

EXCESS CAPACITY IN GASOLINE RETAILING

by

STUART MALCOLM McFADYEN

B.Sc., The University of Manitoba, 1959

M.A. University of California, 1967

A THESIS SUBMITTED IN PARTIAL FULFILMENT OF
THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF ARTS

in the Department of Economics

We accept this ~~thesis~~ as conforming to the required standard

THE UNIVERSITY OF BRITISH COLUMBIA

April, 1968

In presenting this thesis in partial fulfilment of the requirements for an advanced degree at the University of British Columbia, I agree that the Library shall make it freely available for reference and Study. I further agree that permission for extensive copying of this thesis for scholarly purposes may be granted by the Head of my Department or by his representatives. It is understood that copying or publication of this thesis for financial gain shall not be allowed without my written permission.

Department of Economics

The University of British Columbia
Vancouver 8, Canada

Date April 29 / 68

ABSTRACT

The purpose of this study was to analyse the competitive pressures producing excess capacity in gasoline retailing and to attempt to estimate the excess capacity existing in this industry in British Columbia.

Before either of these tasks could be undertaken it was necessary to decide exactly what is meant by the term "excess capacity." A study of the relevant literature led to the choice of the following definition:

Excess capacity = (number of outlets existing in an industry under present competitive conditions) - (number of outlets which could be expected in the industry under conditions of active price competition).

This definition of the optimum number of firms in an industry makes it possible to measure the excess amount of resources in an industry over the most efficient amount. The key to the definition is the presence of active price competition in the market under consideration. If this condition is met a number of outlets satisfying the Chamberlinian "sort of ideal" will be present in the industry when long run equilibrium is achieved.

To determine whether active price competition was present in a given market, evidence (gathered by means of an interview survey) was considered on the following points: (i) The prevalence of consignment selling, (ii) The degree of uniformity of the retail price of gasoline in a given sub-market, (iii) The height of dealer margins. Supplementary evidence bearing directly on the extent of excess capacity was gathered on: (i) Rent subsidization, (ii) Direct observation of excess

capacity and, (iii) Estimates by service station operators of the degree of underutilization.

Sixteen operators were interviewed in two urban sub-markets and on the basis of a detailed evaluation of the above evidence six service stations were estimated to constitute excess capacity. The oligopolistic interdependence of the major oil companies which dominate gasoline retailing in urban areas prevented an extension of this proportion to all urban stations.

In non-metropolitan areas of the province 39 out of 110 stations were estimated to be excess capacity. Because the influence of the major oil companies is much less in these areas this proportion can be extended to show approximately 740 stations to be excess capacity out of the 2107 stations in these areas.

TABLE OF CONTENTS

	Page
INTRODUCTION	1
 Chapter	
I. THE CONCEPT OF EXCESS CAPACITY	11
II. RESEARCH TECHNIQUE AND MEASUREMENT METHOD.	23
III. THE EXCESS CAPACITY ESTIMATES	35
IV. EVALUATION AND QUALIFICATION OF THE EXCESS CAPACITY ESTIMATES	42
V. CONCLUSIONS.	51
BIBLIOGRAPHY	53
APPENDICES	56
I. QUESTIONNAIRE USED FOR SURVEY OF SERVICE STATIONS . . .	57
II. DETAILED DESCRIPTION OF EACH GASOLINE MARKETING AREA AND THE SERVICE STATIONS WITHIN IT	62
III. DETAILED DATA AND A DISCUSSION OF THIS DATA ON THE FOLLOWING ASPECTS OF EACH MARKET AREA	80
(a) Posted Retail Prices	
(b) Rent Subsidization	
(c) Calculation of Gallonage Required at Five Cents per Gallon Margin to Maintain Dealer Incomes.	

LIST OF TABLES

Table	Page
I. 1963 Refinery Capacity of Major Oil Companies	4
II. 1963 Gasoline Sales of Service Stations Classified by Ownership Arrangement.	5
III. 1963 Market Shares of Major Brands and Private Brands . .	7
IV. Number of Service Stations in British Columbia in 1963 by Location and Type of Ownership.	9
V. Dispersion of Posted Prices of Regular Grade Gasoline . .	28
VI. Rent Subsidization of Service Stations.	31
VII. Excess Capacity Summary--Metropolitan Areas Sample. . . .	39
VIII. Excess Capacity Summary--Areas Outside Large Metropolitan Centres	40
IX. Areas A and B--1963 Sales of Existing Outlets	62
X. Area C--1963 Sales of Existing Outlets	63
XI. Area D--1963 Sales of Existing Outlets.	64
XII. Area E--1963 Sales of Existing Outlets.	65
XIII. Area F--1963 Sales of Existing Outlets.....	66
XIV. Area G--1963 Sales of Existing Outlets.	68
XV. Area H--1963 Sales of Existing Outlets.	70
XVI. Area I--1963 Sales of Existing Outlets.	71
XVII. Area J--1963 Sales of Existing Outlets.	73
XVIII. Expected Results of Active Price Competition in Area J. .	76
XIX. Area K--1963 Sales of Existing Outlets.	76
XX. Area L Sample--1963 Sales of Outlets Included in Sample .	78

Table	Page
XXI. 1963 Posted Retail Gasoline Prices	84
XXII. 1963 Gasoline Tank Wagon Prices	85
XXIII. Rent Subsidization of Service Stations by Major Oil Companies	87
XXIV. Calculation of Gallonage Required at Five Cent Margin to Maintain Dealer Incomes--Areas Inside Consignment zones	93
XXV. Calculation of Gallonage Required at Five Cent Margin to Maintain Dealer Incomes--Areas Outside the Con- signment Zones.	94

LIST OF FIGURES

Figure	Page
1. Monopolistic Competition Long Run Equilibrium Solution	45

INTRODUCTION

Excess Capacity Defined

Small scale outlets make up the bulk of the retailers in the market for the most commodities. Everyday observation shows us that the stores (or stations) of these retailers are often quite empty and their employees are relatively idle when we patronize them. This observation suggests that excessive amounts of the community's resources are being devoted to retailing. The measurement of the excessive amount of resources devoted to gasoline retailing in British Columbia is the problem to be investigated in this thesis. Of what assistance is economic theory in attacking this problem?

A theory can specify certain critical values of economic variables or parameters on which the solution of a problem might depend, but in order to measure the magnitudes involved (even to estimate them in a qualitative sense), "a detailed specification of the environment to which the theory is to be applied" is required; thus "the role of economic theory in the solution of practical problems is extremely limited: the important (and more difficult) part of the task becomes the problem of measurement, however it is performed."¹

The excessive amount of resources (i.e., the excessive number of service stations) cannot be measured until the unit of measure--the

¹Harry G. Johnson, "The Taxonomic Approach to Economic Policy," Economic Journal, Vol. 61 (December 1951), p. 827.

service station--is defined. As with most retail trades, counting each outlet as one exaggerates the position for there are a large number of tiny outlets. In gasoline retailing the exclusion of certain outlets from the total number of stations is facilitated through supplementary information as to the nature of associated businesses which can be obtained in an interview survey. The excess must be measured in terms of numbers of "conventional" one and two bay stations for all of which gasoline makes up a large proportion of total sales.

My attention was first drawn to the excess capacity in gasoline retailing by general observation of both the large number of service stations in existence and the low level of utilization of these stations (in that they often have no customers and almost never have line-ups even at peak hours). Next an attempt was made to devise a theoretical explanation of these findings in a theoretical definition of excess capacity. The Chamberlinian model of monopolistic competition presents a theoretical explanation of why, when non-aggressive price policies are pursued, an excessively large number of retailers can be expected, on a priori grounds alone, to be operating in a given market area. The use of the term "excessively large" refers to the number of retailers emerging in the absence of price competition as compared to a "sort of ideal" condition proposed by Chamberlin--that is the long run equilibrium which would result in the face of active price competition.

This is the concept of excess capacity which will be employed and which I have attempted to assess. That is, I am attempting to measure the difference between the existing capacity of the industry and the capacity which would exist in the case of active price competition

(capacity in both cases being measured in standard outlet units).

The method used to measure excess capacity in gasoline retailing consisted of interviews with all retailers in a chosen area, direct observation of their premises, their methods of operation, and the characteristic features of the market area. An evaluation of this material was used to develop an estimate of optimum capacity, and hence an estimate of excess capacity for each individual area.

Since the excess capacity to be measured in this thesis is that of gasoline retailing in British Columbia let us now turn to a brief examination of the market structure of that industry.

The Market Structure of Gasoline Retailing in British Columbia

Petroleum retailing in British Columbia is dominated by seven major oil companies. The refinery capacity of each of these firms as shown in the following table gives one indication of their relative importance. In any market where the number of sellers is this small, interdependencies must exist which would affect the price and output decisions of sellers. If these effects were to be transmitted to the retail gasoline market our analysis which is based on an evaluation of the degree to which active price competition is present would of course be greatly complicated. Fortunately very few stations are directly operated by the major oil companies. Almost all fall into three other categories with varying degrees of independence from the supplying oil company. The four categories whose 1963 gasoline sales are summarized in Table II. are:

1. Stations which were owned or leased by the oil company and were operated by its employees on a salary or commission basis.

TABLE I

1963 REFINERY CAPACITY OF MAJOR OIL COMPANIES

Firm Name	Refinery Capacity (Barrels per day)
Imperial	32,000
Shell	21,000
Standard	18,000
British American	18,000
Royalite	5,500
Pacific Petroleums	3,500
Texaco	None
Total	98,000

Source: Charles William Morrow, Report of the Commissioner, Royal Commission on the Gasoline Price Structure, Victoria, 1966, p.68.

TABLE II

1963 GASOLINE SALES OF SERVICE STATIONS CLASSIFIED BY
OWNERSHIP ARRANGEMENT

Ownership Arrangement	Gasoline Sales (Thousands of Gallons)	Number of Service Stations	Gasoline Sales per Service Station (Thousands of gallons)
Company-operated	5,559	27	206
Lessee-operated	164,128	1,310	125
Independents, financed	55,900	822	68
Independents, not financed	32,878	1,068	31
Total	258,465	3,227	80

Source: Charles William Morrow, Report of the Commissioner, Royal Commission on the Gasoline Price Structure, Victoria, 1966, p. 21.

2. Stations which were owned or leased by the oil company and leased by it to lessee dealers.
3. Stations operated by independent dealers who were financed by the oil companies.
4. Stations operated by independent operators who were not financed by the oil company.²

The independent, not financed, outlets sold an average of 31,000 gallons. They constituted 33.1% of the total number of service stations but only accounted for 12.7% of the gallonage sold. As the detailed questionnaire results showed, many of these outlets are not primarily in the gasoline and lubricant retailing field but rather are merely adjuncts to other businesses. Such outlets have been excluded from the excess capacity estimates for the reasons discussed in Chapter I.

What of the stations not retailing gasoline of the major oil company brands, the so-called private branders? It might be thought that their aggressive pricing policies would bring active price competition to British Columbia gasoline retailing. Any such tendency in the areas of the province outside Metropolitan Vancouver is very weak however because the number of private branders is so small. This is indicated in Table III.

In Metropolitan Vancouver, although private branders only made up 4.9% of the stations they had gained 9.7% of the gallonage. Here the tendency to active price competition among stations was checked by the adoption of a so-called "consignment" system by the major oil companies. Through this arrangement dealers were guaranteed a 7¢ per gallon margin regardless of the level of retail gasoline prices. Thus the effects of active price competition by private branders which would normally have

²Charles William Morrow, Report of the Commissioner, Royal Commission on the Gasoline Price Structure, Victoria, 1966, p. 20.

TABLE III

1963 MARKET SHARES OF MAJOR BRANDS AND PRIVATE BRANDS

Brand type	Metropolitan Vancouver		Remainder of Province	
	percentage of number of station	percentage of gallons sold	percentage of number of stations	percentage of gallons sold
Major brand companies	95.1	90.3	97.8	94.3
Private branders including department stores	4.9	9.7	2.2	5.7
Total	100	100	100	100

Source: Charles William Morrow, Report of the Commissioner, Royal Commission on the Gasoline Price Structure, Victoria, 1966, p. 30.

been reductions in competing dealers' margins, or gallonage, or both (and have thereby led to a reduction in the number of stations in long run equilibrium) were forestalled by the major oil companies bearing the brunt of the competitive pressure.

In short private branders were not able to bring about the results of active price competition predicted by economic theory. In regions outside Metropolitan Vancouver this was by virtue of lack of numbers: in Metropolitan Vancouver it was a direct result of major oil company subsidization of dealers through their consignment arrangement.

The relative proportions in which each of the four types of major oil company service stations exist in a given area has important implications for the measurement of excess capacity. These relative proportions for each of three levels of population density are shown in Table IV.

It can be seen from the above that independent dealers are more numerous in areas outside the major metropolitan centres. It is in these areas, where the area by area evaluations have been made, that the Chamberlinian analysis of monopolistic competition is most applicable since the complications introduced by the oligopolistic interdependence of the major companies in the retail market are avoided. Chapter I immediately following examines this analysis in detail with special emphasis on the derivation of the concept of excess capacity.

In Chapter II the sampling techniques and method of estimation are outlined. A discussion of the significance of various types of evidence of the absence of active price competition [(1) Consignment selling, (ii) Uniform retail prices and, (iii) High retail margins] as

TABLE IV

NUMBER OF SERVICE STATIONS IN BRITISH COLUMBIA IN 1963 BY
LOCATION AND TYPE OF OWNERSHIP

	Total	Company Operated	Lessee Operated	Financed Independents	Not financed Independents
Metropolitan Vancouver and Victoria	1120	17	748	181	174
Other centres over 5000 population	544	7	221	156	160
All under 5000 population	1563	3	341	485	734
Total	3227	27	1310	822	1068

Source: Charles William Morrow, Report of the Commissioner, Royal Commission on the Gasoline Price Structure, Victoria, 1966, p. 23.

well as supplementary evidence of excess capacity [(i) Rent subsidization, (ii) Direct observation of excess capacity and underutilization and, (iii) Estimates of underutilization by service station operators] conclude the chapter.

After presentation of the estimates of excess capacity for the areas in which interviews were conducted and for the non-metropolitan areas of the province as a whole in Chapter III, several qualifications and amplifications of these estimates are discussed in Chapter IV. Conclusions of the study are stated in Chapter V.

CHAPTER I

THE CONCEPT OF EXCESS CAPACITY

What is excess capacity?

Speaking of the situation in the United Kingdom in 1966 Harry Townsend states:

It is not easy to decide whether there are too many filling stations today. Demand fluctuates hourly with peak traffic flows, daily with most trade at week-ends, and seasonally with the largest sales in the summer months. How adequate retailing facilities appear depends to a degree on when and where one wants to fill a tank; and it is a convenient service the motorist pays for, not the optimum solution to an exercise in logistics.¹

The nature of the "convenient service" offered by a given service station differs from that offered by his competitors according to the personality of the operator, extent of free services provided, relative proximity to a consumers residence or place of business. Thus we are concerned with a market which is imperfectly competitive and where product differentiation exists. The Chamberlinian analysis of excess capacity deals with precisely this case. This analysis will be examined in detail in the following pages.

The Unit of Measure

Consideration of the Chamberlinian analysis in the following pages

¹Harry Townsend, "Competition in Petrol Retailing," The Three Banks Review, The Royal Bank of Scotland, Blyn Mills & Co., William Deacon's Bank Limited, (March 1966), No. 69, p. 22.

leads to the conclusion that the criterion for the measurement of excess capacity which is most meaningful is:

Excess capacity = (number of outlets existing in the industry under present competitive conditions) - (number of outlets which could be expected in the industry under conditions of active price competition). This type of a market criterion of excess capacity makes it possible to avoid the logistical problem approach suggested by Townsend above.

However denominating excess capacity in terms of the unit "outlet" raises an additional difficulty which is stated by Townsend in the following terms:

As with most retail trades, counting each outlet as one exaggerates the position, for there are a large number of tiny outlets. In 1961, 18 per cent of the outlets supplied by Shell-Mex and B.P., the company with the widest geographical coverage, had annual sales of less than 10,000 gallons, and another 22 per cent had annual sales of between 10,000 and 25,000 gallons. For these retailers petrol can only have been a sideline.²

This last sentence provides the key to the nature of the unit "outlet" which must be used to provide a meaningful measurement of excess capacity. This must be restricted to operations primarily in the business of selling gasoline and lubricants. Townsend sets out a gallonage criterion for deciding which operations fall in this "primarily gasoline and lubricant sales" category as follows:

In stations confined to dispensing petrol and lubricants, annual sales of 100,000 gallons are generally considered the minimum for providing a livelihood to the dealer and a reasonably efficient scale of operation.³

Judge C. W. Morrow suggests a more liberal gallonage definition of an outlet in his statement:

. . . If it were considered that an outlet which sold less than

²Ibid.

³Ibid.

50,000 gallons was not a true service station, there would be 1,773 service stations with an average gasoline sale of 129,000 gallons out of a total number of service outlets of 3,227 whose average sales were 80,000 gallons.⁴

Judge Morrow observed further that most of the outlets in the over 50,000 gallon category were stations owned and either leased or operated by the major oil companies or were independent stations which had received financial assistance from the oil companies. Stations in these categories are of course nearly always of the standard one or two bay service station design. This standard one or two bay service station is our unit of measure in the measurement of excess capacity in gasoline retailing.

It is possible for our criterion to be stated in this more explicit fashion (as opposed to merely a gallonage measure) because of the more detailed information available to us on the nature of associated businesses, physical layout, etc. provided in the questionnaire results.

Also, because of the detailed information made available, it was possible to include as one unit of capacity the few exceptional operations which had as a principal business the dispensing of gasoline and lubricants, but which did not have the physical layout of a standard service station. Most of the 852 independent not financed outlets which had gallonage under 50,000 (out of a total of 1,050 independent not financed stations) represent the operations of automobile dealers and grocery-gasoline combinations. In each of the detailed area evaluations

⁴Charles William Morrow, Royal Commission on Gasoline Price Structure, Report of the Commissioner, Victoria, 1966, pp. 27-28.

of excess capacity such outlets are specifically segregated and the estimate restricted to the service station category designated above plus the exceptions noted.

In summary, the use of the standard one or two bay service station (supplemented by a few exceptional operations chiefly dependent on gasoline sales) as our standard unit of measure of excess capacity is based on the following considerations:

(1) Only those operations primarily in the business of selling gasoline and lubricants can meaningfully be considered part of gasoline retailing capacity. Our criterion provides accurate coverage of this group.

(2) Gallonage measures suggested by other writers are inferior in that they provide only rough approximations as to which outlets are primarily in the gasoline retailing business.

(3) The use of an easily identified unit of measure (supplemented by exceptions which clearly require inclusion) provides an objective standard for area by area evaluation of excess capacity and makes the results of the evaluation more meaningful.

So much for the unit of measure used in our estimates. Before considering the estimates themselves let us examine the theoretical reasoning leading to the competitive market criterion of excess capacity (where excess capacity equals the number of outlets by which those in existence in the present situation exceed the number necessary in the industry under conditions of active price competition).

In the next section a number of possible interpretations of the term "excess capacity" are set forth and each is evaluated to determine

its applicability and usefulness in the problem at hand: that of actually measuring the excess capacity existing in gasoline retailing in British Columbia. As will be seen, by a process of elimination this range of interpretations can be narrowed to one - the Chamberlinian concept of excess capacity determined by the degree to which active price competition exists in a given market. "Excess" capacity can exist of course only as an excess over some optimum or ideal level of capacity. The theoretical basis of the Chamberlinian "sort of ideal" which provides the optimum output level for each firm and hence by derivation the optimum capacity for the industry is also examined in the following section.

A. The Meaning of Excess Capacity

Although the basic idea of the concept of excess capacity is implicit in the term, there are a variety of particular meanings which may be attached to it. Although the list is far from exhaustive we can identify three concepts of excess capacity:

(i) Excess capacity of all factors in the community as a whole (macro-economic sense).

(ii) Excess capacity of fixed factors in an industry.

(iii) Excess capacity of all factors in an industry.

Let us examine each of these in turn.

(i) Excess capacity of all factors in the community as a whole (macro-economic sense)

Excess capacity of all factors in the community, is a macro-economic concept. Much attention has been devoted to the measurement of excess capacity in this sense in recent years,⁵ but by and large this

⁵L. R. Klein, "Some Theoretical Issues in the Measurement of

literature is not relevant to our present task. However, such excess capacity must show up as excess capacity in particular industries, including the particular industry which we are studying. Excess capacity would not be expected to emerge to the same extent in all industries in the face of a macro-economic shortfall of demand, but it would probably affect almost all industries to some degree. Its influence on the demand for gasoline has been estimated to be very slight by Spencer, Clark, and Hoguet. They state:

One of the interesting things revealed by this analysis was the tendency for total gasoline consumption to have a cyclical relation to purchasing power, the latter measured by supernumerary income. Thus, the total amount of driving depends upon the working and living habits of people. These habits are strongly enough entrenched so that small variations in purchasing power exercise only slight effects on gasoline consumption per car, the result being that there is a tendency for short-term fluctuations in gasoline consumption to be dampened. But when large fluctuations in purchasing power occur, as in the early thirties, two consequences become apparent: (1) many persons are unable to operate their cars, and (2) those that continue to operate their cars reduce their consumption of gasoline, but not in proportion to the fall in income. In other words, a sharp drop in purchasing power reduces considerably the number of cars in operation, but reduces only slightly the average consumption of gasoline per car. Therefore, as long as supernumerary income has exhibited a generally rising trend as during the past decade, gasoline consumption for cars and buses could be reasonably well forecast without the use of this variable. But in periods of wide economic fluctuation, supernumerary income turns out to be quite important for improving the accuracy of forecasts.⁶

This aspect of the problem of measuring excess capacity which has been largely ignored in the studies surveyed may be safely accorded the same

Capacity," Econometrica, Vol. 28 (April 1960), pp. 272-280.

A. Phillips, "Appraisal of Measures of Capacity," American Economic Review, Papers and Proceedings, Vol. 53 (May 1963), pp. 309-313.

⁶Milton H. Spencer, Colin G. Clark and Peter W. Hoguet, Business and Economic Forecasting, Homewood, Irwin, 1961, pp. 217-218.

treatment here since no large changes in purchasing power occurred in the years immediately preceding the date of the study. In a period when such changes had occurred some attempt would have to be made to take account of this factor however.

(ii) Excess capacity of fixed factors in an industry

The effects of macro-economic excess capacity are closely related to a second concept of excess capacity, that is what J. M. Cassels refers to as excess capacity of fixed factors in an industry. This concept may be interpreted as implying essentially a shortfall of production relative to existing productive capacity in the short-run. This means that fixed factors are not used to their maximum potential, and the firms in question are not producing at the minimum points on their short-run cost curves. Such shortfall may arise from various causes, including cyclical fluctuations in the economy giving rise to macro-excess capacity as discussed above. Other forces such as changes in the structure of demand (both inter-product and inter-firm) may also be at work.

The excess capacity of fixed factors in an industry or firm is the variety of excess capacity most familiar to economists and businessmen and it is this form which is most obvious because of its physical manifestations - idle repair bays and pumping facilities in the case of service stations, empty shops in the case of meat retailing. There are however several ambiguities involved in this short run concept which renders it inappropriate for our purposes. For instance the importance of any given percentage of excess capacity (in this sense) in any firm or industry will depend on the relative proportions of fixed and variable factors in the production function. Also the excess capacity of fixed

factors in an industry is not necessarily equal to the sum of the excess capacities of the firms in that industry since:

. . . there are some factors, such as labor, which tho [sic] variable from the point of view of the firm, may if specialized or localized, be fixed from the point of view of the industry. It should also be recognized that even from the point of view of the individual firm the factors which have to be regarded as fixed will depend to some extent on the period of time under consideration and the magnitude of the output variations in question.⁷

A third source of ambiguity is the fact that changes in the valuations placed on various factors will alter the measured amount of excess capacity. Since the maximum output physically attainable with the fixed factors would not be economically practical, capacity output is generally agreed to be the minimum point of the short-run average cost curve. The shape of the cost curve and hence the output at which average costs will be minimized will depend of course on the cost-rates applied to the inputs of all the factors concerned. Capacity will vary directly with the valuation of fixed factors and inversely with the valuation of variable factors.

It would thus appear that this is not a useful concept of excess capacity. In part this conclusion rests on the theoretical ambiguities inherent in the concept. But the major reason is that it is strictly short-run in nature. It involves taking a snap-shot of the industry at one point in the process of adjustment to a long term equilibrium, without asking the question: what is the nature of the long run equilibrium to which it is heading? And surely the latter is the interesting question. It is what is implied in the third concept of excess capacity.

⁷John M. Cassels, "Excess Capacity and Monopoly," Quarterly Journal of Economics, Vol. 51 (May 1937), p. 428.

(iii) Excess capacity of all factors in an industry

Cassels has applied the term "excess capacity of all factors" to the third concept. The point which we wish to stress, however, is that it is a long run concept. It involves an attempt to assess the nature of the equilibrium to which the industry is adjusting and to assess the adequacy of the equilibrium productive capacity.

In order to see how this long run concept of excess capacity of all factors leads to the market criterion of excess capacity which has been outlined above we must examine the monopolistic competition analysis of E. Chamberlain.⁸ The usual concept of excess capacity derived from Chamberlain's work relates to the discrepancy between the equilibrium output revealed by the tangency solution and the minimum point on the assumed "U" shaped long run cost curve. Along with Demsetz, Friedman and Stigler⁹ and Chamberlain himself we are rejecting this concept. The minimum point can only be reached by tangency of the cost curve with a horizontal demand curve and such a demand curve is representative only of a purely competitive market. To base the estimated excess capacity on such a construct would be to ignore the characteristic features of the retail market being considered, the desire of consumers for product

⁸E. H. Chamberlain, The Theory of Monopolistic Competition, Cambridge, Harvard, 1933, p. 106.

⁹H. Demsetz, "The Nature of Equilibrium in Monopolistic Competition," Journal of Political Economy, Vol. 67 (February 1959), pp. 21-30.

Milton Friedman, "The Methodology of Positive Economics," Essays in Positive Economics, Chicago, University of Chicago, 1953.

George J. Stigler, "Monopolistic Competition in Retrospect," Five Lectures on Economic Problems, London, Longmans, 1949.

differentiation which is reflected by the sloping demand curve and also the fact that a greater quantity of resources will necessarily be required to distribute a given quantity of goods in an imperfect market.

Chamberlin does suggest a "sort of ideal condition - that is the long run equilibrium which would result in the face of active price competition. He states:

We may regard the elasticity of dd' as a rough index of buyers' preferences for the 'product' of one seller over that of another. The equilibrium adjustment becomes, then, a sort of ideal. With fewer establishments, larger scales of production, and lower prices it would always be true that buyers would be willing to pay more than it would cost to give them a greater diversity of product; and conversely, with more producers and smaller scales of production, the higher prices they would pay would be more than such gains were worth.¹⁰

It is important for the logic of the analysis to recognize that product differentiation does not of itself account for the development of excess capacity. Chamberlin makes clear in the following passage that it is the absence of active price competition which is at the heart of the excess capacity problem.

. . . whenever price competition fails to function, whether because each seller is in close competition with only a few others or for any other reason, the result is not merely higher prices, but also excess capacity as a permanent and normal characteristic of the equilibrium adjustment.

In the measurement of excess capacity, then, much of the burden must be thrown on an assessment of the degree of price competition which is present in the market and from there on an evaluation (necessarily hypothetical) of the structure of the industry if active price competition existed.

This divergence from the "sort of ideal" is the concept of excess

¹⁰Chamberlin, op. cit., pp. 93-94.

capacity which we employ and which we are attempting to assess. That is, we are attempting to measure the difference between the existing capacity of the industry (measured in standard outlet units) and the capacity which would exist in the case of active price competition.

The criteria used to determine whether active price competition was present in a given market are :

(i) Whether price-cutting is used as a competitive device to give consumers a varied choice of combinations of service, convenience and price.

(ii) Whether retail profit margins in the market are at a low level.

A Broader Concept of Excess Capacity

Cassels introduces a more fundamental definition of excess capacity saying:

What is actually meant by Chamberlin is the presence in an industry of an amount of general productive resources which if they were more efficiently employed could produce an output that would add more to the national dividend.¹¹

This is of course the true object of concern but it is not measurable. The Chamberlin case on the other hand is measurable. While the links between the two cases are not easily determined it seems clear that if there is excess capacity in the Chamberlin case, there is excess capacity in the more fundamental sense. We have confined ourselves to the Chamberlin case throughout this thesis.

Conclusions

The optimum amount of resources to be devoted to an industry can

¹¹Cassels, op. cit., p. 433.

be estimated as the amount which would be devoted to the industry in a hypothetical situation where the industry is in long-run equilibrium and is characterized by active price competition. The excess capacity which we are attempting to measure is the difference between the existing capacity of the industry and the capacity which would exist in the case of active price competition (both measured in standard outlet units).

CHAPTER II

RESEARCH TECHNIQUE AND MEASUREMENT METHOD

Even given the conceptual definition of excess capacity laid out in the previous chapter estimation cannot be undertaken until a specific research method has been decided upon. For the purposes of this study it was decided to interview block samples of service station operators throughout the province. The sampling technique used in selecting these blocks is described in the next section; the regions from which the samples were selected is described in the second following section.

The remainder of the following chapter is devoted to a presentation of the various types of evidence of excess capacity which were adduced during the survey. Consignment selling, uniform posted prices and high retail prices demonstrate a lack of active price competition wherever they are present. Extensive rent subsidization by major oil companies reinforce such a conclusion. Direct observation of excess capacity and underutilization by interviewers and estimates of underutilization by service station operators provide supplementary data to substantiate the area by area estimates.

Sampling Technique

A detailed study of gasoline retailing in British Columbia was necessary to estimate Chamberlin's "sort of ideal" and hence the excess capacity present in each market as well as to examine the underutilization

of existing capacity. Such a study could have been accomplished by interviewing all service station operators in British Columbia or a number of them selected at random from a complete listing. It was felt that obtaining either complete coverage or a random sample large enough to be informative would be excessively costly, and thus a third alternative was adopted. The province was divided into regions to ensure adequate coverage of all geographic areas of the province. Within each region the specific market areas to be interviewed were selected at random. The 100% coverage of the chosen locations made possible a more accurate assessment of each. It was my opinion that an extension of this more accurate result to other markets would provide a more accurate assessment of excess capacity for the province as a whole than a less accurate assessment on the basis of a large sample.

The Regions Surveyed

The province was divided into five regions ordinarily considered geographically disparate. These are:

- (1) Lower Mainland comprising metropolitan Vancouver and all mainland centers within a two hundred mile radius.
- (2) The whole of Vancouver Island.
- (3) The Okanagan. This region includes not only the Okanagan valley from Penticton to Salmon Arm but also points east to the Alberta border and west to Kamloops on the Trans Canada Highway.
- (4) The South-east to include the area south of the Trans Canada Highway and east of the Okanagan Valley.
- (5) The North made up principally of all points north from Hope to Prince George and west to Prince Rupert.

The Questionnaire

The questionnaire used in the survey was designed to elicit a picture of each service station's ownership, operation, and profitability which would be complete enough to accurately assess the probable reaction of its operator to a more competitive environment.

Inquiries were made as to station ownership (including details of leases and mortgages), the length of time the present operator had been at the location and as to his previous job. The wages paid the operator and his employees were ascertained.

The physical facilities and present gallonage were noted as well as the trend of sales over the years and the peak load pattern both daily and yearly. Each operator was asked to estimate the maximum gallonage increases he could handle under present conditions or alternately with an increase in variable factors only.

Information was also sought as to the price of gasoline, rate of rent and amount of the operator's personal investment. A profit and loss statement was requested from all dealers.

A copy of the complete questionnaire appears as Appendix I.

The Absence of Active Price Competition--Evidence of Excess Capacity

Since excess capacity has been defined as the difference between the existing capacity of the industry (measured in standard outlet units) and the capacity which would exist in the case of active price competition the fundamental precondition for its presence is the lack of active price competition. Evidence as to the presence of consignment selling, uniformity of posted prices, and a high level of retail margins in

gasoline retailing in British Columbia is presented in three following sections. This evidence provides substantial support for the conclusion that active price competition is absent from this industry.

(1) Consignment Selling

In the large urban centres gasoline retailing is dominated by a national oligopoly of major oil companies. Because of their large stake in the industry these firms are unwilling to engage in price-cutting and the industry is characterized by price leadership. It is in these areas that the retail price is maintained at a specific margin above the tank-wagon price by a consignment arrangement which allows the retailer a fixed commission on each gallon sold. To state that price leadership and consignment arrangements exist is not to suggest that competition per se is lacking, since the firms do vie to provide the highest level of credit card and pump island service. The proliferation of service stations in the urban areas is one of the methods by which the major oil companies are able to increase the level of service offered to consumers.

In centres outside the consignment zones similar forces work to cause rigid prices but since these areas are characterized by a different market structure these forces work through different channels. The local oligopoly of dealers with its "live and let live" attitude is the principal method of maintaining high dealer margins. The national oligopoly however is the primary reason these various local oligopolies are able to achieve this result, since the members of the national oligopoly are able to provide support to dealers in any areas where they are threatened by price competition from "private-brand" or other discounters. In these areas outside the consignment zones there appeared to be some

proliferation of outlets due to building programs of the major oil companies but the major influence generating excess capacity was the high profit margin maintained by the local oligopolies which enabled low volume outlets to remain open.

(ii) Uniformity of Posted Prices

The second type of evidence which can be adduced to illustrate the absence of active price competition in gasoline distribution is data illustrating the extent to which firms compete for business by cutting price and the extent to which it leads to a variety of price and service combinations being offered to consumers. Details of evidence obtained on this point are contained in the section headed "Posted Retail Prices" in Appendix III. Table V presents a short summary.

In the urban centres and nearby areas (not shown above because they are consignment zones) the consignment system accompanied by a fairly stable tank-wagon price has yielded a relatively stable retail price. In previous years private brand stations have been a source of price competition, but the major oil companies have neutralized them by meeting price cuts in the areas affected and stabilizing prices with only a limited price differential. This results of course in a more limited range of alternatives of price and service combinations than can be found in other retail industries.

Outside the consignment zones operators are free to set their own prices but, as the above table shows, differentials are extremely limited. Often the differentials which do exist are so poorly advertised that they reflect the ignorance of one another's prices by the operators

TABLE V

DISPERSION OF POSTED PRICES OF REGULAR GRADE GASOLINE

Market Area	Number of stations	Range between highest and lowest price (cents per gallon)	Difference between modal and lowest price (cents per gallon)
A and B	3	4.9	.0
C	3	1.1	-
D	6	1.6	.0
E	15	1.4	.1
F	9	1.1	.1
G	11	0.2	.2
J	38	5.0	3.0
K	10	1.5	1.5

Note: The inference that none of these markets are characterized by active price competition must be drawn from the evidence in the fourth column showing the difference between the modal and lowest price in each market. The data illustrate that there is very little divergence downward from the most common price in any of the markets (except for Area J where two stations in an isolated sub-market have indulged in price cutting). The fact that the range between the highest and lowest price in each market is of considerably greater magnitude is not however contradictory evidence. It merely reflects the fact that isolated convenience outlets often charge prices considerably higher than accepted levels because of the additional services involved.

more than a tendency towards aggressive price cutting behavior. At times this pattern is disturbed but under normal market conditions the consumer faces only a limited choice of price and convenience even outside the consignment zones.

(iii) High Level of Retail Margin

A high level of retail margins is the third type of evidence which can be presented to illustrate the absence of active price competition. The 7¢ margin prevailing in the consignment zones, although lower than margins in these centres prior to the adoption of the consignment arrangement, was higher than the margin prevailing in other Canadian cities. In 1963, the retail margin was 6¢ in Winnipeg, 6.5¢ in Calgary, Edmonton, Montreal, Toronto, and Regina, and 7¢ in Vancouver and Victoria.¹ As the data in Appendix III on margins and prices show, margins in areas outside the consignment zones are still higher, ranging up to 11.7¢ in area K.

Thus the information on consignment selling, uniformity of posted prices and high retail margins leads us to the conclusion that active price competition is absent and hence excess capacity must be present in the retail gasoline market in British Columbia.

Additional Evidence of Excess Capacity

The specific estimates of excess capacity for each area are based on an evaluation of the manner in which the industry might adapt to increased price competition (included in the detailed area evaluations

¹Initial submission of Imperial Oil Limited to the Royal Commission on the Gasoline Price Structure. Facing p. 38.

in Appendix II) along with the information to be considered in the next three sections. These deal with rent subsidization, direct observation of excess capacity and underutilization, and estimates of underutilization by service station operators.

Rent Subsidization

The analysis of rent subsidization was undertaken to determine the extent to which the service stations whose operators were interviewed were viable economic units. The basic premise of the analysis is that with profit maximizing lessors and operators earning opportunity incomes, a station which is a viable economic unit should be paying a rent which is sufficient to cover the full costs incurred by its owner, i.e., not only explicit costs such as property taxes but also implicit costs such as depreciation and return on invested capital. The total dollar value of the annual subsidization received by each station is shown by the subsidization per year figure shown for each station. Since the rent subsidization must be received by the oil companies in the form of their share of profit on the gasoline handled by each station, the subsidization per gallon has special significance and hence is shown separately for each station. The median subsidization per gallon for each area is shown in the following table (Table VI).

The highest degree of subsidization occurs in L and I areas. Both of these are in the present consignment zones which are the site of past price wars. Thus the conclusion may be drawn that the oil companies have forestalled the market adjustment process which would normally take place in the face of active price competition. The exit of firms to the point where the number remaining would correspond to

TABLE VI
RENT SUBSIDIZATION OF SERVICE STATIONS

Market Area	Median Subsidization (cents per gallon of last complete year's sales)
E	1.2
G	1.5
I	1.8
J	1.1
L	1.9

the number encompassed by the Chamberlinian "sort of ideal" has been prevented by means of each oil company granting larger subsidies (in the form of rents below the level of full owners costs) to those of its dealers who are located in areas where active price competition prevails.

Direct Observation of Excess Capacity and Underutilization

The sight of a service station every few blocks in certain populated areas as well as the occasional intersection with two or even three of the corners occupied by service stations leads to the casual observation among the general public that there are too many service stations. The number of occasions when these retail outlets are serving no customers and the rarity of any waiting period even during rush hours provide the impression that there is extensive underutilization of these stations.

The direct observations resulting from the survey served mainly to confirm the above impressions and to reveal evidence of latent capacity in the form of land area available for additional repair bays or pumping facilities at many stations. Three qualifications to conclusions based

on these direct observations must be taken into account.

The first is in regard to the observation of excessive numbers of service stations. Zoning regulations and the buying habits of consumers sharply limit the area within which service stations can locate. Thus a group of stations located one on every other block may be serving a large hinterland and the first impression as to the extent of overcapacity may be exaggerated. This difficulty has been partially obviated by the use of exact information on the operations of each station.

The second qualification relates to the identification of specific service stations as the excess capacity in a given retail gasoline market area. Certain establishments whose operators were interviewed were in the process of exiting from the industry as a result of the normal workings of the market over time for example changing consumer tastes or changing traffic patterns. The estimates of excess capacity are subject to the criticism that gasoline outlets which are exiting for these normal market reasons cannot be identified explicitly and excluded. This is not a serious difficulty however since in a given market at any point of time the number of firms exiting for this type of reason is offset by the number entering for similar reasons (e.g., located on the new road). Also the estimates of excess capacity are not based solely on the performance of individual dealers but rather on a comparison of the present number of outlets to the number which would be present under conditions of active price competition.

The third qualification is in regard to the accuracy of the impression of underutilization of capacity. Most service stations are integrated gasoline and repair businesses; each gallon of gasoline sold

is accompanied by a certain volume of service and repair work. Thus although observation of the pumping facilities alone leads to a facile conclusion of underutilization it must be recognized that although the service station operator could easily add substantially to his gasoline gallonage he might quickly find that his service and repair facilities would become overtaxed. The discussion of underutilization has attempted to take into consideration the integrated nature of the service station business.

Estimates of Underutilization by Service Station Operators

The examination of Appendix I shows that dealers were asked to make three different types of estimate of their full-capacity output. Since information on present output was available, comparison of present output to full-capacity output was possible in order to shed light on the degree of underutilization of existing capacity.

Operators were first asked to estimate the amount of additional gasoline sales they could handle with their existing plant, equipment and labor force, secondly what they could handle with the existing plant and equipment but with additional labor. Thirdly they were asked to estimate the maximum gallonage which could be handled at the site if new plant and equipment were introduced and additional labor hired.

The estimates appeared to be of uneven quality. One bias which was discernable was the direct correlation between the size of the present operation and the estimate of capacity. For example operators with very low gallonages consistently supplied very modest estimates of the extent to which they could expand output. In short only limited reliance could be placed on these estimates, but they were helpful in

providing general guidance and served to point out the problems involved in making such estimates.

Conclusions

The first step in the estimation of excess capacity in gasoline retailing is a demonstration of the absence of active price competition. The evidence of consignment selling, the absence of price cutting behavior, and the presence of high retail margins serves this purpose. The data on rent subsidization strengthens the conclusion. The measurement of this excess depends however upon insight into the likely long run adjustment of the industry to a market structure characterized by active price competition.

The estimates of service station operators offer only general guidance to the evaluation of the degree of underutilization. This evaluation depends largely on direct observations (suitably qualified) and a consideration of the overall results of the interviews.

CHAPTER III

THE EXCESS CAPACITY ESTIMATES

We now proceed to a brief summary of the area by area estimates of excess capacity followed by an overall evaluation for the areas covered and for the rural areas of the province as a whole. In considering the following estimates the reader must keep in mind that, for the reasons outlined in Chapter I the unit of measure of excess capacity is the standard service station and that for this reason other types of outlets must be segregated in each instance. Because of the confidential nature of the information involved each area has been designated only by a letter of the alphabet.

Areas A and B

Three rural outlets each pumping less than 70,000 gallons per year. Excess capacity: The single standard service station.

Area C

Three rural outlets each pumping less than 75,000 gallons per year. Excess capacity: Although two outlets would probably close in the face of active price competition our estimate must be restricted to the one standard service station in the area.

Area D

This is a small town where six outlets pump a total of 200,000

gallons per year. Excess capacity: Four outlets would probably close in the face of active price competition but since one of these is a motel with gasoline as a sideline our estimate is a three station excess capacity.

Area E

This area is a large town with six downtown businesses offering gasoline in association with their other services and goods. Along the highway through the town there are seven service stations and two motel and gas combinations. Excess capacity: Only one of the seven highway stations is associated with a dealership or other business. The gallonage of the remaining six could easily be handled by the other outlets in a more competitive environment i.e., our estimate is six service stations.

Area F

This large town contains six dealers pumping 450,000 gallons per year and four high volume service stations pumping 650,000 gallons per year as well as ten marginal outlets averaging 45,000 gallons per year each. Excess capacity: It is estimated that in the face of action price competition ten outlets would close but since only eight of these are standard service stations our estimate of excess capacity is limited to the latter figure.

Area G

This area can be divided into three geographical locations: the highway leading into town (one outlet); a northerly suburb (six outlets);

the town proper (six outlets). Excess capacity; the single integrated outlet on the highway would be relatively unaffected by price competition.

The three integrated outlets would easily handle all sales leaving excess capacity equal to three service stations in the suburb.

In the town proper more active price competition would probably result in one dealer and one service station exiting. Thus excess capacity equals one station in this area for an overall total for area G of four stations.

Area H

This area contains five stations in an urban suburb pumping an average of 170,000 gallons per year each. Excess capacity: Active price competition would probably result in the closing of two marginal stations if no supportive action were taken by the major oil companies.

Area I

This area is another urban suburb with eleven stations again pumping an average of 170,000 gallons per year each. Excess capacity: If the major oil companies did not interfere with the competitive adjustment process four stations would probably close in the face of active price competition.

Area J

This small city was the largest single unit covered by the survey. The results can be best analysed if the large number of stations involved (36) is segregated into six meaningful sub-regions. Region 1. Seven downtown dealers pumping an average of 70,000 gallons per year each. Excess capacity: None since these are convenience

outlets only.

Region 2. An industrial area with three stations mainly involved in repair work. Excess capacity: One station which has a low volume of both gasoline sales and repair work.

Region 3. There are three marginal stations and a dealer pumping an average of 60,000 gallons per year each in this suburb. Excess capacity: The two service stations which would almost certainly exit in the face of active price competition.

Region 4. An isolated integrated outlet. Excess capacity: None since although this outlet would probably close in the face of active price competition it is not a standard service station.

Region 5. This is an artificial region consisting of one service station and six outlets combined with various businesses which have in common only the fact that although they are scattered throughout the city none of them is on a highway. Excess capacity: The one service station is excessive.

Region 6. This region consists of the seventeen relatively homogeneous service stations located on the major traffic arteries of the city and pumping a total of 2.3 million gallons per year. Excess capacity: 2.3 million gallons if pumped by ten stations should be sufficient volume to enable them to compete vigorously on the basis of low cost and efficient operation. Thus excess capacity equals seven stations.

Summary: Of the total 39 outlets it has been estimated that excess capacity consists of eleven stations.

Area K

This small isolated city is serviced by four dealers, a parking garage and seven service stations. Excess capacity: Five of the more marginal service stations would probably close in the face of active price competition.

Overall evaluation of all areas in which interviews were conducted

The excess capacity estimates are summarized in the two tables shown below (Table VIII and Table IX). The estimates for areas H and I have been shown separately since in metropolitan centres the oligopolistic interdependence of the major oil companies coupled with their strong influence in the retail market through their leased stations makes the emergence of active price competition very unlikely and hence the theoretical basis of the excess capacity estimates in these areas less satisfactory.

TABLE VII

EXCESS CAPACITY SUMMARY - METROPOLITAN AREAS
SAMPLE

Area	Present Number of Outlets		Excess Capacity
	Dealers and integrated businesses	Service stations	
H	0	5	2
I	0	11	4
Total	0	16	6

TABLE VIII

EXCESS CAPACITY SUMMARY - AREAS OUTSIDE LARGE
METROPOLITAN CENTRES

Area	Present Number of Outlets		Excess Capacity
	Dealers and integrated business	Service station	
A and B	2	1	1
C	2	1	1
D	3	3	3
E	8	7	6
F	7	12	8
G	6	7	4
J	15	24	11
K	5	7	5
Total	48	62	39

Excess Capacity in the Entire Province of British Columbia

It is very difficult for the reasons advanced in the previous section to arrive at the meaningful estimate of excess capacity for metropolitan centres. If the 6 out of 16 proportion for the areas sampled were extended to the 1120 metropolitan stations (1963 total) an excess of the order of 420 stations would be indicated. This estimate must however be viewed in light of the fact that given the present market structure the theoretical model used as the basis of the definition of excess capacity is not applicable to these areas.

There need be no such qualification to the use of the 39 out of 110 proportion obtained as a result of the estimation of excess capacity in areas outside the metropolitan centres. Extensive sampling was done over a wide and representative area to justify this 35 per cent figure which when applied to the 2107 stations (1963 total) yields an estimate of excess capacity for these areas of approximately 740 stations.

CHAPTER IV

EVALUATION AND QUALIFICATION OF THE EXCESS CAPACITY ESTIMATES

A large proportion of the service stations in British Columbia have been estimated to constitute excess capacity in the industry.

But several questions remain unanswered:

What causes excess capacity to be generated?

Does the limitation of the excess capacity estimates to regular service stations bias the estimates because of insufficient coverage?

What explains the underutilization of existing outlets which was observed in the course of the study?

These questions will be considered in turn in the following section of this chapter.

Generation of Excess Capacity Through the Desire for Adequate Brand Representation

Competition by the major oil companies to secure adequate representation in all market areas is one of the chief incentives to service station construction and hence the creation of excess capacity. The importance placed on adequate representation is illustrated by the fact that each market area has roughly the same number of each major company's stations. The only centre varying from this even pattern was Area K where British American have 9 stations and Standard 7 as against 3 to 5 for other major companies.

The duplication of brand stations in all the larger centres

(E, K, G, I, J) would suggest that numbers of stations could be reduced in any centre of over say 2500 population and still maintain adequate representation. In the smallest centres (A, B, C) some majors have chosen not to install subsidized, money losing stations to secure representation. This suggests that in a community such as D where presently the seven major companies each have one station (although the Texaco has been forced to close) if a more competitive environment were to be introduced, some marginal major company stations would be allowed to close to avoid severe losses.

Restriction of Excess Capacity to "Regular"

Service Stations

As has been outlined above only the "regular" service stations whose principal business is the retailing of gasoline and lubricants can meaningfully be included in an estimate of excess capacity. 83 of the 130 stations interviewed fall in this "regular" service station category. We assume these hardest hit in a more competitive environment. The large number shows there is adequate room for a working-out of the consequences of a different marketing situation. The other 47 establishments would probably just absorb a reduced margin and continue to pursue their auxiliary businesses (auto dealerships, repairs, motels or stores). Outlets eliminated would probably be mainly in the service station category but some of the firms with related businesses might choose to discontinue pumping gas if the margin fell too sharply. Others of course would increase gallonage merely by remaining in business in a new market situation with fewer "regular" service station

competitors.

The view has been taken in this study that in the light of this set of opposing forces the market share of this non-service station segment of the market would remain relatively constant in the face of active price competition. Service stations as a group would thus be faced by a constant market share but a lower profit margin and hence lower total gross income as a result of active price competition. As has been outlined in the theoretical discussion above, the Chamberlinian "sort of ideal" in such a situation is the number of stations which are able to earn a normal return on investment in such circumstances. In each market area an attempt was made to estimate this "sort of ideal," the divergence of the existing number of stations from the sort of ideal being the measure of excess capacity.

The Chamberlinian discussion is conducted of course in terms of an amorphous "quantity of resources" terminology. The quantification in terms of units of service stations is possible in the context of this study since all outlets whose principal business is the dispensing of gasoline and oil at retail utilize quite uniform physical plant and operational technique, that exemplified by the standard one or two bay service station.

The Underutilization of Capacity

If the theoretical concept of excess capacity is to be restricted to the excessive duplication of outlets then a further explanation must be given for the underutilization of these outlets which was observed in this study. The excess capacity of all factors discussed by Cassels

is a long run concept. Thus each outlet, when long run equilibrium has been reached at a point such as Q in the diagram shown in footnote 1 below should have adjusted its fixed factors to the optimal quantity required for that output.¹ Three major factors causing the underutilization of the existing units which will be considered for both (a) privately owned stations and (b) major oil company owned stations are the following:

- (i) The fact that a long run disequilibrium situation is being observed, i.e., long run equilibrium at Q not achieved
- (ii) Technical bounds to station size

¹This is not precisely true since for all equilibrium solutions the downward sloping demand curve DD' is tangent to the long run cost curve at points to the left of its minimum. Therefore DD' must also be tangent to the short run cost curve appropriate in each case at a point to the left of its minimum as shown in the following diagram.

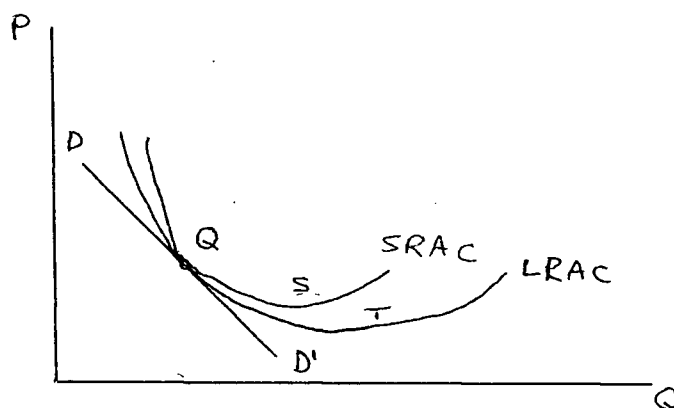


Figure 1--Monopolistic Competition Long Run Equilibrium Solution

Since Q, the point of tangency when excess capacity is present, is to the left of S, the minimum point of the short run average cost curve, some underutilization of fixed factors will be observed even when equilibrium is achieved at Q.

(iii) Importance of maintaining the brand image.

Privately Owned Stations

(i) Long Run Disequilibrium

When long run equilibrium is attained at a point such as Q because of the absence of active price competition in the market concerned an excessive number of optimum sized (as qualified by note 1) outlets will be in existence.

This equilibrium cannot be achieved instantaneously since adjustment of fixed factors is a lengthy process. Thus when the present market structure is examined and much underutilization of factors is encountered, this can be attributed partly to the fact that firms have not had sufficient time to adjust to the new lower outputs which they will be handling when equilibrium is reached.

The importance of this factor in the gasoline retailing industry is indicated by the long life-span of the fixed factors used. Thus when an outlet is constructed on the basis of a certain expected level of output and the entry of new stations to the marketing area reduces its output it may be ten or twelve years before the existing physical plant requires replacement. During this entire ten to twelve year period the firms in this area will be in long run disequilibrium and underutilization of the existing capacity will be observed.

A second dynamic factor which may account for part of the underutilization is the fact that market demand may be growing or be expected to grow. In this case outlets may be larger than would be optimal in view of present conditions since entrepreneurs are considering these growth factors in determining the size of outlet to be constructed.

In the case of privately owned stations growth factors will be of secondary significance since most operators lack sufficient investment capital to construct stations larger than present demand would warrant.

(ii) Technical Bounds to Station Size

Technical considerations in regard to the physical operation of a service station set a lower bound to their size. Thus even although a very low gallonage may be available to a station technical considerations dictate the construction of a building large enough to hold at least one bay (and nearly always two) plus an office, the installation of two pumps, and the paving of an area large enough to provide parking and access. It is true of course that in rural areas gasoline dispensing may be combined with other businesses and this type of technical indivisibility overcome. But even here the fact that the individual operator is indivisible means that in an area where demand is not sufficient to justify the employment of one man in an outlet under-utilization will be observed even in such a small one man operation.

(iii) Maintenance of the Brand Image

Since the actions of any single dealer cannot significantly affect the overall brand image of the oil company whose products he distributes, considerations affecting the maintenance of this image play only a minor role in determining the size and nature of outlet to be constructed by private investors. To the extent that major oil companies are able to influence these investment decisions through their power to refuse to allow their products to be sold through sub-standard outlets maintenance of the brand image becomes operative in the same fashion as for leased stations as described below.

Stations Leased from Major Oil Companies

(i) Long Run Disequilibrium

As for privately owned stations a long run equilibrium may be achieved with an excessive number of optimum sized outlets in existence. The adjustment by the major oil companies of the scale of their outlets to a size appropriate to the gallonage to be handled at this long run equilibrium is slowed in the same fashion by the long life of the fixed factors involved. During the ten to twelve year physical life of a station the firms will be in long run disequilibrium and underutilization of existing capacity will be observed.

Expectations of future market growth play an important role in the investment decisions of major oil companies. Growth considerations become important in the determination of the size of outlets principally because the oil companies possess the financial resources to implement programs designed to provide capacity which will necessarily stand idle for perhaps several years in order to service future increases in volume without station alterations. The data on rent subsidization shows in part that the oil companies are prepared to sustain current losses on their service station investments in order to provide outlets which are of larger than optimal size. Thus expectations of future market growth are an important factor leading to an underutilization of existing capacity.

(ii) Technical Bounds to Station Size

Since both the oil companies and private owners operate outlets of identical technical nature, the conclusions reached in the discussion of privately owned stations is equally applicable here.

(iii) Maintenance of the Brand Image

The maintenance of the brand image of the major oil company is an important factor influencing the building of stations which are too large by the standard of any present or expected future demand. Just as the major oil companies wish to have a representative of their brand in every market area in order to service regular customers who are touring, they also wish to maintain each of these stations at an equally high standard. Considerations of this sort in addition to the advantage for advertising purposes of having a chain of identical outlets dictate in some market areas an outlet larger than that which would, these considerations aside, be needed to handle the gallonage available. This also is then a possible cause of the underutilization of existing capacity which was observed in the study.

Conclusions

The desire for adequate brand representation in each sub-market appears to be an important influence in the generation of excess capacity. Evidence indicates however that if excessive losses occur in a certain sub-market the major oil companies will sacrifice brand representation.

Excess capacity should be restricted to units of "regular" service stations since these are the outlets whose main business is the retail dispensing of oil and lubricants and hence are the group which would bear the brunt of the closures in the face of more active price competition.

Finally we have seen above that although the Chamberlinian analysis provides us with a rationale to explain the excessive proliferation of service stations additional explanations must be sought for the underutilization of these outlets which was observed in the course of

the study. The following three explanations were considered:

(i) The situation presently being examined is often one of long run disequilibrium.

(ii) There are minimum technical bounds to the size of service stations which can be constructed.

(iii) A minimum standard is required of any service stations in order to maintain the brand image of the major oil company which will supply it.

These three explanations provide a sufficient explanation of why both privately owned and leased service stations could have been expected to be underutilized at the time of the study.

CHAPTER V

CONCLUSIONS

The purpose of this study was to analyse the competitive pressures producing excess capacity and causing the underutilization of capacity in gasoline retailing. Furthermore an attempt was made to estimate the excess capacity existing in this industry in British Columbia.

Before excess capacity could be measured or the competitive pressures producing it could be analysed it was necessary to decide exactly what is meant by the term. A study of the relevant literature led to the choice of the following definition:

Excess capacity = (number of outlets existing in an industry under present competitive conditions) - (number of outlets which could be expected in the industry under conditions of active price competition).

In more general terms "excess capacity" refers to the presence in an industry of an amount of general productive resources which if they were more efficiently employed could produce an output that would add more to the rational income. The definition used in this thesis has proven to be a useful criterion to quantify the resource misallocation present in gasoline retailing in British Columbia.

To measure excess capacity it was necessary to hypothesize the long run equilibrium result of active price competition in each sub-market under consideration. For each area an estimate of excess capacity

was calculated by comparing the number of outlets which would result in long run equilibrium under conditions of active price competition to the number presently operating in the market.

Using this procedure for metropolitan areas it was estimated that six out of sixteen service stations interviewed constituted excess capacity. However because of the strong influence of the major oil companies in the metropolitan retail gasoline market and the complication introduced by their oligopolistic interdependence this investigator felt it inadvisable to extend this six out of sixteen proportion to the full 1120 metropolitan stations (1963 total).

The estimation procedure is however fully applicable to the non-metropolitan areas of the province. In these areas the 39 out of 110 proportion obtained as a result of the interviews can confidently be extended to the full 2107 stations (1963 total) in this category to yield an excess capacity of approximately 740 stations.

BIBLIOGRAPHY

- Andrews, P. W. S. Fair Trade: Resale Price Maintenance Re-examined, London, Macmillan, 1960.
- Andrews, P. W. S. On Competition in Economic Theory, London, Macmillan, 1964.
- Bain, J. S. Barriers to New Competition, Cambridge, Harvard, 1956.
- Baumol, William J. Business Behavior, Value and Growth, New York, Macmillan, 1959.
- Cassels, John M. "Excess Capacity and Monopoly," Quarterly Journal of Economics, Vol. 51 (May 1937), pp. 426-443.
- Chamberlin, E. H. The Theory of Monopolistic Competition, Cambridge, Harvard, 1933.
- Demsetz, H. "The Nature of Equilibrium in Monopolistic Competition," Journal of Political Economy, Vol. 67 (February 1959), pp. 21-30.
- Demsetz, H. "The Welfare and Empirical Implications of Monopolistic Competition," Economic Journal, Vol. 74 (September 1964), pp. 623-641.
- Dow, Louis A. and Lewis M. Abernathy. "The Chicago School on Economic Methodology and Monopolistic Competition," American Journal of Economics and Sociology, Vol. 22 (April 1963), pp. 235-250.
- Fellner, William. Competition Among the Few, New York, Knopf, 1949.
- Ford, P. "Decentralization and Changes in the Number of Shops, 1901-1931," Economic Journal, Vol. 46 (June 1936), pp. 359-363.
- Ford, P. "Excessive Competition in Retail Trades. Changes in the Number of Shops, 1901-1931," Economic Journal, Vol. 45 (September 1935), pp. 501-508.
- Friedman, Milton. "The Methodology of Positive Economics," Essays in Positive Economics, Chicago, University of Chicago, 1953.
- Hall, Margaret and C. Winsten. "The Ambiguous Notion of Efficiency," Economic Journal, Vol. 69 (March 1959), pp. 71-86.

- Hall, Margaret. Distribution in Great Britain and North America, London, Oxford, 1961.
- Hall, Margaret. Distributive Trading, London, Hutchinson's, 1949.
- Hall, Margaret and John Knapp. "Gross Margins and Efficiency Measurement in Retail Trade," Oxford Economic Papers, N.S. Vol. 7 (October 1955), pp. 312-326.
- Harrod, R. F. Economic Essays, London, Macmillan, 1952
- Hicks, J. R. "The Process of Imperfect Competition," Oxford Economic Papers, N.S. Vol. 6 (February 1954), pp. 41-54.
- Johnson, Harry G. "The Taxonomic Approach to Economic Policy," Economic Journal, Vol. 61 (December 1951), pp. 812-832.
- Kahn, R. F. "Some Notes on Ideal Output," Economic Journal, Vol. 45 (March 1935), pp. 1-35.
- Kaldor, Nicholas. "Market Imperfection and Excess Capacity," Economica, New Series, Vol. 2 (February, 1935) reprinted in Readings in Price Theory, G. J. Stigler and K. E. Boulding editors, Chicago, Irwin, 1952.
- Klein, L. R. "Some Theoretical Issues in the Measurement of Capacity," Econometrica, Vol. 28 (April 1960), pp. 272-286.
- Lewis, W. A. "Competition in Retail Trade," Economica N. S. Vol. 12 (November 1945), pp. 202-234.
- Morrow, Charles William. Royal Commission on Gasoline Price Structure, Victoria, Queens Printer, 1966.
- Phillips, A. "Appraisal of Measures of Capacity," American Economic Review, Papers and Proceedings, Vol. 53 (May 1963), pp. 309-313.
- Robinson, Joan. Economics of Imperfect Competition, London, Macmillan, 1933.
- Schumpeter, Joseph A. Capitalism Socialism and Democracy, New York, Harper, 1942.
- Smithies, A. "A Theory of Value Applied to Retail Selling," Review of Economic Studies, Vol. 6 (June 1939), pp. 215-221.
- Spencer, Milton H., Colin G. Clark and Peter W. Hoguet. Business and Economic Forecasting. Homewood, Irwin, 1961.
- Stigler, George J. "Monopolistic Competition in Retrospect," Five Lectures on Economic Problems, London, Longmans, 1949.

Townsend, Harry. "Competition in Petroleum Retailing," The Three Banks Review, The Royal Bank of Scotland, Edinburgh, 1966.

Wilson, T. and P. W. S. Andrews, eds. Oxford Studies in the Price Mechanism. Oxford, Clarendon, 1951.

APPENDICES

- I. Questionnaire used for survey of service stations
- II. Detailed description of each gasoline marketing area and the service stations within it.
- III. Detailed data and a discussion of this data on the following aspects of each market area:
 - (a) Posted retail prices
 - (b) Rent subsidization
 - (c) Calculation of gallonage required at five cent per gallon margin to maintain dealer incomes.

APPENDIX I

SURVEY OF SERVICE STATIONS

being carried out for

THE ROYAL COMMISSION ON THE GASOLINE PRICE STRUCTURE

The purpose of this questionnaire is to aid the Commission in assessing the economic efficiency of the retail distribution system for gasoline in British Columbia. The information obtained from this survey will be treated as confidential. The answers given to the following questions will be used in the study but the service stations providing the information will not be identified.

Name and Brand Designation

Location

Kind of Station:

Self-owned and operated.. Is there a mortgage on the property?..

Leased from oil company..... from other.....

Other.....

Number of Islands..... Number of Hoses.... Number of Bays.....

Size of Lot.....

Name of person interviewed

Position lesee

owner.

manager.

other

1. How long have you been in charge of the station?
2. What was your previous position?
3. About what percentage of your gasoline business comes from people who live and work in this area?

.....%
4. With how many stations are you in direct competition?.....
5. About what percentage of your gasoline business is handled with

Credit Cards?.....% Charge Accounts% Cash?%
6. What was the gallonage here last year?
7. How does this gallonage compare with previous years?
8. How many gallons did you sell in your best year at this station?

. in your worst year?
9. Average monthly sales last year $\frac{\quad}{12} =$
10. What was the monthly pattern of your gasoline sales last year, i.e., what months were busier or quieter than the average?

January.....	May	September
February.....	June.....	October.....
March.....	July.....	November.....
April.....	August.....	December.....

11. Is this the usual pattern?
12. Daily average last month _____ =
13. What are your busy days and what are your slack days during the week?

Monday	Friday
Tuesday	Saturday
Wednesday.....	Sunday
Thursday.....	

14. What are your hours of operation?.....
15. (a) What are your busy and slack periods during the day?.....
- (b) What percentage of daily gallonage is pumped during your busy periods?
.....%
16. What is your estimate of the gallonage of sales you lose because your customers have to wait??
17. Including yourself, how many persons are employed at this station and how many hours a week do they work?

	<u>Hours per week</u>	<u>Wages per hour</u>
Owner-Lessee-Manager	_____	_____
Employees:		
Full-time.....	_____	_____
Part-time.....	_____	_____

18. How is the time of yourself and your employees divided among:
- (a) gasoline sales and pump island sessions _____% ?
- (b) service and repair work _____% ?
- (c) idle time _____% ?
19. What is the largest gallonage ever sold in one month at this station?

20. Given the present time pattern of your sales how many gallons of gasoline per month do you estimate could be sold at this station with no increase in the number of hours worked, no change in the physical facilities of the station and without a line-up for service?
21. If you could sell more gasoline with the existing number of hours worked what changes in working arrangements would be made by you and your employees?
22. What is the maximum gallonage you could possibly handle at this station, after adding new employees and pumps?
23. For what percentage of your customers do you provide the following free services? (Percentage applies to total number of individual gasoline purchases.)

Windshield wiping	.....
Water, battery and oil checks	.....
Check tires	.....
Other	.....

24. If you didn't perform these free services by how much could you reduce your labour requirement?
25. What rental is paid to the supplier company?
26. What free painting, advertising, training, etc. have been provided by the supplier company in the last two or three years?
27. What are the suppliers' policies with respect to repair work, oil, and T.B.A.

28.		<u>T.W. Price</u>	<u>Retail Price</u>	<u>Margins (or Consignment Commission)</u>
	Regular	.....	.....	.....
	Premium	.....	.....	.....

29. What was your total income from this station in the last financial year?

30. What fraction of this income would you attribute to the sales of gasoline?

sales of T.B.A.

service and repairs

31.	<u>Investment</u>	<u>Date of Investment</u>	<u>Actual Value per Tax Assessment</u>
	By dealer _____	_____ Land	_____
	By company _____	_____ Improvements	_____
	Total \$ _____	Total	\$ _____

32. In general what are the biggest problems that service stations are facing today?

SURVEY OF SERVICE STATIONS
being carried out for
THE ROYAL COMMISSION ON THE GASOLINE PRICE STRUCTURE

You are requested to provide, on a confidential basis, the following information on gross profits and investment to The Royal Commission on the Gasoline Price Structure. The answers given to the questions will be used in the study of the retail gasoline distribution system but the service stations providing the information will not be identified.

Name and Location of Station

From the balance sheet at your last financial year end:

<u>For Partnership or proprietor</u>	<u>For limited Company</u>
Owner's (or partners') equity\$ _____	Capital stock \$ _____
Long term debt _____	Earned surplus _____
Total Investment \$ _____	Long term debt _____
Total investment \$ _____	

From the income statement for your last financial year end:

	Sales	-	Cost of Sales	=	Gross Profit
	\$		\$		\$
Gasoline	_____		_____		_____
Oil	_____		_____		_____
Tires, Batteries, Accessories	_____		_____		_____
Service and Labor	_____		_____		_____
	Total Gross Profit				_____
<u>Expenses</u>			\$		
Occupancy - Rent			_____		
Wages Front-end			_____		
Wages Repair Shop			_____		
Other Expenses			_____		\$ _____
	Dealer Income				\$ _____

Note: If a Limited Company please state
wages paid to owners: \$ _____

Please return the completed form to: Dr. J. Young,
Economics Department
University of British Columbia

Thank you very much for your co-operation in this study.

APPENDIX II

This appendix contains a detailed description of each market area and the service stations within it. In the discussion of areas for which estimates of excess capacity were developed, there is included a detailed evaluation of the probably long run equilibrium results of active price competition in each market.

TABLE IX

AREAS A AND B
1963 SALES OF EXISTING OUTLETS

Type of outlet	Sales (Thousands of gallons per year)
(1) Repair garage	50
(2) Store and gas	67
(3) Service station	40
Total	157

Areas A and B are on the border of a price war area. Station (3)'s price is 4.9 cents higher on regular gasoline than the price posted by the other two stations.

Conclusions for Areas A and B

(a) Dealers were unaware of the possibility of going off consignment.

(b) The operators interviewed felt that retail sales by bulk

dealers were as important a factor in reducing gallonage in this area as the price differential between this area and the price war area.

(c) Low variable costs and low opportunity incomes combine to keep sub-marginal rural stations open.

TABLE X
AREA C
1963 SALES OF EXISTING OUTLETS

Type of outlet	Sales (Thousands of gallons per year)
(1) Service station and cafe	75
(2) Repair garage	19
(3) Store and gas	28
Total	122

Conclusions for Area C

The total gallonage could easily be pumped by any one of the concerns. If a more competitive environment were introduced (perhaps by a ripple effect from D) the most likely result would be to put (1) and (3) out of the gasoline business.

Summary

Two outlets closed.

One store/gas combination pumping 122,0000 gallons per year left.

TABLE XI
AREA D
1963 SALES OF EXISTING OUTLETS

Type of outlet	Sales (Thousands of gallons per year)
(1) Service station	35
(2) Service station	30
(3) Service station	30
(4) Repair garage	55
(5) Store and gas	45
(6) Motel and gas	5
Total	200

Conclusions for Area D

A more competitive environment would probably result in the closing of all outlets save (4) and (5). Since (4) does the repair work for a saw-mill owned by its owner and (5) has an active retail grocery business, they would maintain their operation. If the gallonage were split approximately evenly (i.e., 100,000 gallons per year each), both would be well within the limits of physical capacity.

Summary

Three service stations and one motel/gas combination closed. One store/gas and one repair garage remaining open pumping a total of 200,000 gallons per year.

TABLE XII
AREA E
1963 SALES OF EXISTING OUTLETS

Type of outlet	Sales (Thousands of Gallons per year)
(a) Highway stations:	
(1) Service station	26
(2) Motel and gas	40
(3) Service station	90
(4) Service station	120
(5) Service station	70
(6) Motel and gas	20
(7) Service station	80
(8) Service station	90
(9) Service station	40
Total	576
(b) Town stations:	
(10) Co-op store and gas	67
(11) Dealer and shop plus gas	60
(12) Dealer and shop plus gas	80
(13) Repair garage	30
(14) Repair garage	36
(15) Dealer	70
Total	343

Conclusions for Area E

The town stations are all integrated with other businesses. They estimate they could handle 500,000 gallons per year without any increase in the number of hours worked. One of the highway stations is associated with a dealership. Therefore this station plus perhaps the two motel/gas combinations in association with the town stations could handle the total annual gallonage of 920,000 gallons.

This would be a probable result of a more competitive environment

since the service stations have very low gallonage and would be uneconomic at lower margins without additional subsidization.

Summary

6 service stations closed.

Two motel/gas combinations and seven stations combined with dealerships left.

TABLE XIII

AREA F
1963 SALES OF EXISTING OUTLETS

Type of outlet	Sales (Thousands of gallons per year)
(a) Dealers who would remain in business despite a more competitive marketing situation	
(1) Dealer	60
(2) Dealer	85
(3) Dealer	60
(4) Dealer	50
(5) Dealer	123
Total	378
(b) Service stations presently pumping over 100,000 gallons per year	
(6) Service station	200 ^a
(7) Service station	240
(8) Service station	105
(9) Service station	108 ^a
Total	653

TABLE XIII (Continued)
1963 SALES OF EXISTING OUTLETS

Type of outlet	Sales (Thousands of gallons per year)
(c) Low volume marginal outlets	
(10) Service Station	50 ^a
(11) Service station	40 ^a
(12) Grocery store and gas	12 ^a
(13) Service station	40 ^a
(14) Service station	40 ^a
(15) Dealer	70
(16) Service station	38
(17) Service station	40 ^a
(18) Service station	50 ^a
(19) Service station	75
Total	455

^aDenotes operator of outlet not interviewed.

Conclusion for Area F

The dealer group can be depended upon to carry on their gasoline business in the face of reduced margins if for no other reason than merely customer convenience. One dealer however did state that in such a situation he would remove his pumps. This outlet has therefore been shown above amongst the marginal service stations.

In this town there is a rather sharp break between the large volume efficient stations and the low volume outlets. The four high-volume stations pump approximately 50 per cent more gasoline than the ten low-volume stations combined. In a more competitive situation it seems likely that the 455,000 gallons handled by the latter group could be absorbed by the high volume stations (taking another 200,000 or 300,000) and the balance going to the dealers who are operating on very

low volumes at present.

Summary

Five dealers and four high volume stations left.

Ten inefficient stations closed.

TABLE XIV
AREA G
1963 SALES OF EXISTING OUTLETS

Type of outlet	Sales (Thousands of gallons per year)
Section 1	
(1) Grocery store and gas	75
Section 2	
(2) Dealer	50
(3) Dealer	79
(4) Machine shop and gas	100
(5) Service station	87
(6) Service station	84
(7) Service station	50 ^a
(8) Dealer	63
(9) Dealer	40
(10) Service station	135
(11) Service station	85
(12) Service station	205
(13) Service station	190
Total	1,243

^aDenotes operator of outlet not interviewed.

Conclusions for Area G

Section 1.

A lower margin would result in lower profits for this operation, but would probably not affect its gallonage to any large extent. The associated businesses (repairs and groceries) would enable it to remain open.

Section 2.

A more competitive situation would almost certainly close the three service stations in this area, since they are all so extremely marginal now. The two dealers and the machine shop and gas operation would be able to stay open because of their associated businesses. If expanded to their estimated capacity these three stations could handle the whole gallonage for section three. It is probably however that the abandonment of doubtful business practices (such as carrying many poor-risk accounts receivable) would result in a shift of a portion of this volume to Section 3.

Section 3.

The one very marginal service station and the dealer who professed a lack of interest in gasoline would probably drop out in a more competitive environment, whereas the three high volume service stations and one dealer would stay.

Summary

Section 1. One station remains. No closures.

Section 2. Three service stations closed.

Two dealers plus one machine shop and gas combination remain.

Section 3. One station and one dealer closed.

Four stations remain open.

Eight out of twelve are efficient economic units.

TABLE XV
AREA H
1963 SALES OF EXISTING OUTLETS

Type of outlet	Sales (Thousands of gallons per year)
(1) Service station	120
(2) Service station	240
(3) Service station	200
(4) Service station	180
(5) Service station	100
Total	840

All stations are pumping at capacity during the four o'clock to six o'clock rush hour.

Conclusions for Area H

Physical pumping capacity and an adequate level of operator income could be provided by three stations. Both the low gallonage stations (1) and (5) are marginal and would probably be forced out in a more competitive environment. This however would result in a degree of reduction in customer satisfaction. Since the five stations presently operate at capacity during the four o'clock to six o'clock rush, a reduction in their number would force some consumers either to change

their time of purchase or to purchase their gasoline in some other district.

Summary

Three service stations left. Two closed.

TABLE XVI
AREA I
1963 SALES OF EXISTING OUTLETS

Type of outlet	Sales (Thousands of gallons per year)
(1) Service station	262
(2) Service station	260
(3) Service station	250
(4) Service station	204 ^a
(5) Service station	180
(6) Service station	180
(7) Service station	170
(8) Service station	150
(9) Service station	120
(10) Service station	100
(11) Service station	40
Total	1,916

^aDenotes operator of outlet not interviewed.

Conclusions for Area I

Stations (9) and (11), besides being among the lowest gallonage stations, also did the lowest volume of repair work. Station (10) was the second lowest in gallonage. Although it does a good repair volume, the advanced age of the facilities limits its efficiency. A more competitive situation would eliminate these three.

The annual sales of 1,916,000 gallons could be pumped by five stations, but five stations could not provide adequate repair facilities for this area. Either six or seven stations would be required to provide both repair and pumping facilities.

As in the area discussed above, the peak load problem from four o'clock to six o'clock would mean some losses in consumer satisfaction with this reduced level of service. The problem however is not so severe in this area.

Summary

Six or seven stations remaining open out of eleven.

TABLE XVII
AREA J
1963 SALES OF EXISTING OUTLETS

Type of outlet	Sales (Thousands of gallons per year)
Section 1	
(1) Dealer	30
(2) Dealer	65
(3) Dealer	75
(4) Dealer	66
(5) Dealer	20
(6) Dealer	100
(7) Dealer	46
Total	402
Section 2	
(8) Gas plus large repair volume	40
(9) Gas plus large repair volume	40
(10) Gas plus large repair volume	55
Total	135
Section 3	
(11) Service station	90
(12) Dealer	48
(13) Service station	60
(14) Service station	38
Total	236
Section 4	
(15) Grocery store and gas	12
Section 5	
(16) Service station	48
(17) Repairs (not interested in gas)	7
(18) Groceries and gas	40
(19) Groceries and gas	15
(20) Groceries, motel and gas	17
(21) Dealer	101
(22) Groceries, motel and gas	52
Total	280

TABLE XVII (Continued)

Type of outlet	Sales (Thousands of gallons per year)
Section 6	
(23) Service station	118
(24) Service station	60
(25) Service station	1148
(26) Service station	40
(27) Service station	60
(28) Service station	70
(29) Service station	50
(30) Service station	93
(31) Service station	165
(32) Service station	252
(33) Service station	230
(34) Service station	322
(35) Service station	140
(36) Service station	130
(37) Service station	160
(38) Service station	190
(39) Service station plus large repair shop	75
Total	2,303

Conclusions for Area J

Section 1. Since all dealers supplied gasoline to their customers to a large degree mainly as a convenience item, it is assumed that a more competitive situation would not change their attitude in this regard and that in such a situation they would continue to pump approximately their present gallonage.

Section 2. These outlets, since they are in an industrial area, depend heavily on their repair work. Station (10) has a small volume of repair work. A more competitive environment would eliminate him.

Section 3. The dealer in this section expressed little interest in gasoline sales and need not be assumed to continue providing it

even on a convenience basis. The three service stations all rely heavily on gasoline sales and are all very marginal.

There is only sufficient volume in this area to support one efficient station in a competitive marketing situation.

Section 4. Gas insignificant for this outlet. It would close if margins reduced.

Section 5. (16) is a very marginal station and (17) is very uninterested in gasoline sales. Competition would probably close these. Since the remaining outlets are all associated with other businesses it seems likely that they would continue to operate despite the reduced margins that competition would bring.

Note: It is not suggested that the repair portion of (17)'s business would close down. He would probably concentrate on it exclusively.

Section 6. In this urbanized setting, this selection of the outlets (excluding dealers) is relatively homogeneous. The economic efficiency of the various stations can be judged roughly by the comparative gallonage figures. (39) does not fall into this pattern because it has a large repair business.

Assuming that those stations which have been unable to achieve large gallonages in present circumstances would continue to do relatively poorly, it would appear that a more competitive environment would eliminate stations (24) to (30) inclusive. The ten remaining stations would each have a share of the 2,303,000 gallon per year total, which should be sufficient to enable them to compete vigorously on the basis of low cost, efficient operation.

TABLE XVIII

EXPECTED RESULTS OF ACTIVE PRICE COMPETITION
IN AREA J

Section	Outlets Closing	Outlets Remaining Open	Annual gallonage (thousands of gallons)
1	None	Seven dealers	402
2	One low repair	Two high repair	135
3	Three low gallonage	One station	236
4	One not interested	None	12
5	One service station and one repair shop (gasoline section only)	Five combined businesses	280
6	Seven service stations	Ten service stations	2,303
Total	Fourteen stations	Twenty-five stations	3,368

TABLE XIX

AREA K
1963 SALES OF EXISTING OUTLETS

Type of outlet	Sales (Thousands of gallons per year)
(1) Auto parts and gas	42
(2) Dealer	75
(3) Dealer	155
(4) Service station	146
(5) Service station	80
(6) Service station	125
(7) Dealer	112
(8) Service station	185
(9) Parking garage and gas	96
(10) Service station	180
(11) Service station	175
(12) Dealer	100
Total	1,471

Conclusions for Area K

(9) buys on a tender basis and would continue to supply customers as a convenience if margins were reduced. The dealers, since they operate integrated businesses, would probably continue to pump their present volumes (at least) in a competitive market with fewer stations. These outlets (2), (3), (7), (9) and (12) account for 538,000 gallons per year.

Stations (1), (4) and (5) are extremely marginal and would be the first to close in a more competitive market. They presently account for 268,000 gallons per year in total. Although these three closures would leave 665,000 gallons for the remaining four service stations, it must be borne in mind that the high level of wages and profits (which are necessary in this area because of the isolated geographic location) mean that higher than ordinary gallonages would be required if margins were to be reduced. Also part of this 665,000 gallons might be diverted to the dealers. We may thus conclude that a reduction to two in this last group of service stations might be likely in a more competitive market situation.

Summary

Remaining:	4 dealers plus parking garage	538,000 gallons per year plus share of closures
	2 service stations	933,000 gallons per year less share of closures going to dealers
Closing:	3 marginal service stations	268,000 gallons per year
	2 service stations	320,000 gallons per year

TABLE XX
 AREA L
 1963 SALES OF OUTLETS INCLUDED IN SAMPLE

Type of outlet	Sales (Thousands of gallons per year)
(1) Service station	210
(2) Service station	235
(3) Service station	335
(4) Service station	265
(5) Service station	1100
(6) Service station	135
(7) Service station	188
(8) Service station	242
(9) Service station	350
(10) Service station	180
(11) Service station	70

Conclusions for Area L

The difficulty of drawing firm conclusions from this technique of random sampling over wide areas was one of the determining factors in deciding on the block sampling technique used in the remainder of the study.

Fifty-six per cent of stations named four or more direct competitors, but 85% of the stations stated that 70 per cent or more of their business came from those who lived or worked in the area of their station. This seems to be the strongest evidence of overcapacity.

Gallonages ranged from 70,000 to 350,000 gallons with physical plants which were very similar. Thus although Area L has a distinct peak load problem (i.e., at 4:00-6:00, week-ends, and July, August) it seems that the smaller volume stations are definitely under-utilized. This conclusion is borne out by the fact that operators estimated that at present they were pumping, on the average, only 57 per cent of their capacity with present number of hours worked.

APPENDIX III

This appendix contains detailed data and a discussion of this data on the following salient aspects of market areas in which interviews were conducted:

- (a) Posted retail prices
- (b) Rent subsidization
- (c) Calculation of gallonage required at five cent per gallon margin to maintain dealers incomes.

(a) Posted Retail Prices

In each market area pricing policies were evaluated to determine the degree of active price competition present. The results were as follows:

In market areas L, I, H, identical prices of 39.9 (cents) for regular and 44.9 for premium were posted by all stations since all those markets were in the metropolitan Vancouver area covered by the consignment arrangement whereby the major oil companies determined the retail price and paid a commission of 7 cents for each gallon sold.

Market A stations, although they also were covered by consignment arrangement, posted 40.9 and 45.9 since transportation charges to this area were one cent per gallon. The 4.9 cent price differential on regular between these stations and the one at B reflect only the different treatment accorded purchases in the B market area by the oil companies (the B price is made up of the tank-wagon price plus the dealer's choice

of a mark-up). The wide price difference is not the result of price competition by the A market area stations.

Station (2) in C market area posted approximately one cent higher than the other two stations since he was not interested in gasoline business. The two other stations posted almost identical prices.

Station (6) (a motel outlet) in D market area was similar to Station (2) mentioned above in that his price was 1.3 cents above the lowest price in the area because of his lack of interest in the gasoline business. Prices of the other five stations were within .5 cents on regular although there was a spread of 1.6 cents on premium (one combination store gas outlet .9 cents higher than all others). No price competition was evident.

In Market Area E thirteen of the fifteen stations posted between 47.5 and 47.9 for regular; 51.5 and 51.9 for premium. The two remaining stations posted higher prices. No evidence of active price competition was observed.

Only nine of the nineteen stations in Market Area F were interviewed. Of these five posted 44.9 for regular; one was .1 cents lower which the remainder ranged up to 1 cent higher. Premium prices were grouped in the narrow range from 48.2 to 48.9. No dealer was willing to incur the displeasure of other dealers by cutting below prevailing prices to meet the lower prices at stations in the nearby consignment zone.

In Market Area G all stations but one posted regular at 45.9. The one exception, station (9) posted at .2 cents lower for regular. This station was one of the two posting lower than the 49.9 premium price of ten of the twelve stations. However, the actions of station (9)

cannot be taken as evidence of active price competition since it is primarily a dealership and is not interested in gasoline business.

The majority of stations in Market Area J posted 50.9 cents for premium allowing a 9.1 cent margin and 46.9 for regular allowing a 10.1 cents margin.

The price cutting station, (28) posted at 7.1 cents margin on regular and 6.2 cents on premium. His competitor (26), across the street, obtained 7.1 cents on each. The retail commission dealer (37), posted at what would amount to 8.1 cents on each. The other four stations charging less than the usual mark-up were all small stations strung out along the highway east of J. With one exception, stations posting higher than usual mark-ups (eight stations) were small gallonage down-town stations. The exception, Station (38) (a 190,000 gallon highway station in town) charged the highest margin of all: 12.1 cents on regular; 11.1 cents on premium. The operator stated that he had not noticed any drop-off in gallonage because of his higher prices.

The actions of station (28) definitely constitute active price competition. Since the station is off the main traffic arteries and is a relatively small establishment, collective action by local dealers has been sufficient to maintain the customary level of retail prices. Station (37) which is of the same brand as station (28) and (26) which is near it, have been forced to reduce their prices however. In summary, since other dealers have been able to withstand the pressure to cut prices resulting from station (28)'s actions this market cannot be said to be characterized by active price competition.

In Market Area K five stations posted regular within .1 cents of

49.9 while four others were within .1 cents of 48.5. Premium prices were scattered over the range from 51.4 to 53.3 except for station (1)'s 49.9 price. This latter was probably more a result of dealer ignorance than any other factor since the operator of this outlet was uninterested in gasoline and sold a very small volume. Price differentials were not advertised and dealers did not appear to be aware of their magnitude. In short price cutting did not seem to be a competitive device.

Conclusions Re-Posted Retail Prices

The price cutting of station (28) in Market area J provides the only real evidence of active price competition uncovered by the survey in any of the areas in which interviews were conducted. However even in this case the impact of the price-cutting was as limited by the dealer's isolated location that the conclusion can be drawn that there was no active price competition in any of the interviewed areas. Evidence for this takes the following forms:

- (a) Substantial price uniformity in most areas.
- (b) Statements by operators that they would not wish to displease their fellow operators by price cutting and that it would do no good since there was only so much gallonage to go around and competitors would be forced to meet the price cut to maintain their share.
- (c) Dealer ignorance of price differentials.
- (d) Reluctance of most dealers to post price signs or otherwise advertise price differentials.
- (e) High retail price margins.

TABLE XXI

1963 POSTED RETAIL GASOLINE PRICES

Market Area	Station Number	Price (cents per gallon)		Market Area	Station Number	Price (cents per gallon)	
		Regular	Premium			Regular	Premium
A	1	40.9¢	45.9¢	G	1	45.9¢	49.9¢
	2	40.9	45.9		2.	45.9	49.9
B					3	-	-
		45.8	N/A		4	45.9	49.9
C	1	47.5	51.9		5	45.9	49.9
	2	48.6	-		6	45.9	49.9
	3	47.7	52.2		7	a	
D	1	48.6	52.0		8	45.9	49.9
	2	48.3	51.3		9	45.7	48.1
	3	48.3	51.3		10	45.9	49.9
	4	48.5	51.5		11	45.9	49.9
	5	48.5	52.9		12	45.9	48.9
	6	49.6	52.6		13	45.9	49.9
E	1	47.7	51.7	J	1	46.9	N/A
	2	47.9	51.9		2	47.0	50.9
	3	48.9	52.9		3	47.8	51.9
	4	47.8	51.7		4	46.9	50.9
	5	a			5	47.9	51.9
	6	47.9	51.6		6	46.9	50.9
	7	48.9	52.9		7	46.9	50.9
	8	47.6	51.6		8	46.9	50.9
	9	47.6	51.6		9	46.9	50.9
	10	47.7	51.7		10	46.9	50.9
	11	47.6	51.6		11	46.9	50.0
	12	47.8	51.8		12	47.9	52.0
					13	46.9	50.9
					14	46.9	50.9

TABLE XXI (Continued)

Market Area	Station Number	Price (cents per gallon)		Market Area	Station Number	Price (cents per gallon)	
		Regular	Premium			Regular	Premium
E	13	47.9	51.6	J	15	47.0	N/A
	14	47.5	51.5		16	44.9	49.9
	15	47.5	51.5		17	44.0	50.5
F	1	45.7	48.7		18	46.9	50.0
	3	44.9	48.9		19	46.0	50.0
	4	44.8	48.8		20	46.7	50.9
	7	44.9	48.9		21	46.9	50.9
	8	44.9	48.5		22	44.9	49.9
	15	44.9	48.9		23	46.9	50.9
	16	44.9	48.9		24	47.9	51.9
	18	45.9	48.9		25	47.1	51.1
	19	45.2	48.2		26	43.9	48.9
K	1	-	49.9		27	^a 43.9	
	2	-	-		28	43.9	48.0
	3	49.9	51.9		29	46.9	50.0
	4	49.9	51.9		30	46.9	50.9
	5	49.9	52.9		31	46.9	50.9
	6	48.5	51.5		31	46.9	50.9
	7	48.4	51.4		33	46.9	50.9
	8	48.5	51.5		34	46.9	50.9
	9	48.9	51.9		35	46.9	50.9
	10	49.8	52.7		36	46.9	50.9
	11	48.5	51.5		37	44.9	49.9
	12	49.9	53.3		38	48.9	52.9
					39	48.6	51.9

^aDenotes operator of outlet not interviewed.

TABLE XXII
1963 GASOLINE TANK WAGON PRICES

Market Area	Price (cents per gallon)	
	Regular	Premium
A	a	
B	-	
C	37.7	42.7
D	37.7	42.7
E	38.2	43.2
F	35.9	40.9
G	35.9	40.9
H	a	
I	a	
J	36.8	41.8
K	36.4	41.4
L	a	

^aDenotes areas in which gasoline is sold on consignment.

(b) Rent Subsidization

The amount of rent actually paid by each operator during his last financial year as determined in the interview is shown on the rent subsidization schedule under "Annual rent charged." The difference between this figure and the total costs (both implicit and explicit) incurred by the owner of the station is shown in the "Subsidization per year" column opposite each station. Subsidization per gallon is calculated by dividing the subsidization per year by the annual gallonage. Since no arm's length rentals are paid by owner-operated stations no subsidization of these stations is possible.

The figure for total owner's costs is made up of three items, namely taxes, implicit return on invested capital and depreciation, which are calculated as follows:

- i) Taxes. These were confirmed either by letters from, or direct inquiry of, the appropriate municipality.
- ii) Implicit returns on invested capital. Assessed values of the land, improvements and machinery were obtained for each station from municipal officials in the same manner as the taxes. Market values of each property were estimated as twice the sum of the assessed value of land plus improvements plus machinery. An implicit return of 7 per cent on this market value was calculated and is shown opposite each station in Table XXIII in the column headed "7 per cent Market Value."
- iii) Depreciation. No depreciation is chargeable against land. The market value of improvements (double the assessed value) was depreciated at 5 per cent; that of machinery at 10 per cent. Where no separate figure was shown by the municipality for machinery the entire improvements amount was depreciated at 5 per cent.

TABLE XXIII

RENT SUBSIDIZATION OF SERVICE STATIONS BY MAJOR OIL COMPANIES

Market Area	Station Number	Annual Gallonage (thousands)	Basis of Monthly Rent	Assessed Values Land	Assessed Values Improvements	Owners Costs 7% on Market Value	Owners Costs Depreciation	Owners Costs Taxes	Owners Costs Total	Annual Rent Charged	Subsidization per year	Subsidization per gallon
E	3	90	\$15+3¢/gal.	3,535	12,155	2,180	1,213	536	3,929	2,880	1,049	1.2¢
	4	120	\$325	6,100	17,186	3,250	1,719	838	5,807	3,900	1,907	1.6
	6	100	\$75+2¢/gal.	1,700	13,600	2,140	1,360	502	4,002	2,900	1,102	1.1
	8	90	a	925	11,438	1,720	1,144	388	3,252	-	-	-
	9	80	2¢/gal.	925	9,955	1,520	996	335	2,851	1,600	1,251	1.6
	10	43	a	420	8,340	1,220	834	254	2,308	-	-	-
	11	67	\$200	1,490	9,271	1,500	927	338	2,765	2,400	365	.6
	12	60	a	2,350	15,780	2,530	1,578	610	4,718	-)mainly	-	-
	13	80	a	3,975	14,318	2,540	1,540	635	4,607	-)reprs.	-	-
	14	30	a	510	9,110	1,350	911	285	2,546	-	-	-
	15	36	a	2,205	9,147	1,580	915	362	2,857	-	-	-
G	2	50		2,525	10,145	1,780	1,015	414	3,209	a	0	0
	3	79	\$325	7,900	12,435	2,850	1,244	860	4,954	3,900	1,054	1.4¢
	5	87	\$200	3,713	14,950	2,610	1,645	650	4,905	2,400	2,505	2.8
	6	84	\$275	3,400	12,755	2,260	1,425	545	4,230	3,300	930	1.1
	8	63		6,200	14,510	2,900	1,601	745	5,246	a	0	0
	9	40	\$425 b	4,660	17,585	3,120	1,909	710	5,739	5,100	639 ^b	1.6 ^b
	10	135	\$115+1¢/gal.	21,070	17,060	5,340	1,856	1,272	8,468	2,730	5,738	4.2
	11	85	\$200	8,435	16,495	3,470	1,780	834	6,084	2,400	3,684	6.3
	12	205	\$50+2¢/gal.	26,100	16,000	5,900	1,750	1,516	9,166	4,700	4,466	1.1
	13	190	\$275	9,400	15,980	3,560	1,748	840	6,148	3,300	2,848	1.5

TABLE XXIII (Continued)

Market Area	Station Number	Annual Gallonage (thousands)	Basis of Monthly Rent	Assessed Values Land	Assessed Values Improvements	Owners Costs 7% on Market Value	Owners Costs Depreciation	Owners Costs Taxes	Owners Costs Total	Annual Rent Charged	Subsidization per year	Subsidization per gallon
I	1	262	\$475/mo.	45,000	6,000	7,140	600	2,083	9,823	5,700	4,123	1.5¢
	2	260	\$375/mo.	15,380	11,200	3,720	1,120	1,379	6,219	4,500	1,719	.7
	3	250	\$450/mo.	39,200	9,000	6,840	900	2,045	9,785	4,200	5,585	2.2
	4	-	\$300+1¢/gal	24,250	6,000	4,250	600	1,251	6,101	N/A	N/A	N/A
	5	180	\$365/mo.	30,800	5,600	5,100	560	1,907	7,567	4,380	3,187	1.8
	6	180	-	12,000	7,000	2,660	700	836	4,196	a	0	0
	7	170	2¢/gal.	33,000	7,500	5,660	750	1,659	8,069	3,840	4,229	2.7
	8	150	\$50+2¢/gal.	16,185	13,200	4,120	1,580	1,335	7,035	3,600	3,435	2.3
	9	120	\$140+1¢/gal	15,010	9,600	3,440	960	1,222	5,622	2,880	2,742	.6
	10	100	\$170+\$200	16,300	2,400	2,610	240	988	3,838	2,400	1,438	1.5
	11	80	1¢/gal.	16,335	15,800	4,500	1,580	1,544	7,624	800	6,824	8.5
J	5	20	\$225	12,700	14,400	3,800	1,440	1,176	6,416	2,700	3,716	18.5¢
	7	46	\$125+1¢/gal	16,900	9,100	3,640	910	1,179	5,729	1,960	3,769	8.2
	8	40	\$100	1,520	7,900	1,320	790	392	2,502	1,200	1,302	3.2
	9	40	\$100	4,150	5,940	1,410	594	434	2,438	1,200	1,238	3.1
X	10	150	\$115¢/gal.	1,290	3,600	680	360	212	1,252	1,380	(128)	(.2)
X	23	118	\$60+2¢/gal	14,580	11,500	3,610	1,150	1,134	5,894	3,080	2,814	2.4
	24	60	\$200	2,290	6,400	1,220	640	389	2,249	2,400	(151)	(.4)
	25	148	\$65+2¢/gal.	4,650	15,540	2,800	1,574	860	5,234	3,740	1,494	1.0
	27	-	-	3,650	8,740	-	874	510	-	N/A	N/A	N/A
	31	165	\$100+1 1/2¢	15,100	11,800	3,770	1,180	1,181	6,131	3,675	2,456	1.5
	32	252	\$50+2¢/gal	21,100	10,500	4,320	1,120	1,404	6,844	5,640	1,204	.5
	33	230	\$256	11,250	12,750	3,330	1,440	986	5,756	3,072	2,684	1.2
	34	322	\$350	16,400	8,940	3,460	964	1,124	5,548	4,200	1,348	.4
	35	140	\$50+2¢/gal.	6,870	8,500	2,150	860	654	3,664	3,400	264	.2

TABLE XXIII (Continued)

Market Area	Station Number	Annual Gallonage (thousands)	Basis of Monthly Rent	Assessed Values Land	Assessed Values Improvements	Owners Costs 7% on Market Value	Owners Costs Depreciation	Owners Costs Taxes	Owners Costs Total	Annual Rent Charged	Subsidization per year	Subsidization per gallon
J	36	130	\$50+2¢/gal	10,000	10,940	2,930	862	835	4,627	3,100	1,527	1.1¢
	38	190	\$70+1 1/2¢	9,200	8,740	2,500	871	784	4,158	3,690	468	.3
L	1	210	\$375	8,170	14,000	3,115	1,726	850	5,691	4,500	1,191	.6¢
	2	235	\$105+1/2¢/gal.	22,200	13,000	5,080	1,575	1,910	8,565	4,785	3,780	1.6
	3	335	\$850	48,900	22,000	9,925	2,525	3,871	16,322	10,200	6,122	1.9
	4	265	\$450	7,950	14,300	3,125	1,713	937	5,775	5,400	375	.2
	5	100	\$175+1¢/gal.	13,310	12,400	3,596	1,526	1,227	6,349	3,100	3,249	3.2
	6	135	\$260	12,270	14,700	3,800	1,668	1,270	6,638	3,120	3,518	2.6
	7	188	\$150+2¢/gal.	40,800	13,600	7,550	1,576	3,095	12,221	5,560	6,661	3.5
	8	242	\$400	11,290	14,100	3,560	1,724	1,198	6,482	4,800	1,682	.7
	9	350	\$500 ^b	10,720	8,500	2,700	1,058	931	4,689	6,000	(1,311)	(.3) ^b
	10	180	\$250	15,400	20,000	4,950	2,375	1,794	9,119	3,000	6,119	3.4
	11	70	\$50+2¢/gal.	8,950	14,540	3,290	1,685	10975	6,050	2,000	4,050	5.9

^aDenotes a station owned by its operator.

^bDenotes a station owned by a third party which is not a major oil company.

Conclusion re rent subsidization

The arithmetic mean of the rent subsidization figures for all the above stations is 2.3 cents per gallon. Full costs of invested capital are not being met by British Columbia service stations even with the existing intensity of price competition.

Survey data showed dealers to be earning only their opportunity incomes, thus rent subsidization provides conclusive evidence that costs of all factors cannot be covered under existing market conditions.

(c) Calculation of gallonage required at five cents per gallon margin to maintain dealers income

The following two tables present the results of an attempt to evaluate the changes in the nature of the operations of service stations which might be necessitated by a much lower profit margin per gallon. These results are intended as one type of check on the area by area estimates of excess capacity which have resulted from this study.

The hypothesized lower margins and higher volumes appear to be relevant since lower margins (of the order of five cents per gallon) have resulted in other petroleum marketing areas under conditions of active price competition, and since dealer incomes are already at opportunity income levels in interviewed areas, some increase in physical volume must result if active price competition were to occur in retail gasoline marketing in British Columbia.

The increases in physical volume that would result would be reflected not only in increased gasoline sales, but also in increased repair volume and tire, battery and accessory sales. Service station operators generally view each gallon of gasoline sold as bringing in a

fixed gross profit on these latter items in addition to the gross profit on the gasoline itself. Thus in the case of Station (1) in Area L, although each gallon of gasoline provides only seven cents directly, it is accompanied by, on the average, 10.5 cents gross margin on repairs, tires, batteries and accessories. In the calculation of the total margin of each station at the increased physical volumes it was assumed that this gross margin per gallon on related items could be maintained i.e., for Station (1) in Area L in a more competitive environment the total margin per gallon of gasoline sold would be five cents direct plus 10.5 cents for associated items or a total margin of 15.5 cents per gallon. This assumption seems reasonable since each gallon of increased volume must be drawn from the business previously done by a firm exiting from the industry in the face of the active price competition, and this firm will have rendered associated services in approximately the same ratio with each gallon.

In the consideration of costs, because of the underutilization of labor and capital at present volumes, it was assumed that the larger volume requirements could be handled with no increase in wages or the items included in other expenses. Rent, which was not included in this latter category, was adjusted where information was available, to the value calculated in Table XXIII as an economic rent for the property.

The gallonage required at a 5 cent margin to maintain dealer's income at opportunity income levels was calculated from the above information by using the following formula when x stands for the new larger gallonage required:

$$x \cdot (\text{Total margin}) - (\text{Rent} + \text{Wages} + \text{Other Expenses}) = \text{Dealer Income}$$

For example: the data for Station (1) in Area L would be inserted as follows:

$$X \cdot (.155) - (5700 + 25,000 + 7,700) = 600$$

which can be solved to give $x = 250,000$ gallons.

Conclusions re gallonage required at 5¢ per gallon margin to maintain income

For areas inside the consignment zones, as shown in Table XXIV, the median figure for present gallonage was 210,000 gallons. The median figure for the results at a five cent margin was 275,000 gallons. For areas outside the consignment zones, as shown in Table XXV, the corresponding medians were 90,000 gallons and 148,000. In both categories these results reflect the operations of only the better managed stations, since only for these was adequate accounting information available. However, in spite of this bias, the medians calculated for the two categories provide a useful guideline as to what could realistically be expected to result in the various areas where estimates of excess capacity were made.

The magnitude of the gallonage increase in the two areas is especially interesting in that it is 31 per cent in the consignment zones and 65 per cent outside the consignment zones. This would indicate excess capacity on an overall basis to be of the order of 25 per cent in the consignment zones and 40 per cent in areas outside the consignment zones. These overall results were obtained independently of the area by area evaluations and thus provide a rough check on the validity of the latter estimates.

TABLE XXIV

CALCULATION OF GALLONAGE REQUIRED AT FIVE CENT MARGIN TO MAINTAIN DEALER INCOMES
AREAS INSIDE THE CONSIGNMENT ZONES

Market Area	Station Number	Gasoline Margin (cents per gallon)	Annual Gallonage (thousands)	Gross Profit (thousands of dollars)			Operating Expenses (thousands of dollars)				Dealer Income (thousands of dollars)
				Gasoline	Repair & TRA	Total	Rent	Wages	Other	Total	
H	3	6.8	190	13.0	4.1	17.1	3.8	5.8	3.2	12.8	4.3
		5.0	235	11.6	5.2	16.8	3.8	5.8	3.2	12.8	4.0
	4	6.9	180	12.5	11.5	24.0	0	15.8	8.2	24.0	0
		5.0	217	10.8	14.0	24.8	0b	15.8	8.2	24.0	.8
I	2	7.0	260	18.2	18.2	36.4	4.2	13.5	6.3	24.0	12.4
		5.0	320	16.0	22.4	38.4	6.2a	13.5	6.3	26.0	12.4
	3	7.0	250	17.5	10.2	27.7	4.2	13.8	5.9	23.9	3.8
		5.0	370	18.5	14.8	33.3	9.8a	13.8	5.9	29.5	3.8
L	1	7.0	210	14.7	22.1	36.8	4.5	25.0	7.7	36.2	.6
		5.0	250	12.5	26.2	38.7	5.7a	25.0	7.7	38.4	.3
	2	7.0	240	16.8	7.2	24.0	2.4	17.5	4.1	24.0	0
		5.0	300	15.0	9.0	24.0	2.4	17.5	4.1	24.0	0
	3	7.0	335	23.5	35.3	58.8	9.6	53.6	9.6	72.8	(14.0)
		5.0	420	21.0	44.5	65.5	16.3a	53.6	9.6	79.5	(14.0)
	4	6.6	265	17.5	22.5	40.0	6.4	13.3	9.7	29.4	10.6
		5.0	285	14.2	25.8	40.0	6.4a	13.3	9.7	29.4	10.6
	6	7.1	140	10.0	0	10.0	2.5	1.0	2.0	5.5	4.5
		5.0	210	10.5	0	10.5	2.5	1.0	2.0	5.5	5.0
	7	7.0	188	13.2	13.4	26.6	6.0	11.0	5.3	22.3	4.3
		5.0	275	13.8	19.2	33.0	12.2a	11.0	5.3	28.5	4.5
	11	7.0	70	4.9	6.2	11.1	2.0	3.5	2.3	7.8	3.3
		5.0	108	5.4	9.8	15.2	6.0a	3.5	2.3	11.8	3.3

a Rent figures marked in this way represent adjustments to economic (i.e., non-subsidized) values for purposes of the gallonage calculation. Areas for which no data was available for the property values have been left at the figure for actual rent. b Self owned stations for which no rent has been included.

TABLE XXV

CALCULATION OF GALLONAGE REQUIRED AT FIVE CENT MARGIN TO MAINTAIN DEALER INCOMES
AREAS OUTSIDE THE CONSIGNMENT ZONES

Market Area	Station Number	Gasoline Margin (cents per gallon)	Annual Gallonage (thousands)	Gross Profit (thousands of dollars)			Operating Expenses (thousands of dollars)				Dealer Income (thousands of dollars)
				Gasoline	Repair & TBA	Total	Rent	Wages	Other	Total	
D	1	10.0	35	3.5	15.8	19.3	1.1	7.2	6.8	15.1	4.2
		5.0	53	2.7	16.6	19.3	1.1	7.2	6.8	15.1	4.2
	4	10.0	55	5.5	6.0	11.5	0	3.1	4.9	8.0	3.5
E		5.0	92	5.6	6.9	11.5	0	3.1	4.9	8.0	3.5
	3	9.0	90	8.1	12.6	20.7	2.8	2.0	7.4	12.2	8.5
		5.0	136	6.8	15.0	21.8	3.9a	2.0	7.4	13.3	8.5
	8	9.0	90	8.1	0	8.1	0	4.8	6.3	11.1	(3.0)
		5.0	162	8.1	0	8.1	0b	4.8	6.3	11.1	(3.0)
G	5	9.0	87	7.8	8.9	16.7	2.4	3.6	6.0	12.0	4.7
		5.0	148	7.4	11.8	19.2	4.9a	3.6	6.0	12.0	4.7
	12	8.6	205	17.4	12.1	29.5	4.3	11.4	6.1	21.8	7.7
		5.0	344	17.2	17.2	34.4	9.2a	11.4	6.1	26.7	7.7
J	2	9.5	65	6.1	5.9	12.0	0	8.4	3.6	12.0	0
		5.0	83	4.2	7.8	12.0	0b	8.4	3.6	12.0	0
	9	9.0	90	8.1	9.3	17.4	0	7.4	6.0	13.4	4.0
		5.0	116	5.8	11.6	17.4	0b	7.4	6.0	13.4	4.0
	23	8.1	118	9.6	15.4	25.0	3.0	10.0	7.8	20.8	4.2
		5.0	170	8.5	19.4	27.9	5.9a	10.0	7.8	23.7	4.2
	25	9.5	148	14.0	6.8	20.8	2.9	7.3	5.6	15.8	5.0
		5.0	275	13.6	9.5	23.1	5.2a	7.3	5.6	18.1	5.0
	32	9.5	252	24.0	10.9	34.9	5.4	14.5	5.0	24.9	10.0
		5.0	390	19.5	16.8	36.3	6.8a	14.5	5.0	26.3	10.0
	36	9.8	130	13.3	9.7	23.0	2.8	7.9	7.9	18.6	4.4
		5.0	225	11.2	13.5	24.7	4.6a	7.9	7.9	20.4	4.3
	39	10.5	75	7.9	6.9	14.8	0	6.0	5.9	11.9	2.9
		10.5	104	5.2	9.6	14.8	0b	6.0	5.9	11.9	2.9

^aRent figures marked in this way represent adjustments to economic (i.e., non-subsidized) values for purposes of the gallonage calculation. Areas for which no data was available for the property values have been left at the figure for actual rent.

^bSelf-owned stations for which no rent has been included.