26)	-3.8 (1.07)	8.5 (2)*	-7.3	0.38
CT	-0.78 (0.7)	1.8 (1.4)	-72 (1.85)**	-10	0.14
W	-2.6 (1.79)**	0.4 (0.1	26 (2.0)*	-3.9	0.75
A	-4 (2.4)*	369 (0.5)	3.2 (2.8)*	-5.7	0.6

Figures in the parantheses are t values.

*significant at 0.01 and ** significant at 0.05 levels.

Table 4. Estimated Log-linear Demand Function (Log Q)

Industry	Constant	Log P	Log Y	D	D*log Y	D1	D2	D3	D4	Adjusted R^2	F
M	-11 (4.3)*	-0.66 (1.98) *	6.2 (5.2)*	-1.3 (0.5)	0.36 (0.4)	-0.1 (2.3)*	0.4 (9.6)*	-	-	0.87	37
R	-11 (3.7)*	-0.27 (1)	6.0 (4.5)*	-23 (2.5)*	9.1 (2.4)*	-0.4 (5.1)*	-0.9 (4.2)	-	-	0.91	43
CT	-5.4 (2.9)*	-0.66 (3.7)*	2.7 (3.8)*	-11 (1)	3.9 (1.2)	0.5 (0.5)	-0.3 (3.3)	0.08 (0.7)	-0.1 (0.13)	0.7	18
W	-24 (2.7)*	-2.2 (4.6)*	11 (2.98)*	-2 (0.09)	0.74 (0.9)	0.24 (0.6)	0.47 (1.9)	-	-	0.85	20
A	-10 (2.7)*	0.3 (0.46)	6.1 (3.6)*	-9.3 (1)	4.6 (1.78)**	1 (8.6)	1.2 (8)*	-	-	0.91	42

Figures in the parantheses are *t* values.

* significant at 0.01 and ** significant at 0.05 levels