A REFORMULATION OF THE ADMINISTERED PRICE INFLATION HYPOTHESIS AND ITS EMPIRICAL VERIFICATION IN A CANADIAN CONTEXT

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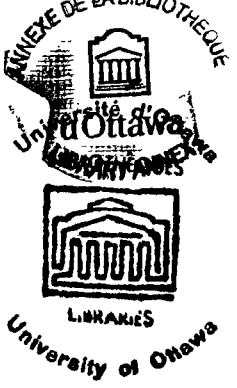
Thesis presented to the School of Graduate Studies as partial fulfillment of the requirements for the degree of Master of Arts in Economics.



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The author assumes sole responsibility for the remaining errors.

CURRICULUM STUDIORUM

Richard Lesage was born December 15, 1948, in Quebec City, Quebec. He received the Bachelor of Science (Honours) degree in Economics at the University of Ottawa in 1970.

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INTRODUCTION

Inflation over the recent years has been a popular subject of discussion among Canadian economists and a cause of concern for the Canadian government. To witness, it created a Prices and Incomes Commission, giving the latter a mandate to study the problem of inflation in greater detail in an effort to better understand its causes and its effects on the domestic economy.

The early sixties were for Canada and the United States not only a period of constantly rising prices but also a period of constant growth and high capacity utilization (81). Inflation became a problem in the late sixties when prices kept increasing (as they had done previously from 1955 to 1958) despite distinct overcapacity, fair size unemployment and no excess demand (91, p. 372).

Inflation, while it had been explained by a monolithic theory in the period of demand pressure could no longer be explained so simply as some sectors were experiencing price rises while others were decreasing them. As Samuelson and Solow were quick to point out, only a desire for symmetry

could explain the use of a monolithic pricing theory for sectors as different as services and machinery, for example.

A theory proposed by Duesenberry (36) in 1950 suggested that a discussion of business decisions, which produce the price increases, is necessary if inflation is to be understood fully. This theory was the basis of numerous attempts to explain the inflation of the price level.

A review of the literature on inflation revealed that one of these attempts, the theory of Administered pricing, had not received an adequate coverage in Canada. The review of the theoretical and empirical contributions to this theory further revealed the lack of a well-organized theoretical framework and also brought out the weaknesses of the attempts made to test the theory.

The theory of Administered Price inflation suggests that the pricing behaviour of industries with market power is different from that of the more competitive industries.

An empirical study by Weiss (107) established that economic concentration influenced prices significantly in the United States. A study of the same nature for Canada was very appealing in view of the fact that the smallness of the market hinted at a higher level of industrial

concentration here than in the United States.

A study by the Department of Consumer and Corporate Affairs (25) released late in 1971 did confirm this suspicion. It demonstrated that industrial concentration has been increasing and that its level was much higher here than in the United.States. The report states that the fifty largest American manufacturing companies accounted for 25 per cent of value added by manufacturing enterprise in the United States in 1963, while the fifty largest manufacturing entreprises in Canada accounted for 36 per cent of the value added by manufacture in Canada in 1965. Therefore, a study designed to understand better the effect of market power on pricing decisions was justified more than ever before, and seemed to be especially relevant for Canada.

While the goals of this thesis were to provide a useful theoretical framework to study the theory of administered pricing and to develop a model to test this theory, in Chapter I, the relevant literature was reviewed. According to this review, two versions of the theory of Administered Price Inflation seem to exist. One version emerged from the empirical contributions and states that prices in concentrated industries increase more than in competitive industries. It has been disproved by further empirical research. In the other version, it is assumed that concentrated industries price differently from the more

competitive ones and further that the non-compatibility of results for different time periods can be explained by differences in the level of capacity utilization.

A new model was built to verify these more sophisticated hypotheses, which were developed by Ackley, Galbraith and Means. The model developed in Chapter II was also designed to incorporate the findings of case studies of pricing policies in big business.

In Chapter III, the model was tested with Canadian data.

The last chapter was an attempt to find out whether the size of an industry and its degree of market power have an influence on pricing policies. The total sample was therefore divided into subgroups according to the size of the industries, to the size of their concentration ratios and to their utilization of market power. These tests, while they yielded interesting results as to the pricing behaviour of the subgroups, also permitted to study the stability of the model.

The policy implications of the findings and suggestions for further research are emphasized in the summary and conclusions. The appendix lists the results of the empirical research. It also gives a list of the industries

included in the different samples which were formed to verify the theory of Administered Price Inflation and to test the pricing behaviour of subgroups in manufacturing industries.

CHAPTER I

ADMINISTERED INFLATION

The theory of administered prices inflation

It is extremely difficult to decide on a guiding definition for the theory of Administered Price Inflation because this term has been used to describe two different hypothesis both related to the behaviour of concentrated industries with respect to pricing.

Gardiner C. Means who did the pioneer work in this area defined an administered price as one "which is set and maintained for a period of time and a series of transactions[1]" There is more to this definition that is evident at first sight. The first hypothesis or the first approach to Administered pricing theory can be derived almost entirely from it.

Even though the definition does not explicitly mention the importance of market power, industries in which prices are administered must have a certain degree of control over their prices to make the administration possible.

Competitive firms are by definition price-takers and cannot influence the price level.

The Means' definition also implies that prices that are administered tend to be more stable over time. A policy of price stability can be justified on various grounds. It is advantageous for the consumer of the product because he will know what price to expect. It is of course advantageous to the seller because it foregoes the costs associated with price changes and with the justification of the increases to the customers. "It is also a natural reaction to the oligopolist's uncertainty regarding the position of his demand schedule[2]."

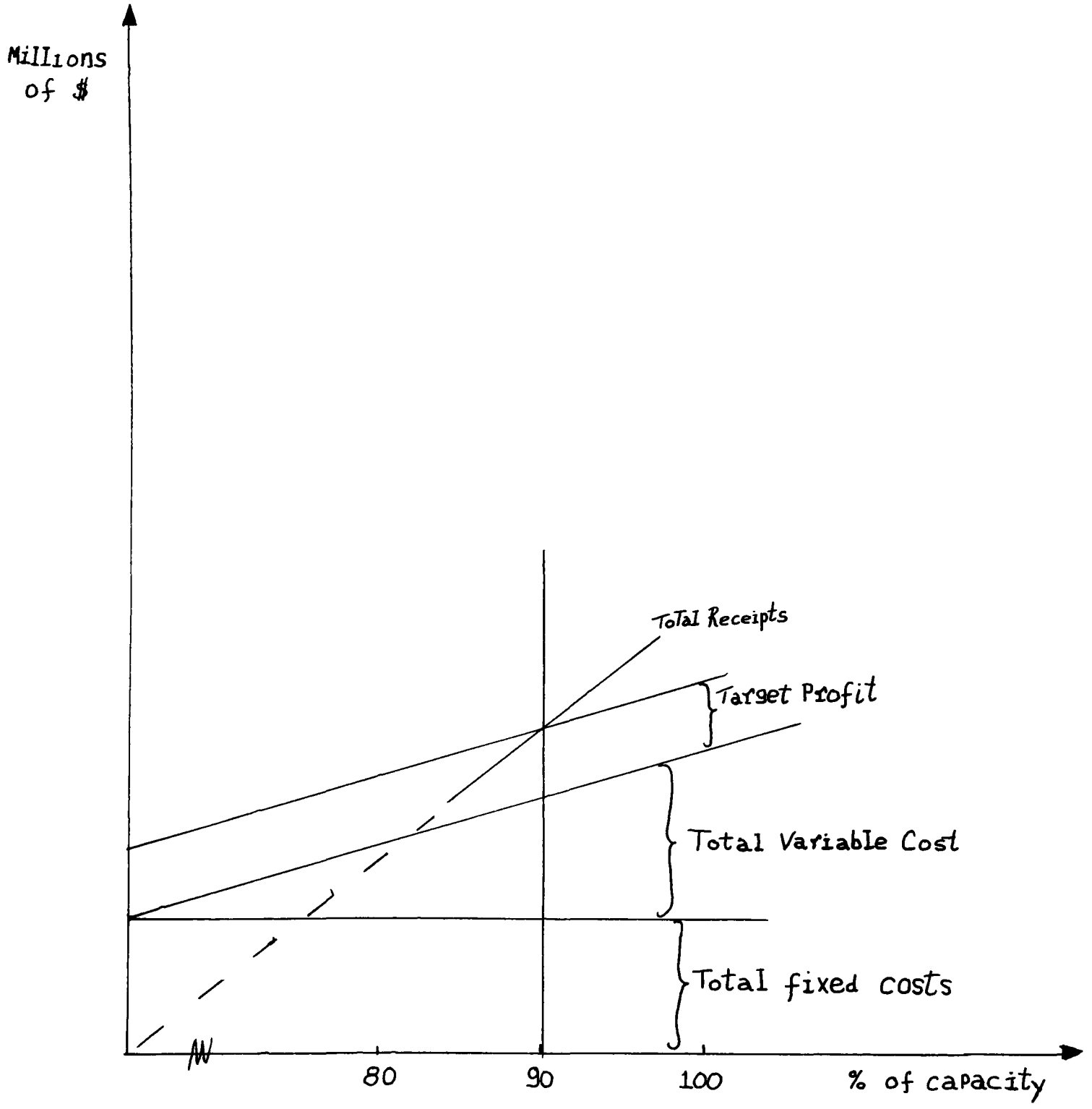
The Means' definition does not consider administered prices as an economic evil. "In no event does he regard them as something that can or should be done away with[3]." The definition implies a goal of price stability in concentrated industries; it does not only involve a downward inflexibility of prices (i.e. stable prices despite falling costs), but also an upward rigidity (or stable prices in the face of rising costs).

There is in the literature a type of pricing which fits in well with administered price theory and, according to case studies is one of the most frequently use mechanism of price

determination. It is called "target return pricing"[4]. Figure I, which appears on page 4 , is reproduced from a book by Leonard W. Weiss. It portrays target return pricing as it is used by General Motors of America[5]. In this model, the product of output by a constant average variable cost (implying a constant marginal cost) is added on to the total fixed costs to form a total cost curve. A target profit rate on capital is then added on and is represented by a parallel to the total cost curve. The price is established to cover both costs and target profits. The flaw in that type of pricing is evident. It requires a high price when sales are low and vice-versa. "Rather than do that, GM determines a standard volume which is supposed to be an estimate of the long-run operating rate of the company,s plants, and then tries to set a price that yields the target profit at that output[6]".

This price will be maintained as long as the standard volume for which it was established is a fair estimate of the long-run average use of capacity. It will be subject to periodic revisions to reflect cost changes. The slope of the total receipts line will be the price level which will be maintained for a certain period assuming that the expected level of capacity utilization in the long-run remains stable (at 90% in figure I).

Figure I : Target Return Pricing



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Price changes to reflect cost changes are difficult to understand if one assumes that the monopolist or the oligopolist was in a profit maximizing position. Wroe Alderson makes this point very clear: "Actually a target return can only be equal or less than the optimum return[7]". Means and Galbraith both agree that concentrated industries have "an unused capacity for gain" since they are able to increase their prices to achieve their target return when cost increases cut into the profits[8]. This is necessary since cost increases do nothing to improve a firm's market position. The unused capacity for gain concept provides the leeway for oligopolies and monopolies to increase their prices in the face of a stable demand and to keep relatively stable prices despite changing demand conditions.

The behaviour described above, while it implies a continuous relationship between market power and price movements, also hints at different types of behaviour in concentrated industries with respect to price changes depending on the level of capacity utilization. Administered price theory, if it is to be complete must take into account three different sub-hypotheses.

The "Means-Galbraith hypothesis" claims that when capacity is below a normal level, prices in concentrated industries are likely to remain stable or even to rise. In

periods of low capacity utilization, a positive relationship between concentration and prices, given changes in demand and costs will be said to verify the Means-Galbraith hypothesis. In other words, firms with market power will use their control over prices to counteract the depressing effects of falling demand and of lower costs on their selling prices.

The "Ackley-Galbraith hypothesis" relates to the behaviour of concentrated industries when the economy is operating at full-capacity. According to this hypothesis, the prices of concentrated industries will follow those of the competitive sector with a lag.

The weaker version of the "Ackley-Galbraith" sub-hypothesis claims that in the long run, the prices of concentrated industries will catch up, so that an insignificant or zero relationship between market power and prices will be expected.

The stronger version would imply a persisting lag for the prices of concentrated industries at full-capacity. This version will be verified by a significantly negative relationship between market power and prices.

The "catching-up hypothesis"[9], like the other two, attempts and explanation of prices in concentrated industries taking into account the level of economic activity. It

claims that concentrated industries are likely to anticipate a recovery. In the early part of an upswing, prices and market power should be positively correlated, given changes in demand and costs, since firms with a sufficient control over their selling prices will attempt to cover up their losses or at least to make up for the failure to gain in the previous period when demand was inadequate.

The theory of administered prices inflation thus assumes that prices are less subject to frequent changes in concentrated industries. This theory received empirical support from a study by Levy and Moore.[10] A case study by Kaplan, Dirlam and Lanzilotti also found that price stability was often a pricing goal of big business.[11]

The case studies and administered prices inflation theory

Further, the other pricing goals of big business isolated by this case study are very compatible with the version of administered prices inflation described above. The goals that were mentioned the most frequently were a target return on investment, the stabilization of prices and margins, the maintenance or improvement of the market position or market share and a price that meets or follows that of competitors. Product differentiating advertising was reported to be used to justify different prices.

An important conclusion can already be drawn from the above. While it was not to be expected that company executives would claim that their goal is profit maximization it is significant that a number of objectives, stabilization of prices being a clear cut case, imply no desire to maximize short-run profits. Business seems to be more interested in the long-run profits and sometimes more in volume than in profits itself.

Pricing, as seen by these interviews, seems fairly complicated. "In most of the companies, one of the goals predominates, but as the listing of collateral objectives indicates, price-making by any one firm was not always ruled by a single policy objective[12]."

The pricing policy goals and administered price theory

It is clear from both the article by Lanzilotti (70) and the joint study by Kaplan, Dirlam and Lanzilotti (59) that target return pricing was the most frequently mentioned of the pricing goals. Figure I has already explained the way in which target return pricing works.

This type of pricing is in line with the administered price hypothesis which claims that prices in concentrated industries are not as high as they could be in periods of excess demand and are higher than they would be under

competitive conditions when demand is slack. "Having earned what is necessary during poor times to provide an adequate return, they will refrain from upping the price as high as the traffic will bear in prosperity[13]." One last point made by Lanzilotti (70) is interesting. The target returns admitted by the company executives were for the 1947-1955 period lower than the actual returns and brings in the possibility that the target may be a minimal goal. A "satisfying" rather than maximizing goal.

A second objective mentioned frequently in the interviews as a collateral objective and also by two firms as their most important policy objective is stable prices and margins. This objective does not need to be developed further as it is self evident that it generates the type of behaviour expected in the administered prices framework.

This however is not the case of the third pricing objective mentioned. A number of firms claimed that their main interest did not lay in unit profit but in market share. These industries will not sell at a loss[14] but will cut prices in order to achieve their goal. The underselling policy is of course only possible in a case of oligopoly because pure competition would drive the price upwards in no time. Whenever this policy is in force, concentration can thus be expected to have a depressing effect on prices.

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A number of large firms interviewed claimed that they did not have an independent pricing policy and that they were following competition. Again this type of pricing is not too aptly described by cost-push models since prices are determined by a price leader who takes his costs into account but not that of other firms. To the extent that the price leader is trying to obtain a target return on profits or a stable price policy, the prices in the industry will obviously follow the administered pricing behaviour. In other words, if the prices of a price leader are sticky, the prices of the industry as a whole will also be. However, at the industry level a markup over cost model might not be ideal as different firms might have a different cost structure depending on the availability of the factors of production, the age of the plant (whether it includes all the technical innovations of other plants or not) and on the efficiency of the management. Here, it would clearly be best to use statistics of the leading firm in an attempt to explain the price of the industry but these are not available. Industry statistics can however be considered to be a reasonable proxy.

Non-price competition was also mentioned frequently as a policy to maintain a competitive position. If one thinks back in terms of figure I presented above to illustrate target return pricing and considers that advertising expenses

become a fixed cost in industries engaging in non-price competition, it is clear that these expenditures will bring up the price level, and more significantly so when sales are low. The effect of concentration on prices for companies using non-price competition seems to be upward for all phases of the cycle. The stickiness linked to administered pricing is also likely to occur as advertising expenditures get to be more significant in periods of low capacity utilization. The goals aimed at by pricing policy of big business will probably result in sticky prices. However, concentrated industries after suffering through a period of below normal prices will probably lead the way by increasing prices in the early period of the recovery. They, after all, do not have to wait for the demand pressures to be felt as they have an unused capacity for gain. The rates of increases will slow down as full capacity is reached.

In conclusion, it seems appropriate to emphasize that pricing decisions cannot be said to aim at one unique objective for a given firm. "... no single theory of the firm - and certainly no single motivational hypothesis such as profit - maximization - is likely to impose an unambiguous course of action for the firm for any given situation; nor will it provide a satisfactory basis for valid and useful predictions of price behaviour[15]."

The empirical verification of administered prices inflation

At the very beginning of this chapter, it was emphasized that there had been two different types of behaviour associated with the theory of Administered Prices Inflation and yet only the one version with its three sub-hypothesis has been presented in the review of the theoretical literature. The reason is simple. The second version originates with empirical work.

Means's analysis refers only to one period of low capacity utilization. He feels and attempts to prove that the degree of industrial concentration had a positive effect on prices for that period, but he finds no historical parallel for it, i.e. he does not expect the relationship to hold over time.

However, ever since De Podwin and Selden (26) attempted to correlate prices and concentration ratios, most of the attention has been directed at establishing a positive relationship between these two variables. The insignificance of their results are interesting since they cover the period which Means had chosen for his demonstration before the Kefauver Committee. Their findings are subject to two main criticisms. They extend the time period of analysis from 1955-1958 to 1953-1959.

While it is true that one might wish to do so to reduce the chance of random results in a given period, it might be undesirable from another point of view. Since the period 1955-1958 was at the bottom of the cycle, more or less all manufacturing industries must have had some unused capacity. Adding years to this period implies that some industries might have been operating closer to capacity in at least one of the terminal years. Aggregation now becomes a problem as it is not the same phenomenon which is being measured for all industries in the sample. This is especially important in view of the importance of the level of activity in the theory of Administered Prices Inflation. The choice of the time period is a key decision that is likely to affect the results significantly if some industries are not in the same stage of the cycle.

The second criticism also applies to Means' analysis. Both studies lack a reasonable model. In fact, it was mentioned by Bailey even before the De Podwin and Selden paper appeared: "Gardiner Means's classic study of the apparent correlation between concentration and price inflexibility and Blair's subsequent work along the same lines, cited by him, make no allowance for differences from industry to industry in the variability in marginal costs; this consideration could make the observed correlations essentially spurious[16]."

Weiss (107) reversed this argument and claimed that the de Podwin-Selden results could be spurious because they did not take into account these differences in marginal cost from industry to industry. In fact, he provides the first model to test Administered Price Theory. It allows for changes in demand and in costs and uses full-cost pricing.

Weiss claims that the coefficients of the unit cost variables are approximately equal to the relative share of the variables in manufacturing. A simple numerical example will show why. Assuming the following relation to be true for two successive periods, equation (2) could take the following form.

$$(1a) \quad 12. = (1 + (.2))\ (6 + 4) = 7.2 + 4.8$$

$$(1b) \quad 13.2 = (1 + (.2))\ (7 + 4) = 8.4 + 4.8$$

Transforming this into a ratio form, one finds, as Weiss did,

$$(2) \quad \frac{13.2}{12} = a\ \frac{8.4}{7.2} + \frac{4.8}{4.8}\ b$$

If (3) $a + b = 1$

$a = .6$ is the solution for a and it is also the relative share of labour. The results can very slightly if the aggregation does not include the whole economy, while the measures of factor shares do. Still the results should

be reasonably close if full-cost pricing is in fact used. Additional variables will however disturb this relation slightly.

The Weiss model includes a proxy for demand and a measure of market power as well as the unit cost measures. With this model, he discovers that concentration was significantly and positively correlated with prices for the same period as de Podwin and Selden (1953-1959). His results however are insignificant for the 1959-1963 period and he concludes that concentration might have had only a temporary effect on prices due to particular circumstances. It is amazing that he does not attempt to link his results with the business cycle, since admininistered pricing theory is based on it.

Later researchers will put the Weiss equation into words and make it their hypothesis to verify administered price theory with new data. Phlips will be out to prove that "... price increases are higher in more concentrated industries, given positive changes in demand and costs[17]."

In fact, this approach was not entirely new. Some theorists, like Nourse , had been blaming the firms with market power for the inflationary spiral. "From 1946 forward, (the powers of price administration) have been freely exercised

by both parties, but the consequence has been an inflationary spiral rather than any general curtailment of production[18]." If one considers that more than ten years elapsed from 1946 to his hearing before the sub-committee on Anti-trust and Monopoly, he certainly is thinking in terms of a persistent upward pressure on prices from concentrated industries, irrespective of economic conditions.

The failure of Phlips to find a significant and positive relationship between prices and concentration with data from the European Economic Community and that of De Silva with Canadian data were rapidly taken to mean that Weiss' results might have been caused by a particular set of circumstances especially since he could not reproduce them for another period (1959-1963).

Those results seemed to be a strong support for those who claimed " that oligopoly and monopoly prices had no special relevance for inflation[19]..." It is clear however that they only disprove the second version of the theory, the one that was developed from empirical studies and that what is really needed is a new model to test the administered prices inflation theory as it was reformulated at the beginning of this chapter. This model should of course also take into account the different pricing policies of big business whenever feasible.

The need for a revised model to test the administered price inflation hypothesis

The empirical verification of administered pricing theory leaves a lot to be desired. While one of the two approaches presented above has been disproved, of the three different sub-hypothesis derived from the other type of pricing behaviour, only one has been empirically tested. Weiss (107) proved that, in the U.S.A., concentration was positively and significantly correlated to the price level for the period 1953-1959. In that period, the economy was generally operating below capacity.

Considering that inflation is a dynamic process[20], it seems more appropriate to explain the change in the price level than the price level itself and the model will be based on that assumption. The model should of course also include capacity utilization, the key variable in the reformulation.

The author feels very strongly that pricing models should be used to reflect pricing decisions and the Kaplam, Dirlam, Lanzilotti (59) case studies will be incorporated whenever it is feasible. The model should however not only be general enough to incorporate pricing decisions specific

to some firms or industries but as an aggregative model it should also attempt to take into account long-run profit maximization, one objective common to most pricing decisions in big business.

FOOTNOTES TO CHAPTER I

1. Means (77, p. 47-59).

2. McFetridge (76, p. 1).

3. Blough (17, p. 203).

4. Eckstein and Fromm build a model from this type of pricing in (38).

5. Weiss (110, p. 354).

6. Weiss (110, p. 354).

7. Alderson (7, p. 457).

8. Galbraith (47, p. 39) and Means (77, p. 83).

9. While McFetridge (76) uses "catching-up" for periods of inadequate demand generally, it seems preferable to retain the term for a recovery period where demand, while it is still lagging, is picking up. Oligopolists are more likely to catch up then, after having maintained their price in the period where demand was falling and inadequate. The Means Galbraith hypothesis is the term used in periods of falling and (or) inadequate demand.

10. Levy and Moore (73) proved that prices are less flexible in concentrated industries.

11. Kaplan, Dirlam and Lanzilotti (59, p. 165-180), and Lanzilotti (70).

12. Lanzilotti (70, p. 932). This article is an outgrowth of the original study by Kaplan, Dirlam and Lanzilotti (59).

13. Lanzilotti (70, p. 932).

14. According to Kaplan, Dirlam and Lanzilotti (59, p. 183), A & P, while it had market share as its main objective also enforced a 3 per cent markup in its stores. On page 194, an example of Sears lower prices is given for a handful of selected products.

15. Lanzilotti (70,p. 939).

16. Bailey (11, p. 459).

FOOTNOTES TO CHAPTER I CONCL'D.

17. Phlips (88, p. 1).

18. Nourse (83, p. 11).

19. Stigler (101, p. 8) is one of the economists who make this claim.

20. Numerous authors define inflation as a dynamic process to verify this, the reader can read Ackley (3, p. 421) Ball and Doyle (14, p. 7) and Machlup (74, p. 149-150).

CHAPTER II

AN ADMINISTERED PRICING MODEL

The variables and the problems of aggregation

It has already been seen that in big business alone, pricing decisions were made to meet five different objectives and a mixture of those was usually reflected in the pricing policy of a given firm. This, in itself, is not a big problem as far as the number of variables is concerned if we assume that manufacturing uses markup pricing, and marks up to a different degree according to its main objective. As a result, one gets an average on the relative factor shares, as coefficients for the unit cost variables. The model is usable because the policy makers in all the firms use the same indicators.

Even when the competitive sector is included in the sample, this conclusion holds, because average variable cost is a good proxy for marginal cost and that it can be used in pricing decisions. This is because an increase in production is not likely to change the factor proportions in the short-run

as a reduction in output is likely to lead not only to lay-offs of workers but also to idle machinery. "Accordingly, so long as the producer retains his method of production and stays within his normal operating range, we should expect his input of variable factors and - given factor prices - also his variable cost to vary in proportion with output[1]."

Since average variable cost is equal to marginal cost as long as the former is constant,there is no doubt that the average variable cost is a good estimate of marginal cost. It is also probably the best available estimate since production is a process that takes place over time so that it may be very difficult to estimate the cost of additional output as some of the cost may have been incurred in the previous year, the previous quarter and the previous month while others occur after the product is on the market.

Also, most firms produce more than one product or a wide range of quality for the same product. It might be difficult to separate the cost attached to one particular product unless the constant average cost assumption is made. Pricing is probably often made on the basis of the average cost of production. Even in the competitive sector where trial and error is required, average variable cost seems a better indicator than marginal cost.

The problems of aggregation in the model occur when a variable is introduced to reflect the influence of monopoly power on pricing. There are two reasons for this aggregation problem: first, administered price theory implies that pricing behaviour is not the same in each phase of the capacity utilization cycle; and second, different business pricing objectives may have different effects on the dependent variable thus increasing the inaccuracy of the measurement of the overall effect of concentration on inflation in the prices of manufactured products.

By definition, concentration is insignificant for perfect competitors. However, the depressing effect on the coefficient of the concentration variable and its t-value will probably be small because of the small number of highly competitive industries in the manufacturing sector[2].

It was demonstrated above that most of the pricing objectives of big business would lead to a policy of sticky prices. Two notable exceptions have to be mentioned however.

Advertising expenditures and other expenditures related to non-price competition through product differentiation were shown to have a positive effect on prices.

Since these expenditures occur mostly in concentrated industries, the positive correlation between concentration and

advertising expenditures, which are unaccounted for in the model, might cause a bias on the coefficient of the concentration ratio. Advertising expenditures, being a cost element, cause higher prices. The resulting bias should thus be upwards, increasing the likelihood of significant results in periods where the coefficient is expected to be positive and decreasing this likelihood when the expected sign is negative[3]. Lack of data does not allow the introduction of a variable which would specifically measure advertising expenditures. Some allowance should be made for them, but the best that can be done is to assume that they will be accounted for with other fixed costs[4].

Research and development expenditures have also been made mostly by highly concentrated firms but more economic research would be required in order to evaluate whether these can be included as fixed costs or whether they follow the cycle[5]. In any event, materials and manpower used in research and development are accounted for in unit cost variables of cost-push models.

The other exception of a price of objective that does not lead to sticky prices but to a given effect on prices, whatever the level of economic activity, is the attempt to increase market share by price competition. The reader will recall that Kaplan, Dirlam and Lanzilotti mention this

as a possible case. But clearly, as the case of the kinked demand curve[6] illustrates, this case is not too important since most industries attempt to avoid price wars. The greater the concentration, the less likely the price competition, both because of the increased likelihood of price leadership and because a smaller the number of competitors makes a more likely that price competitor will degenerate into a price war. This is due to the fact that the encroachment on the markets of individual competitors will be more significant if their number is small. Since price competition is more likely to occur in the less concentrated industries, again we have an upward bias with concentration. These combined effects will probably cause an upward bias on the coefficient of concentration, but this cannot be measured until a model which takes into account the cost of advertising and other services is constructed. Unfortunately, data is not available. Keeping this in mind, insignificant results when the coefficient is expected to be positive would disprove the theory if obtained with all the proxies tested in the model. Insignificant coefficients for concentration in periods of high economic activity, while they support the weaker version of the catching up hypothesis, may not allow a rejection of the stronger one.

The model

For the purpose of this paper, production functions are assumed to be linearly homogeneous. Consequently, one can write

(1) $X = A \cdot L^{\alpha} \cdot K^{\beta} \cdot M^{\gamma}$

where X = real output

A = labour

K = capital

M = material

$\alpha + \beta + \gamma = 1$

(2) and (3) can be derived from (1).[7]

(2) $$\frac{\partial X}{\partial L} = \frac{\alpha . X}{L} = \frac{W}{MR} = \frac{W}{P\ \frac{(e+1)}{e}}$$

where e is the elasticity of demand

α = elasticity of output with respect to labour

γ = elasticity of output with respect to material inputs

Q = marginal return in money terms to material input

W = money wage rate

P = price level of final product

(3) $$\frac{\partial X}{\partial M} = \frac{\gamma X}{M} = \frac{Q}{MR} = \frac{Q}{P\ \frac{(e+1)}{e}}$$

Solving for the price level p, one finds:

$$(4)\quad P = \frac{1}{\alpha} \cdot \frac{e}{e+1} \cdot \frac{W.L}{X}$$

$$(5)\quad P = \frac{1}{\gamma} \cdot \frac{e}{e+1} \cdot \frac{Q.M}{X}$$

where $\frac{W.L}{X}$ defines unit salary and wage costs (USW) and $\frac{Q.M}{X}$, unit material cost (UMC). In equilibrium and at the margin, the return to all factors of production will be equalized.[8]

$$(6)\quad P = \frac{1}{\alpha}\ (E)\ \ USW = \frac{1}{\gamma}\ (E)\ \ UMC$$

where E is a measure of monopoly power defined as $\frac{e}{e+1}$.

One can combine the two parts of (6) to form a unique price equation.

$$(7)\quad P = \frac{E}{\Sigma}\left(\frac{1}{\alpha}\ USW + \frac{1}{\gamma}\ UMC\right)$$

In this model, one must notice that the coefficients of USW and UMC, while related to the factor shares (inversely), are not the factor shares as in the Weiss model (106). It has already been emphasized that inflation is

considered to be a dynamic process. Keeping this in mind, an explanation of changes in the price level will be preferred to an explanation of the price level itself. Equation (8) is the total derivative of equation (7).

$$(8)\quad dP = \frac{1}{2\alpha}\, d(E) \cdot USW + \frac{1}{2\alpha}\, E \cdot d(USW) + \frac{1}{2\gamma}\, d(E)\, UMC + \frac{1}{2\gamma}\, E \cdot d(UMC)$$

Grouping terms, substituting E for its value and dividing both sides by P yields[9]:

$$(9)\quad \frac{dP}{P} = \frac{1}{P}\,\frac{E}{2\alpha} \cdot USW\,\frac{d(USW)}{USW} + \frac{1}{P} \cdot \frac{E}{2\gamma} \cdot UMC\,\frac{d(UMC)}{UMC} + \frac{dE}{E}$$

or after simplification:

$$(10)\quad \frac{dP}{P} = a\,\frac{d(USW)}{USW} + b\,\frac{d(UMC)}{UMC} + \frac{dE}{E}$$

To fully understand the above model, one has to examine the variables that can affect E, the measure of monopoly power, over time.

It is particularly interesting to note that changes in demand affect the elasticity of demand even when the shift is parallel. The effect depends on the shape of the marginal

cost curve. Since $e = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q}$, if we assume the slope $\Delta Q/\Delta P$ to be constant, it is the change in P/Q which will determine what is happening to the elasticity of demand. Manufacturing industries are usually believed to be operating on the constant part of their marginal cost curve. If this is the case, or even if the costs increase slightly with output, an outward parallel shift in demand will have a depressing effect P/Q and therefore also on the absolute value of the elasticity of demand. It is not surprising to find that the measure of market power will increase whenever this is the case.

It is also possible,of course that the slope of the demand curve will change when the curve shifts. A more inelastic demand curve (steeper) will of course increase the degree of monopoly power. Advertising is often directed at such a shift in the curve as the firms try to obtain fidelity from their customers.

Considering that the variable is a measure of monopoly power, one can assume it to be a linear function of shifts in demand and of concentration. It is the latter variable that should follow the cycle according to the different hypothesis included in the reformulated version of administered pricing theory. As a proxy for changes in demand, changes in output[10] and in prices will be used. In equation form one obtains

$$(11) \quad \frac{dE}{E} = V_1 \frac{dQ}{Q} + V_2 \frac{dP}{P} + V_3 C$$

where Q = output and C = concentration ratio

While output alone is usually considered to be an adequate proxy for demand, the desire to allow the model to measure the impact of different pricing policies has lead to the inclusion of changes in P as an explanatory variable for changes in E. The Kaplan, Dirlam and Lanzilotti (59) study has revealed that in some cases price competition does occur among oligopolistic firms. Advertising policies directed at product differentiation may very well cause an outward shift in the demand curve thus reducing the elasticity of demand. This may lead to higher prices with virtually no change in output.

Equation (11) is also important because it allows the measure of the influence of market power by an index of economic concentration which can be calculated.

Equation (10) can now be combined with equation (11) to read

$$(12) \quad \frac{dP}{P} = \frac{a}{1-V_2} \frac{d(USW)}{USW} + \frac{b}{1-V_2} \frac{d(UMC)}{UMC} + \frac{V_1}{1-V_2} \frac{dQ}{Q} + \frac{V_3}{1-V_2} C$$

or when simplified

$$(13)\quad \frac{dP}{P} = \mu_1 \frac{USW}{USW} + \mu_2 \frac{UMC}{UMC} + \mu_3 \frac{Q}{Q} + \mu_4 C$$

E, the measure of monopoly power, varies inversely with the absolute value of the elasticity of demand, e. The higher the E, the more inelastic the demand, the more likely it is that the cost increases will spill over into higher prices. Even if C was not included in the model the coefficients of the cost variables would partly measure the effect of concentration on prices because E enters directly in their calculation.

Equation (13) can now be rewritten as (14)

$$(14)\quad \frac{P}{P} = \rho_1 \frac{USW}{USW} + \rho_2 \frac{UMC}{UMC} + \rho_3 \frac{Q}{Q}$$

Obviously, under ceteris paribus assumptions, the size of ρ_1 and ρ_2 in concentrated industries should be larger than in competitive industries.[11]

One will also expect that when concentration is significant in determining the price level, its withdrawal from the equation will affect at least one of the coefficients in the same direction as its sign. For example when concentration is significant and positive, one will expect that

$$\rho_1 > \mu_1 \quad \text{or} \quad \rho_2 > \mu_2$$

or that both $\rho_1 > \mu_1$ and $\rho_2 > \mu_2$

when comparing the parameters of equations (13) with those of equation (14).

The effect of capacity utilization

The review of administered price theory has already emphasized the importance of capacity utilization in measuring the effect of concentration on prices. It will be noticed that the model above does not include a variable which specifically measures the degree of capacity utilization in manufacturing.

The main reason is that the level of capacity is just as important if not more important than its change in explaining price variations and it seems difficult to incorporate both the level of capacity and its change in a dynamic model. Allowance can be made for it just as effectively however by carefully choosing the time period.

1. Scitovsky (96, p. 308).

2. "Pure competition is rare in modern America. Most of our industries fail to meet one or another of its major requirements". Weiss (110, p. 121). See also Means (77) and Galbraith (47).

3. "Most of the industries of low concentration seem to have low advertising budgets...Most of the big advertisers are in the concentrated group...Weiss (110, p. 509-511).

4. "Once rival advertising is started, no single seller can withdraw without losing his place in the market. The advertising outlays become built in the cost structures... and lead to higher product prices than would otherwise prevail" Leftwich (71, p. 236).

5. Markham (75, p. 348).

6. Leftwich (71, p. 226-229), and Scitovsky (95, p. 388-390).

7. Evans (41, p. 291), Leftwich (71, p. 21) and Scitovsky (96, p. 251), all derive proofs for the formula $MR=P\frac{(e+1)}{e}$ which provides the link between productivity and price in equations (2) and (3). Actually Leftwich and Scitovsky obtain a different sign because they treat the elasticity of demand as positive. The marginal revenue equation brings out the fact that $MR>0$ if $|e|>1$, under the standard assumption of a positive price. None of the three authors mention that the formula is only an approximation. Correct derivation follows:

$$MR = \frac{Po\ (q1-qo) + q1\ (P1-Po)}{(q1-qo)}$$

$$MR = Po + q1\ \frac{(P1-Po)}{(q1-qo)}$$

$$MR = Po + qo\ \frac{(P1-Po)}{(q1-qo)} + (q1-qo)\ \frac{(P1-Po)}{(q1-qo)}$$

$$MR = Po + Po\ \frac{.1}{e} + P1-Po$$

$$MR = P1 + Po\ \frac{.1}{e}$$

Since the change in price is known to be marginal.

$$MR \simeq Po \frac{(e+1)}{e}$$

8. From equations (4) and (5), one can derive the factor shares. Defining the share of labor as $\frac{w.L}{p.X}$, from (4)

one gets $$\frac{w.L}{(1/\alpha \;.\; e/\;(e+1).w.L/X)X} = \frac{w.L.\;(e+1).X}{e.w.L.X} = \frac{(e+1)}{e}$$

Similarly, from (5), the share going to materials is $\gamma.(e+1)/e$. Both shares will be positive as a firm will not produce when $e > -1$.

9. Equation (9) is derived from (8) as follows:

(8a) $$\frac{dP}{P} = \frac{1}{P}\,\frac{.1}{2\alpha}\,(d(E)\;.USW + E.\;d(USW)\;) + \frac{1}{p}\,\frac{.1}{2\gamma}\,(d(E)\;.UMC + E.\;d(UMC)\;)$$

(8b) $$\frac{dP}{} = \frac{1}{P}\,\frac{.E}{2\alpha}\,.USW\,\frac{.d(USW)}{USW} + \frac{1}{P}\,\frac{.E}{2\gamma}\,.UMC.\,\frac{d(UMC)}{UMC} + \frac{1}{2P}\,\frac{(USW+UMC)}{\alpha\quad\gamma}\,.d(E)$$

From equation (7), however

(7a) $E = 2P/\,(USW/\alpha + UMC/\gamma)$

(8b) becomes (9)

(9) $$\frac{dP}{P} = \frac{1}{P}\,\frac{.E}{2\alpha}\,.USW\,\frac{.d(USW)}{USW} + \frac{1}{P}\,\frac{.E}{2\gamma}\,.UMC\,\frac{.d(UMC)}{UMC} + \frac{d(E)}{E}$$

10. In the mark-up models surveyed, four attempt to allow for demand pressure. Hines (51) uses the difference between vacancies and unemployed and divides it by the labour force; the Bank of Canada (49) and (50) uses sales figures, while Scarfe (93) and Weiss (107) use output. The last form was chosen because of data availability at the industry level

and because it has been used consistently in previous administered pricing models.

11. Unfortunately, no reasonable test can be devised in the context of the present model, because of the impossibility of attaining ceteris paribus conditions. It is highly unlikely that the share of labor, for example, is the same in concentrated industries as on the competitive ones. The same can be said of the share of material inputs and of the unit costs which all enter in the calculation of P.

CHAPTER III

CONCENTRATION AND PRICES: EMPIRICAL EVIDENCE

Capacity, concentration and time periods

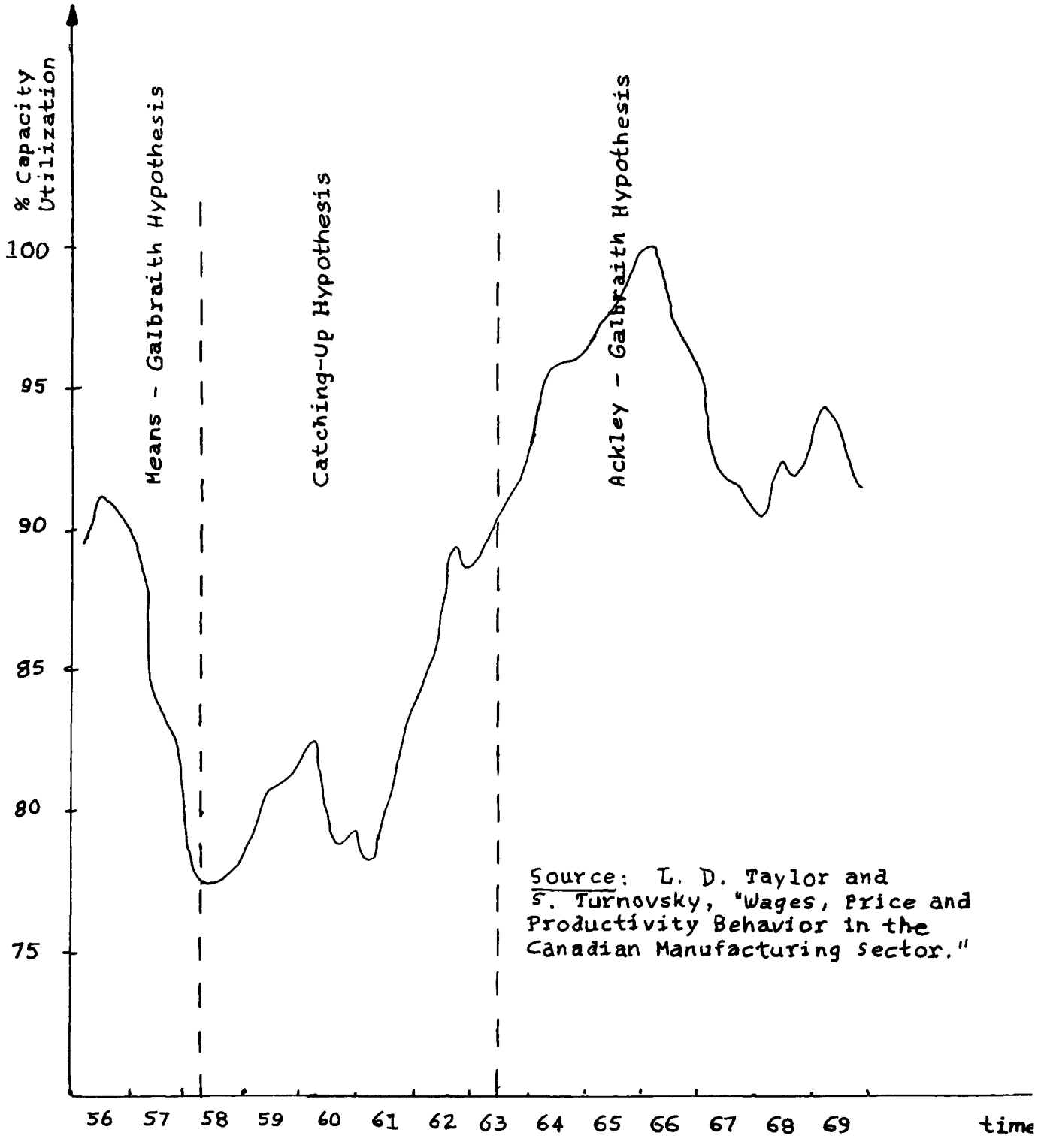
Figure II on page 37 , shows the percentage of capacity utilization over time in the manufacturing industries of Canada. It has been presented in order to determine which time periods provide a valid test for the three sub-hypotheses included in the theory of administered prices.

The period ending in 1957 provides a valid test of the "Means-Galbraith" hypothesis regarding the effect of concentration on prices when the economy is slowing down.

The period extending from 1957 to 1963 (or in some cases only to 1961) can be used to test the "catching up" hypothesis.

The period starting in 1963 is ideal to test the hypothesis attributed to Ackley and Galbraith in Chapter I, regarding the pricing policies that concentrated industries adhere to in periods of high capacity utilization. The period actually extends to 1969, but the best conditions are certainly

Figure II. Capacity Utilization in Canadian Manufacturing Industries.



Source: L. D. Taylor and S. Turnovsky, "Wages, Price and Productivity Behavior in the Canadian Manufacturing Sector."

obtained for the 1963-1966 period. There was, in 1967, a dip in capacity utilization in manufacturing industries and the subsequent upturn did not bring capacity back to the previous level.

The variables

While capacity utilization was introduced in the model in this indirect fashion, data or proxies were used for all other variables. The dependent variable, $\dot{P}/P$, was constructed by calculating the percentage change in the selling prices of the goods of individual industries over the relevant periods.

$\dot{Q}/Q$, which measures the effect of output changes on the price level is the percentage change in the value of shipments deflated by the price level.

Two different measures were used for unit labour cost. The first was obtained by deflating the total wage bill of production workers by the output variable and by taking the percentage change in the resulting unit cost measurement. To obtain the second proxy, the payroll of office and professional workers was added on to the wage bill of production workers before the deflation by output, and then, the same process was repeated.

This split might throw some light on the effect of salaries on prices, as they are expected to be a more stable component of labour cost than wages.

The unit material cost variable, $\dot{UMC}/UMC$, was calculated by deflating with the output variable, the sum of the expenditures of the individual industries on fuel and electricity and the cost incurred by purchasing raw materials. Again the percentage change is the relevant measure in the model.

For concentration, four measures were used. The percentage of shipments accounted for by the four and eight largest establishments in the industry and an herfindahl index calculated with the value of shipments of the establishments and the entreprises in an industry. While the results obtained were very similar, the last two measures were preferred because unlike the first two, they are representative of the whole industry[1].

The data[2] and the model

For forty-one different manufacturing industries, data was collected. This data included the industry selling price index, the value of shipments, the wages of production workers, wages and salaries, fuel and electricity expenditures, the cost of materials inputs, the value added by manufacturing

and four different measures of concentration.

The equations of the model developped in chapter III that were tested empirically are equations (13) and (14). The availability of two measure for unit labour cost makes it necessary to rewrite them as equations IV.1 to IV.4.

$$\text{(IV.1)}\quad \dot{P}/P = \dot{Q}/Q + \dot{W}/Q/W/Q + \dot{UMC}/UMC$$

$$\text{(IV.2)}\quad \dot{P}/P = \dot{Q}/Q + \dot{W}\ \&\ SAL/Q/W\ \&\ SAL/Q + \dot{UMC}/UMC$$

$$\text{(IV.3)}\quad \dot{P}/P = \dot{Q}/Q + \dot{W}/Q/W/Q + \dot{UMC}/UMC + CR$$

$$\text{(IV.4)}\quad \dot{P}/P = \dot{Q}/Q + \dot{W}\ \&\ SAL/Q/W\ \&\ SAL/Q + \dot{UMC}/UMC + CR$$

For most of the series used to estimate these equations there was no continuity prior to 1957, so that it was not possible to test the "Means-Galbraith hypothesis" with Canadian data. It has however been tested for the U.S.A., by Weiss (107), for the period 1953-1959. As was mentioned in Chapter I, the result gave concentration a significantly positive coefficient thus confirming that sub-hypothesis.

The Canadian data are however very well suited to test the "catching-up" and the "Ackley-Galbraith" hypotheses.

The "catching-up" hypothesis

The"catchin-up" hypothesis is fully supported on the basis of Canadian data. Table I, gives the result obtained

with equations IV.1 to IV.4 when the Model was tested for the periods 1957-1959 and 1957-1961. The concentration ratios is evident that most of the coefficients of the concentration variables are significantly different from zero. Also, when the concentration variable is withdrawn from the equation at least one on the unit cost coefficients increases. Appendices A-5 to A-8 provide additional equations that prove the same point. The last result is easily seen to hold by comparing equation IV.1 to IV.3, and equation IV.2 to IV.4.

While it is evident that market power did have an influence on price, it is also clear that concentrated industries used that part of their market power to offset the cost of salaries in the period of low economic activity, when the staff was underwork.

Equations IV.1 and IV.3 for the period 1957-1959 show that in the early part of the recovery, wage demands by production workers did not cause prices to rise as the unit labour cost coefficient is insignificant. The addition of salaries to that variable increased both its coefficient and its t-value and also reduced the significance of concentration is explaining price changes.

Salaries being the more stable component of the labour cost variable cause the unit cost to rise when activity declines. The reason for treating salaries differently is

that the recruitment and the training of salaried office personnel is high and consequently the firms usually keep their salaried staff on in the face of falling demand and production.

Equations IV.2 and IV.4 do imply that during the recovery firms may use part of their market power to recuperate the salaries of their under-employed technical staff by charging a higher price for their product. This will be true only of concentrated industries and the positive correlation between the index of market power and the policy to transfer salary costs to the buyers by charging higher prices cause a reduction in the direct effect of concentration on prices during that period.

Salaries are an important determinant of prices during the recovery as their inclusion increases $\bar{R}^2$ in all relevant equations and reduce the standard error of estimate.

Once the recovery has fully started, wages start playing an important role in the determination of prices. These results appear clearly when the 1957-1959 period is compared with 1957-1961 in table I. Appendix A-5 and A-7 provide more equations of the same nature.

TABLE I: EMPIRICAL VERIFICATION OF THE "CATCHING-UP HYPOTHESIS"

TIME PERIOD	$\dot{P}/P = \dot{Q}/Q$	$+ \dot{ULC}/ULC$	$+ \dot{UMC}/UMC$	+ CR	$\bar{R}^2$	SEE
1957-1959						
IV.1	- .03 (- .5)	+.098 (0.9)	+.384 (4.7)	*	.426	4.68
IV.2	-.006 (-.01)	+.266 (2.5)	+.330 (4.4)	*	.496	4.38
IV.3	-.073 (-1.2)	+ .03 (0.3)	+.390 (5.0)	+.161 (2.2)	.4788	4.45
IV.4	- 0.4 (- .7)	+.197 (1.7)	+.338 (4.6)	+.119 (1.6)	.5175	4.28
1957-1961						
IV.1	.079 (1.3)	+.402 (3.7)	+.255 (4.0)	*	.461	5.35
IV.2	.063 (1.3)	+.443 (5.3)	+.236 (4.2)	*	.578	4.73
IV.3	.043 (0.7)	+.384 (3.7)	+.224 (3.6)	+.190 (2.3)	.5171	5.06
IV.4	.031 (0.6)	+.418 (5.2)	+.212 (3.9)	+.158 (2.2)	.6158	4.52

NOTE: A* implies that concentration is not included in that equation. Equations IV.1 and IV.3 include only wages in their unit labour cost variable, while IV.2 and IV.4 include wages and salaries.
CR is an herfindhal index of the value of shipments for all the establishments of an industry.
T-values are in brackets below their respective coefficient.

"Catching-Up" and the other measures of market power

When the two other establishment measures of market power were tested the results did not change much. The concentration variable became slightly more significant when the measure used was the percentage of the value of shipments of the four largest and eight largest establishments of the industry[3]. The results appear in Appendix H.

However, when entreprise concentration was used to replace the establishment concentration measures, the t-value of the coefficients increased significantly as can be seen in table II and in Appendices A-1 to A-4. The value of $\bar{R}^2$ was also increased by the change of proxies.

Table II also reveals that the conclusions reached regarding the unit cost variables are not affected by the change of proxy.

The coefficient itself dropped but this is due to the increase in its average value which jumped from 7.99 to 12.81. For the period 1957-1959, in equation IV.3 the coefficient drops from .161 to .134. This nevertheless means that the establishment concentration ratio implied a price increase of 1.286%, while the entreprise concentration ratio explained an increase of 1.717%. Entreprise concentration ratios explain the price behaviour of the manufacturing

TABLE II: EMPIRICAL VERIFICATION OF THE "CATCHING-UP HYPOTHESIS"

TIME PERIOD	$\dot{P}/P = \dot{Q}/Q$	$+ \dot{ULC}/ULC$	$+ \dot{UMC}/UMC$	+ CR	$\bar{R}^2$	SEE
1957-1959						
IV.3	-.102 (-1.7)	+.019 (0.2)	+.393 (5.2)	+.134 (2.9)	.5176	4.28
IV.4	-.068 (-1.1)	+.167 (1.5)	+.346 (4.9)	+.108 (2.3)	.5451	4.16
1957-1961						
IV.3	.01 (0.2)	+.359 (3.6)	+.225 (3.8)	+.160 (3.0)	.5569	4.85
IV.4	.005 (0.1)	+.392 (4.9)	+.215 (4.1)	+131 (2.7)	.6387	4.38

NOTE: Equations IV.1 and IV.2 are not included because they are exactly the same as in Table I.
The unit labour cost variable of equation IV.3 includes wages only, while that of IV.4 also includes salaries.
CR is an herfindahl index of the value of shipments for all the entreprises of an industry.
T-values are in brackets below their respective coefficient.

industries better than establishment concentration ratios. This strongly suggests that the use of market power is more important in the price formation at the entreprise level than at the establishment level in periods of economic recovery.

"The Ackley-Galbraith hypothesis"

Canadian data also supports fully the "Ackley-Galbraith hypothesis". The reader will remember that in Chapter I a distinction was made between a strong version and a weak version for that hypothesis.

It is the weak version that is supported here. It can be seen from table III that all the coefficients obtained for the concentration ratios are insignificant and further that all but one of them are negative. Concentration is certainly not a significant determinant of inflation and indications are that concentrated industries are even slightly lagging behind the competitive ones with their price increases.

This lag becomes even more obvious, if the positive bias introduced in the coefficient by the different pricing policies of big business, is considered. This was demonstrated in Chapter I.

TABLE III: EMPIRICAL VERIFICATION OF THE "ACKLEY-GALBRAITH HYPOTHESIS"

TIME PERIOD	$\dot{P}/P$ =	$\dot{Q}/Q$	$+\dot{ULC}/ULC$	$+\dot{UMC}/UMC$	+CR	R^2	SEE
1963-1966							
IV.1		-.012	+.329	+.417	*	.6620	4.59
		(-.04)	(6.8)	(10.1)			
IV.2		.028	+.100	+.372	*	.3630	6.30
		(0.8)	(2.6)	(6.6)			
IV.3		.005	+.329	+.431	-.077	.6588	4.61
		(0.2)	(6.7)	(9.5)	(-0.8)		
IV.4		..039	+.098	+.380	-.048	.3479	6.37
		(0.8)	(2.5)	(6.2)	(-0.4)		
1963-1967							
IV.1		-.017	+.251	+.594	*	.808	4.96
		(- .5)	(3.8)	(6.6)			
IV.2		-.001	+.261	+.554	*	.6559	4.94
		(-0.3)	(3.8)	(5.8)			
IV.3		-.025	+.243	+.599	+.031	.6442	5.02
		(-0.6)	(3.3)	(6.5)	(0.3)		
IV.4		-.007	+.266	+.551	-.014	.6467	5.00
		(-0.2)	(3.3)	(5.5)	(-0.1)		

NOTE" A* Implies that concentration is not included in that equation. Equations IV.1 and IV.3 include only wages in their unit labour cost variable, while salaries are also included for equations IV.2 and IV.4
CR is an herfindahl index of the value of shipments for all the establishment of an industry.
T-values are in brackets below their respective coefficient.

It should also be mentionned that because concentration is insignificant it is not necessary for the coefficients of either unit cost variable to increase when the concentration ratio is withdrawn from the price equation. A look at table III reveals that in one case, neither do. The results that appear in table III are also shown in Appendices A-5 to A-8. The concentration ratio is an herfindahl measure with the value of shipments at the establishment level within each industry.

There is clear evidence in table III, that the pressure of wages on prices exerts itself mostly in the early period of high capacity utilization when the demand for labour is high because the period is extended and the staff is presumably complete. This effect is apparent when the results for 1963-1966 are compared with those for 1963-1967 in table III.

The equations in the same table also reveal that the pressure of salaries on prices is low during the early part of a high capacity utilization period. The wages and salaries variable is not nearly as significant as the other measure of unit labour cost and the value of $\bar{R}^2$ is much lower when wages and salaries are used as a proxy for unit labour cost. This was to be expected because the salaried staff is not increased but it stops being underemployed. The total

salary bill is relatively constant as the production reaches "new highs". A decrease therefore in unit salary costs will impair a strong correlation between the unit salary and wage cost variable and the rising prices.

The Ackley-Galbraith hypothesis and other measures of concentration

Again very little can be said about the other establishment measures of concentration except maybe that all the coefficients obtained in the high capacity utilization period are negative. If one considers the positive bias on this coefficient, the fact that they turn out to be consistently negative leads to the conclusion that even the stronger version of the Ackley-Galbraith hypothesis cannot be rejected as there seems to be a negative relationship between concentration and prices. Concentrated industries do not use their market power to increase prices in periods of high capacity utilization, and further they do not even seem to keep up with the price increases in the more competitive sectors of the economy.

The results do not change when entreprise concentration ratios are preferred to the measures calculated from establishment data.[4]

A final remark can be made as a comparison between the effect of material costs in the "catching-up" period and its effect on prices in the high capacity utilization period. The coefficients of the unit material cost variable are much higher and much more significant in the latter case than in the recovery period. Increasing costs are thus an important cause of rising prices in periods of excess demand.

Conclusions

This chapter has verified empirically that manufacturing industries in Canada behave like the administered price theory expects them to in periods of high capacity utilization and in the recovery period. Results from the Weiss study (107) have already verified the hypothesis for a period of low capacity utilization in the U.S.A. Concentration has been demonstrated to affect prices and the direction of this effect has been shown to vary with the growth cycles[5].

Other interesting effects that were demonstrated had to do with the effect of the unit cost variables. The unit material cost variable was shown to be more important in periods of high capacity utilization; the wages of production workers were especially important at the end of the recovery and early in the period of full-employment,

while salaries exerted their biggest upward pressure on prices in the early part of the recovery. The above findings have important implications for policies designed to control prices and incomes.

FOOTNOTES TO CHAPTER III

1. The share of all establishments or entreprises in the industry are used in the calculation of an herfindahl index. The formula used to calculate the index is given in Appendix D.

2. The list of the forty-one industries appear in appendices B and D. The concentration measures were obtained in (25). The other data was collected from items (31), (32), (33) and (34) of the bibliography. Data for all the variables except concentration was collected for the years 1957, 1959, 1961, 1963, 1966 and 1967. Concentration data is for the year 1965.

3. In fact, the correlation between the percentage of shipments accounted for by the four largest establishments and the related herfindahl index is .9684 (25, p. 273). The similar results are therefore not a complete surprise.

4. The calculated price decrease is smaller when entreprise figures are used. (-.295 against -.616 for establishment figures for 1963-1966 with equation IV.3.

5. The term growth cycle is used voluntary in preference to business cycle to indicate that periods of absolute decline in activity are rare and that the trough of the cycle only represents a decline in the rate of growth of economic activity. For more detail on growth cycle analysis see Mintz (81).

CHAPTER IV

DIFFERENT PRICING BEHAVIOURS: EMPIRICAL EVIDENCE

Further research and methodology

The behavioral equations in Chapter IV simply state that the average Canadian industry, whether it is highly concentrated or not, has used its market power to influence the price level[1]. The direction of the influence of market power on prices was seen to vary with the degree of all-manufacturing capacity utilization. The pricing behavior of highly concentrated industries has not yet been compared with that of more competitive ones.

The cross-sectional nature of the analysis permits interesting regroupings. In order to judge whether the behaviour of groups of industries was the same as that of the manufacturing sector as a whole, the forty-one industry sample was divided on the basis of concentration and size.

The twenty most concentrated industries formed a group the behaviour of which was compared with that of the twenty-one less concentrated. The current dollar value of

shipments was chosen as a criterion to divide the sample into the twenty largest industries and the twenty-one smallest. In order, to keep the sample constant, the value of shipments for all the available years were added together before the ranking was done. In appendices B and D, the industries are ranked by size and by degree of concentration.

The effect of size on the behaviour of firms

When the model was tested by means of two sub-samples (determined on the basis of industry size) it became evident that concentration did not affect prices differently in small industries and in large ones. Nevertheless a number of interesting results emerged from this analysis.

It was established that the pricing behaviour of large industries is different from that of small ones. Such a lack of symmetry was especially evident when the influence of unit costs on prices was compared for the two groups and also when an attempt was made to find out whether a long-run or a short-run model was more relevant.

Size and unit costs

Percentage changes in labour costs are the major determinants of price changes is smaller Canadian manufacturing industries.

TABLE IV: SIZE AND UNIT COSTS

TIME PERIOD	$\dot{P}/P = \dot{Q}/Q$	$+\dot{ULC}/ULC$	$+\dot{UMC}/UMC$	$\bar{R}^2$	SEE
1957-1961					
(IV.1) LARGE	.116 (2.0)	+.200 (1.4)	+.482 (3.6)	.5396	4.13
(IV.1) SMALL	-.031 (-0.3)	+.417 (2.4)	+ 236 (1.1)	.4919	6.00
(IV.1) COMPLETE SAMPLE	.079 (1.3)	+.402 (3.7)	+.255 (4.0)	.461	5.35
1959-1963					
(IV.1) LARGE	.001 (0.0)	+.063 (0.9)	+.570 (6.9)	.5829	3.90
(IV.1) SMALL	.031 (0.7)	+.490 (3.8)	+.286 (5.1)	.6007	4.84
(IV.1) COMPLETE SAMPLE	.036 (1.3)	+.198 (2 7)	+.343 (6.6)	.439	5.13

Indeed, table IV and appendix C show that smaller industries have a consistently bigger and more significant coefficient for their unit labour cost variable.[2]

Wage-push may occur regularly in small industries where the wage-bill constitutes a large share of total cost, while it seems to be less significant for the larger industries. This conclusion may have to be qualified depending on the average size of the percentage changes in the two subgroups for unit labour cost. The findings are however supported by large differences in both the relevant coefficients and their respective t-values.

Table IV. also shows that the reverse proposition seems to hold when one looks at the unit material cost variable. This time, however, the distinction is not quite so clear. While the coefficient is almost always larger for the bigger industries, the t-value is often as large in the equation examining the behaviour of the smaller industries. Unit material cost changes are important in determining price changes in both sub-groups.

The large firms: a long-run approach

The model supports the case studies findings that big business is interested in long run profits and makes its pricing decision on the basis of long run performance. By

gradually extending the time period from 1957-1959 to 1957-1967, it is evident that the explanatory power of the model improves for the largest industries, while it remains relatively stable for the complete sample and deteriorates for the smaller firms. Notice the movement of $\bar{R}^2$ in Table V, as the time period expands for equation IV.4. The complete equation appear in appendices C-4, C-8 and A-8. The results are similar for the big industries in equations IV.1 to IV.3. Equations IV.3 and IV.4 are the only two however where a deterioration does occur in the long-run explanatory power of the model for the smaller industries.

Other results

Even when the unit cost variable accounts for most of the cost-push pressure on prices, an output variable can still be useful in determining the type of inflation. It is very likely that it will become insignificant when the cost elements are accounted for by other variables since they are so highly correlated with output. Some significant results were obtained for output after the split.

A negative coefficient implies that the unit cost proxies were not good enough and that the output still reflects significant cost pressures affecting prices. Such a result was obtained for the smaller industries in the

TABLE V: LONG-RUN PRICING IN BIG BUSINESS EMPIRICAL EVIDENCE (IV.4)

TIME GROUP PERIOD	$\bar{R}^2$ LARGE	SEE	COMPLETE SAMPLE $\bar{R}^2$	COMPLETE SAMPLE SEE	$\bar{R}^2$ SMALL	SEE
1957-1959	.3253	2.72	.5175	4.28	.6568	4.73
1957-1961	.6234	3.73	.6154	4.52	.6325	5.10
1957-1963	.7508	4.51	.5239	6.27	.4461	6.86
1957-1967	.8149	6.13	.5367	9.05	.3876	9.83

1959-1961 period and in all four equations.

A positive coefficient when it is significant implies that demand pressure was at work since it reflects a movement of output and prices in the same direction. In the early part of the recovery, significantly positive coefficients were obtained for the demand variable in the larger industries group. The result was significantly positive in the 1957-1961 period.

Little can be said about the influence of concentration on prices when the data is devided according to size. It will no doubt have been noticed by the reader that most of the periods used for the equations presented in Appendix C, correspond to the "catching-up hypothesis". The expected sign of the coefficient is positive and this is confirmed by the results for both groups. However, the number of significant results obtained is very small. It seems that size does not divide neatly the industries which use their market power and those which do not.

Concentration in the recovery period

Chapter IV has provided a number of equation which have proven concentration to affect prices significantly in the early part of the recovery. An attempt to isolate the industries which actually used their market power over that

period lead to a division of the sample by size. This was found not to be the answer even though it provided a number of interesting results. The sample was subsequently divided between highly concentrated and not so highly concentrated industries.

Concentration more important for highly concentrated firms

It is evident from the results that concentration is more important for the highly concentrated firms. The more concentrated industries group in all cases from 1957 to 1963 had a more significant coefficient than the less concentrated group except for 1957-1959 period. Moreover, the addition of concentration improved the overall equation for the former group in all cases, while there were some exceptions for the latter. The equations in table VI are given as examples and the detailed results are available in Appendices E-9 to E-16. The replacement of the establishment concentration ratio by the entreprise concentration ratio improved some equations while others deteriorated[3]. This is obvious by comparing tables VI and VII.

In chapter III, it was seen how it had improved the overall equation for the recovery period. Here the results are mixed but the t-value of the concentrated group always improves with the choice of entreprise concentration ratios in the recovery period even though the overall fit

TABLE VI: CONCENTRATION AND USE OF MARKET POWER BY ESTABLISHMENTS

TIME PERIOD	$\dot{P}/P =$	$\dot{Q}/Q$ +	$\dot{ULC}/ULC$ +	$\dot{UMC}/UMC$ +	CR	$\bar{R}^2$	SEE
1957-1961							
(IV.4) CONCENTRATED		-.046	+.228	+.166	+.164	.5696	3.95
		(-0.8)	(2.5)	(1.9)	(2.5)		
(IV.4) LESS CONCENTRATED		.171	+.758	+.224	+.116	.7906	3.79
		(1.9)	(5.7)	(3.6)	(0.3)		
(IV.4) COMPLETE SAMPLE		.031	+.418	+.212	+.158	.6154	4.52
		(0.6)	(5.2)	(3.9)	(2.2)		
1959-1961							
(IV.4) CONCENTRATED		-.142	+.175	+.302	+.068	.8177	1.96
		(-5.1)	(2.4)	(5.6)	(2.0)		
(IV.4) LESS CONCENTRATED		.166	+.852	+.163	-.107	.6950	3.29
		(1.2)	(5.7)	(2.4)	(-0.4)		
(IV.4) COMPLETE SAMPLE		-.135	+.414	+.142	+.125	.5849	3.40
		(-3.1)	(4.7)	(2.9)	(2.3)		

NOTE: Unit Labour Cost Variable includes both wages and salaries. The Concentration Ratio is an Herfindahl Index of the Value of Shipments calculated with Establishment Data.

TABLE VII: CONCENTRATION AND USE OF MARKET POWER BY ENTREPRISES

TIME PERIOD	$\dot{P}/P = \dot{Q}/Q$ +	$\dot{ULC}/ULC$ +	$\dot{UMC}/UMC$ +	CR	$\bar{R}^2$	SEE
1957-1961						
(IV.4) CONCENTRATED	-.144	+.320	+.230	+.169	.7536	3.46
	(-2.4)	(3.9)	(3.5)	(4.1)		
(IV.4) LESS CONCENTRATED	.188	+.646	+.218	+.062	.6421	4.57
	(2.1)	(4.3)	(3.1)	(-0.3)		
(IV.4) COMPLETE SAMPLE	.005	+.392	+.215	+.131	.6387	4.38
	(0.1)	(4.9)	(4.1)	(2.7)		
1959-1961						
(IV.4) CONCENTRATED	-.121	+.208	+.299	+.063	.6179	2.12
	(-2.6)	(2.5)	(4.7)	(2.7)		
(IV.4) LESS CONCENTRATED	-.155	+.569	+.078	+.140	.6656	3.84
	(-2.3)	(4.2)	(1.2)	(1.1)		
(IV.4) COMPLETE SAMPLE	-.141	+.408	+.142	+.090	.5998	3.34
	(-3.2)	(4.7)	(3.0)	(2.6)		

NOTE: Same as Table VI, for unit Labour Cost.
The Concentration Ratio is an Herfindahl Index of the Value of Shipments calculated with Entreprise Data.

sometimes deteriorates.

A number of pricing decisions reflect establishment size as well as entreprise concentration. To get better equations consistently, it would be ideal to separate the sample in four groups, highly concentrated with both, one of the two, or no measure. Here the sample size is prohibitive and that theory cannot be verified.

The output variable and concentration groups

The output variable picked up the effect of demand very clearly for the less concentrated industries in the early part of the recovery. The significantly positive coefficients indicate that for those industries output and prices were moving in the same direction. This can obviously not occur in a pure cost-push context further, while significant and positive coefficients for the larger industries group, both the larger t-value and the larger coefficients obtained in equations IV.1 and IV.2 suggest that excess demand was actually felt more by the less concentrated industries than any of the other groups.

It is also interesting to note that the equations listed below are among the best, in terms of fit, of all the equations generated in the model. This could be taken to imply that the output variable is not a really good proxy

for demand pressure even though it performed well in this case. A more satisfying measure might yield a significant demand variable and a better equation in other cases.

PERIOD	GROUP LESS CONCENTRATED				
1957-1959					
(IV.2)	$\dot{P}/P = \dot{Q}/Q + \dot{ULC}/ULC + \dot{UMC}/UMC$			$\bar{R}^2$	SEE
	.228	+.408	+.600	.836	3.07
	(3.3)	(3.1)	(8.4)		
1957-1961					
	.192	+.782	+.233	.801	3.69
	(3.3)	(7.5)	(4.4)		

Further, the output variable, while it was significant and negative for the complete sample and for the three other subgroups studied here, remained positive in the 1959-1961 period for the less concentrated industries.

The coefficient of the output variable for the most concentrated industries was for that period the most significant of those obtained. The meaning of a significantly negative coefficient for the output variable was studied in some detail when the split was made according to the size of the industries.

No pattern was evident in the coefficients of the unit cost variables when the sample was split according to industrial concentration. Also it was not clear whether long-run or a short-run model was more desirable to explain the price behaviour of the two groups.

Concentration in periods of high capacity utilization

For the period 1963-1966, the same process of dividing industries between most and less concentrated was repeated. Since only one period is insufficient to study the variations in the coefficients of all the variables, it seems best to look only at concentration and try to find out whether highly concentrated industries increase their price more than the not-so-concentrated group or whether they simply behave according to the theory of administered prices.

"An insignificant coefficient will confirm the weaker version of the "Ackey-Galbraith hypothesis", while a significantly negative coefficient will of course have to be obtained for concentration if the stronger version is to be upheld. Administered prices theory will be supported further if the coefficient of the highly concentrated industries is smaller than the other one. The 1963-1966 data for Canada gives such support to administered price theory as can be witnessed from table VIII.

TABLE VIII: CONCENTRATION AND USE OF MARKET POWER IN A PERIOD OF HIGH CAPACITY UTILIZATION

TIME PERIOD	$\dot{P}/P =$	$\dot{Q}/Q$ +	$\dot{ULC}/ULC$ +	$\dot{UMC}/UMC$ +	CR	$\bar{R}^2$	SEE
1963-1966							
(IV.3) CONCENTRATED	.052	+.336	+.491	-.174		.6378	5.36
	(1.0)	(3.9)	(6.3)	(-1.4)			
(IV.3) LESS CONCENTRATED	-.067	+.420	+.345	-.077		.6870	3.63
	(-1.3)	(4.4)	(4.3)	(-0.2)			
(IV.3) COMPLETE SAMPLE	.005	+.329	+.431	-.077		.6588	4.61
	(0.2)	(6.7)	(9.5)	(-o.8)			
(IV.4) CONCENTRATED	.044	+.360	+.507	-.139		.6246	5.46
	(0.8)	(3.8)	(6.1	(-1.1)			
(IV.4) LESS CONCENTRATED	-.110	+.032	+.458	+.699		.3570	5.21
	(-1.5)	(0.8)	(4.2)	(1.6)			
(IV.4) COMPLETE SAMPLE	.039	+.098	+.380	-.048		.3479	6.37
	(0.8)	(2.5)	(6.2)	(-0.4)			

NOTE: In Equation IV.3, only wages are included in unit cost variable, while salaries are also included in IV.4.
CR is an herfindahl index of the value of shipments calculated with establishment data.

It is now conceivable that the upward bias is all that keeps the coefficients from becoming significantly negative for the more concentrated industries. The stronger version is certainly partly substantiated for the most concentrated group by these results as negative results appear in the equations for the highly concentrated group[4].

The meaning of the subgroups

What was proven by separating the sample into two groups? That administered pricing exists in Canada? Certainly not! The aggregative model has already taken care of that. This splitting of the sample was done with another goal in mind; finding out about pricing behaviour for different groups of industries.

It was demonstrated clearly that unit labour cost is of secondary importance in the determination of prices by big business; that less concentrated industries were in the beginning of a recovery more subject to demand pressure than the other subgroups studied; that administered pricing explains the behaviour of concentrated industries much better than that of less concentrated ones. In fact, more often, than not, concentration was not significant for the less concentrated industries, while it improved the equation in all cases when it was used for the concentrated industries group.

Concentration and size

Why where two different groups chosen? Is it not true that the most concentrated industries are also the biggest ones? It is probably necessary to test this relationship. This was done by using rank correlation for the 41 industries. It turned out that concentration and size were negatively correlated.[5] The value of R (-.3195) was significant at the 5% level only.

The split was aimed at emphasizing that different industries and different groups of industries behave differently. It was proven that concentration is generally more important for concentrated industries and could conceivably be dropped from a model attempting to explain the pricing decisions in more competitive industries.

Concentration and the use of market power

This is not to say that market power is only used by concentrated industries and is not significant at all for others. Keeping this in mind, it was attempted to improve on one of the best equations for the most concentrated group as far as the t-value of the coefficient of the concentration ratio is concerned.

In an effort to isolate the industries which use

their market power the most, equation IV.4 was tested by deleting from the complete sample, one industry at a time. It was assumed the lowest the resulting coefficient of concentration, the largest was the use of market power by the deleted industry.

This procedure also brought out the extreme sensitivity of the results to sample configuration. The last three equations of table IX result from this procedure for the 1957-1961 period. The equation for the complete sample is also shown in table IX and can be compared with the other three.

The 20 best group, as defined in table IX, was formed by grouping the 20 industries for which the deletion resulted in the lower coefficients for the concentration variable. The resulting equation has been presented in table IX for the period 1957-1961 and it brings out two interesting results.

Not only does it provide the highest t-value for the coefficient of concentration for the period, but also the resulting equation was better in terms of explained variance ($\bar{R}^2$) than any of the subgroups. This was also true in most cases when the process was repeated for the 1959-1963 and 1957-1963 periods. These results appear in appendices G, F-2 and F-3.

TABLE IX: CONCENTRATION AND THE USE OF MARKET POWER

TIME PERIOD AND GROUP	$\dot{P}/P =$	$\dot{Q}/Q$ +	$\dot{ULC}/ULC$ +	$\dot{UMC}/UMC$ +	CR	$\bar{R}^2$	SEE
1957-1961							
(IV.4)							
CONCENTRATED	-.046	+.228	+.166	+.164		.5696	3.95
	(-0.8)	(2.5)	(1.9)	(2.5)			
BEST*	.185	+.662	+.169	+.334		.7142	3.16
	(3.2)	(5.6)	(3.6)	(5.3)			
COMPLETE SAMPLE	.031	+.418	+.212	+.158		.6154	4.52
	(0.6)	(5.2)	(3.9)	(2.2)			
C.S.- MOTOR VEHICLES	.043	+.428	+.212	+.128		.6116	4.55
	(0.8)	(5.2)	(3.9)	(1.5)			
C.S.- IMPORTED CLAY	.038	+.433	+.215	+.134		.6401	4.41
	(0.8)	(5.5)	(4.0)	(1.8)			
C.S.- CORDAGE & TWINE	.035	+.423	+.208	+.148		.6112	4.57
	(0.7)	(5.1)	(3.7)	(1.9)			

NOTE: *Best in terms of highest utilization of market power.
The unit labour cost variable includes both wages and salaries.
C.S. is an abbreviation for complete sample.
The t-values appear in bracket below their respective coefficient.
The method of determining the best group is described in the text.

Again, rank correlation tests were performed with the samples obtained in the three periods (ranked from 1 to 41) and the key samples : size and concentration. Only the 1957-1963 period turned out to be significantly correlated with one of the variables. It was negatively correlated with size and the r obtained was significant at the one per cent level[6]. One can safely conclude that in any given recovery period, it is not necessarily the highly concentrated industries which use their market power the most, but they do use it significantly and are more likely to use it than the others.

The addition of the equation for the group that performed best in terms of the reformulated version of administered prices inflation hypothesis lends unambiguous support to the stronger version of the Ackley-Galbraith sub-hypothesis. It is also noticeable that for that group, demand pressure was very significant. It is thus a good sample to measure "high capacity utilization" and verify the above mentioned hypothesis.

Even if two equations seem to be very little to go by, it seems that the stronger version of their Ackley-Galbraith hypothesis can be reformulated to read that: In concentrated industries, in periods of high capacity utilization and demand pressure,prices are likely to be

TABLE X: CONCENTRATION, USE OF MARKET POWER AND HIGH CAPACITY UTILIZATION

TIME PERIOD		$\dot{P}/P = \dot{Q}/Q$	+ $\dot{ULC}/ULC$	+ $\dot{UMC}/UMC$	+ CR	$\bar{R}^2$	SEE
1963-1966							
(IV.3)	CONCENTRATED	.052	+.336	+.491	-.174	.6378	5.36
		(1.0)	(3.9)	(6.3)	(-1.4)		
	BEST*	.260	+.194	+.427	-.595	.6362	5.57
		(4.0)	(1.6)	(6.4)	(-3.8)		
	COMPLETE SAMPLE	.005	+.329	+.431	-.077	.6588	4.61
		(0.2)	(6.7)	(9.5)	(-0.8)		
(IV.4)	CONCENTRATED	.044	+.360	+.507	-.139	.6246	5.46
		(0.8)	(3.8)	(6.1)	(-1.1)		
	BEST*	.254	+.189	+.437	-.634	.6757	5.26
		(4.1)	(2.2)	(6.9)	(-4.2)		
	COMPLETE	.039	+.098	+.380	-.048	.3479	6.37
		(0.8)	(2.5)	(6.2)	(-0.4)		

NOTE: *Best in terms of Utilization of Market Power. The Method to obtain the sample is described in the text.
The unit labour cost variable includes only wages for equation IV.4.
The t-values appears in brackets below their respective coefficients.

lagging behind those of the competitive industries as a negative relationship appears between market power and the rate of increase in prices. The supporting equations are given in table X.

Industries which use market power

It is disconcerting to realize that of the industries included in the best samples in the catching up period, very few appeared regularly at the top of the list. However, two industries (Linoleum and Coated Fabrics; and Cotton and Jute Bags) appeared in all cases in the top ten while a number appeared twice: Automobile Manufacturers, Cordage and Twine, Domestic Clay Products Manufacturers, Leather Products, Soft Drink Manufacturers and Wooden Box Manufacturers.

Four of these ten industries were included in the group which used its market power the most to reduce the price pressure in the 1963-1966 period.

It is remarkable that the "best groups" for a given period performed rather badly in other periods when there was no overlapping between the periods concerned. Table XI brings out those results clearly.

It is consequently safe to conclude that while the concentrated industries are not necessarily the best group insofar as the utilization of market power in any

TABLE XI: THE PERFORMANCE OF BEST GROUPS IN OTHER PERIODS

TIME PERIOD GROUP	$\dot{P}/P$=	$\dot{Q}/Q$ +	$\dot{ULC}/ULC$ +	$\dot{UMC}/UMC$ +	CR	$\bar{R}^2$	SEE
1951-1959 BEST OF 59-63							
(IV.4)		.059	+.353	-.001	-.059	.4822	2.69
		(1.2)	(3.4)	(-0.0)	(-0.8)		
COMPLETE		- .04	+.197	+.338	+.119	.5175	4.28
SAMPLE		(-0.7)	(1.7)	(4.6)	(1.6)		
1957-1961 BEST OF 63-66							
(IV.4)		-.190	-.134	+.112	+.136	.0869	7.66
		(-2.1)	(-0.8)	(1.2)	(0.9)		
COMPLETE		.031	+.418	+.212	+.158	.6154	4.52
SAMPLE		(0.6)	(5.2)	(3.9)	(2.2)		
1957-1963 BEST OF 63-66							
(IV.3)		-.056	+.150	+.488	+.015	.5059	7.58
		(-1.0)	(1.9)	(4.4)	(0.1)		
COMPLETE		.021	+.261	+.349	+.263	.458	6.64
SAMPLE		(0.5)	(3.1)	(4.9)	(2.0)		

NOTE: In Equation IV.3, only wages are included in the unit labour cost variable and in equation IV.4 both wages and salaries are included.
Best stands for the best sample in terms of the utilization of market power for the year mentioned.

given period is concerned they are the only group which consistently behaves as administered price theory suggests.

It is conceivable that administered pricing is a threshold phenomenon, i.e. industries either administer or do not administer prices[7].

Residuals and the explanatory power of the model for given industries

As a final analysis, it was decided to study the residuals in the catching-up period in order to find out whether the actual price in some industries had been consistently over or underestimated by the calculated price generated in the Model. This was done for three periods: 1957-1959, 1959-1961 and 1961-1963.

It is interesting to realize that of the sample of forty-one industries, seven had their prices consistently underestimated by the model, while only one, Iron & Steel mills actually had its actual price consistently below the calculated prices. Table XII summarizes these results.

It can be seen by comparing the result against the appendix that all but one of the industries that were consistently underestimated fall in the group with a relatively low concentration ratio[8]. It is also interesting to note that

TABLE XII: RESIDUAL ANALYSIS

INDUSTRY	RESIDUAL 1957-1959	1959-1961	1961-1963
Fish Products	5.021	4.721	4.972
Fruits & Vegetables	3.219	2.584	1.833
Flour Mills	3.300	0.671	1.515
Bakeries	4.334	2.675	6.885
Distilleries	3.050	0.401	1.115
Iron & Steel	- .009	- 2.370	- 2.022
Pharmaceuticals	2.249	1.437	2.972
Paint & Varnish	2.969	2.970	.221

they mostly produce consumer goods.

Conclusion

Not only has administered price theory been confirmed by the model, but also the reformulated version of the theory and its sub-hypotheses were seen to be more relevant for the concentrated industries than for the less concentrated ones, the small ones and the large ones. For the concentrated industries, both the "catching-up hypothesis" and the weaker version of the "Ackley-Galbraith hypothesis" were verified.

However, further research proved that while concentrated industries as a group used their market power more than non-concentrated industries, a number of individual industries from the latter group used it more than some in the former one in given periods. As a result, it was possible to find a sample for which concentration was more significant than for concentrated industries. This sample verified both the "catching-up hypothesis" and the stronger version of the "Ackley-Galbraith hypothesis".

These samples however did not do well in other periods than the one for which they were derived. Concentrated industries were the only group to do well consistently in terms of administered price theory.

The "Means-Galbraith" hypothesis was assumed to be true on the basis of a study by Weiss (107) in the United States. Lack of suitable data did not permit its verification in Canada.

FOOTNOTES TO CHAPTERIV

1. The previous empirical literature has also used that approach. It simply implies that the higher the market power, the greater is the influence on prices. The relationship is however assumed to be proportional to the measure of market power, the estimated coefficient providing the link.

2. The only exceptions occur for the period 1957-1959; and also in 1963-1966 when only the wages of production workers are included in the labour cost variable.

3. For complete results, appendices E-1 to E-8 should be compared with E-9 to E-16.

4. The findings are not modified when entreprise concentration is used. It is however interesting to note that in that case, concentration becomes significant and positive for the less concentrated group for equation IV.4 (See appendix E-8).

5. This test is explained in Freund (43, p. 364-366).

6. $r = -.4645$, the test was again taken from Freund (43, p. 364-366).

7. This suggestion was made by Professor William L. Baldwin, Professor of Economics at Dartmouth College, Hanover, New Hampshire upon the reading of a draft related to the present work. The model actually implies that this is the case. The fact that it was possible to find a sample of twenty industries which uses its market power more than the concentrated industries implies that some industries do not use all of their market power to influence prices and some probably not at all. To find where the threshold lies would require to test the results by dropping one industry at a time up to the point where the equation strop improving. The industries would have to have been ranked before the test so that the less important ones could be dropped according to their utilization of market power to affect prices. The remaining sample would be the industries that use their market power to influence their selling prices.

8. If appendices D-1 and D-2 are used the average concentration ratio of the group which had its price underestimated is 4.42. The average for the complete sample is 7.99. If appendices D-3 and D-4 are used the results are 9.80 against a population average of 12.81.

SUMMARY AND CONCLUSIONS

Administered pricing was used by the Canadian manufacturing industries from 1957 to 1967, and there is no reason to believe that its use did not start before then or that it did not continue after that date. Canadian data for the year 1957 to 1963 supports the "catching-up hypothesis" while data from 1963 to 1967 supports the "Ackley-Galbraith hypothesis". The Weiss study (107) was assumed to give sufficient support to the "Means-Galbraith hypothesis".

Further, a division of the sample into subgroups revealed that the most concentrated industries behaved exactly like the administered price theory had implied they would; concentration turned to be significant and positive in the "catching-up" period, while it became insignificant when capacity was reached.

Prices determined at the entreprise level were more affected by concentration than those determined at the establishment level. Entreprise concentration ratios indeed performed better than establishment concentration ratios in verifying the theory both for the manufacturing sector as a whole and for the most concentrated industries.

For other groups, especially for the non-concentrated group, concentration often did not perform according to administered price theory.

While no fixed sample did consistently better than the concentrated industries group, in all the periods it was possible to find a sample which used its market power more than the concentrated industries. While a few industries kept appearing regularly in those samples, the bulk of the industries included varied from one period to the next.

The existence of administered pricing has important implications for the evaluation of the classical anti-inflationary policies. Monetary and fiscal policies will be relatively unsuccessful in checking the rising prices in industries with market power because these industries take advantage of their market power to maintain or even increase their prices in periods of low capacity utilization and insufficient demand. The inflation in some sectors will be unaffected by the change, and the unemployment figure will rise to a socially and politically unacceptable level, unless the classical policies are complemented by an incomes policy.

This was the case in the United States last August when President Nixon instituted his already famous price and

wage controls. By doing so, he was conceding, as Galbraith puts it[1], that the market mechanisms were inefficient in controlling price increases because of the existing economic structure where concentrated industries and labour unions have so much to say about prices and wages.

Grayson, the chairman of the United States Price Commission thinks the biggest problem the administration has to fight is inflationary psychology and that only controls can do the trick. "Once we get inflation out of everybody's mind we can decontrol...[2]" He is not saying that concentration did not cause or contribute to the existence of the steady inflation situation facing the United States today, but only that the first thing to combat is the impression in the public that inflation is a perpetual phenomenon about which little can be done. When that is done, most of the fighting will be over. As for the concentrated sector, he predicts, that "it will always be subject to some voluntary control - some form of jawboning - or direct controls[3]".

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[1]Galbraith, J.K., "Nixon enterre le marche" dans L'Expansion, (Fev. 1972), pp. 83-93.

[2]Grayson as quoted in Business Week, Dec. 25, 1971, p. 22.

[3]Ibid.

The Phase 2 program is certainly an excellent example of what Canada might want to use to combat its next serious inflationary situation. Prices can only be increased when costs rise so that the only way to increase profits becomes an increase in productivity. Further no increase is granted to firms realizing already excessive profits.

The findings of this thesis also have important implications as to the direction of an incomes policy. Assuming that the model is right in explaining prices by costs and market power as well as demand, the results of chapter III and IV become very significant.

The pressure of salaries was seen to be felt mostly in the beginning of the recovery while wages and material costs were instrumental in determining prices in periods of high capacity utilization. It seems wasteful and unwarranted to control all prices and incomes at all times and the implications of the above findings are clear enough that they do not require any discussion as to the period where they might be controlled.

Administered pricing implies a downward rigidity of prices in spite of insufficient demand; in periods of low capacity utilization the market power exerts a positive effect on prices, sometimes causing prices not only to be maintained, but also to rise.

A plolicy designed to control increases in industrial prices in periods of low capacity utilization, if there are some limitations as to the number of industries that can be studied, should recommend the control of the concentrated sector to be assured of isolating most of the administered price increases. However, other industries have also refused to lower their prices or have increased them more than the change in unit costs warranted. Ideally, the controlling body of a prices and incomes policy should study every industry, but would be assured of reasonable results if it centered its efforts on the most concentrated industries and a few special cases.

It is interesting to note in the light of the results described above that the focus in phase 2 has shifted from a control of all business to a control of big business. This is in line with the recommendations emanating from the present research.

It is essential to realize however, that if the price of concentrated industries are controlled in periods of low capacity utilization, they will add to the inflationary pressures when the economy reaches a peak. If the policy makers want the monetary and fiscal policies to be effective, they have to force industries which use their market power, to behave like competitive industries. Then inflationary depressions can be eliminated, but it is likely that

inflationary periods will be characterized by larger increases in the average price level.

Wages that are administered should also be controlled in a similar fashion depending on the average size in productivity and labour market conditions specific to one industry.

While a prices and incomes policy is required, this policy should not be a universal one and should take into account the effect of the different variables on pricing and the special conditions governing the labour market and also the factor markets of individual industries. Clearly, for monetary and fiscal policies to be effective, administered prices should reflect demand conditions and direct controls might be the only way to detract the large companies from a policy of price stability with the anti-cyclical movements that it involves. To reach a definite conclusion one has to take into account the share of manufacturing in gross national product.

This thesis certainly did not cover every aspect of administered pricing and a number of improvements on the present work suggest themselves if data becomes available. One of the weaknesses of the results obtained is the highly significant effect of sample configuration on the results.

This problem might be remedied by adding industries as more data becomes available.

Further research could also attempt to account for costs for which data was not obtainable. Adding advertizing expenditures as an independent variable could conceivably after the results significantly because the industries with high advertising budgets have been demonstrated to be also highly concentrated. Other attempts to improve on the results would be: the inclusion of entreprise or establishment statistics for industries where case studies have revealed price leadership and the addition of a capacity variable to account for the fact that all industries are not necessarily at the same stage of the cycle in the same year. All these improvements, while they will lead to a better understanding of the problem are unlikely to modify the main policy conclusions of this thesis. To combat the effect of administered pricing, the fiscal and monetary policies are not sufficient, they have to be complemented by a prices and incomes policy where price control would be implemented not only for periods of full-employment, but mostly for periods of excess capacity and recovery when the industries with market power keep their price above the level justified by their cost structure.

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APPENDIX A

Listed below are the results obtained when equations IV.1 to IV.4 were run with the complete sample of 41 industries. This appendix has been divided into eight parts A-1 to A-8, each part listing the result for a particular equation for all the time periods where it was run.

The t-values appear in brackets below the coefficient. Appendices A-1 to A-4 were done when enterprise concentration was used as a concentration ratio. Appendices A-5 to A-8 also give the results of using the complete sample for equations IV.1 to IV.4; that time however establishment concentration ratios are used.

APPENDIX A-1

EQUATION IV.1 (ENTERPRISE CONCENTRATION RATIO)

TIME PERIOD	$\dot{P}/P = \dot{Q}/Q$ +	$\dot{ULC}/ULC$ +	$\dot{UMC}/UMC$	$\bar{R}^2$	SEE
1957-1959	-.03	+.098	+.384	.4256	4.68
	(-0.5)	(0.9)	(4.7)		
1959-1961	.079	+.402	+.255	.4605	5.35
	(1.3)	(3.7)	(4.0)		
1957-1963	.068	+.279	+.388	.4167	6.89
	(1.9)	(3.2)	(5.5)		
1957-1966	+.025	+.363	+.439	.5636	9.09
	(+1.1)	(5.5)	(7.7)		
1959-1961	-.143	+.244	+.164	.4304	3.98
	.036	+.198	+.343	.4389	5.13
1959-1966	.017	+.320	+.391	.4784	7.78
	(0.8)	(5.3)	(7.5)		
1961-1963	.046	+.138	+.491	.4538	4.09
	(1.4)	(1.8)	(6.7)		
1961-1966	.001	+.359	+.524	.6936	5.22
	(0.1)	(7.6)	(11.8)		
1963-1966	-.012	+.329	+.417	.6620	4.59
	(-0.4)	(6.8)	(10.1)		

NOTE: The unit labour cost variable includes only the wages of production workers.

EQUATION IV.2 (ENTERPRISE CONCENTRATION RATIO)

TIME PERIOD	$\dot{P}/P = \dot{Q}/Q$ +	$\dot{ULC}/ULC$ +	$\dot{UMC}/UMC$	$\bar{R}^2$	SEE
1957-1959	-.006 (-0.1)	+.266 (2.5)	+.330 (4.4)	.4960	4.38
1957-1961	.063 (1.3)	+.443 (5.3)	+.236 (4.2)	.5784	4.73
1957-1963	.024 (0.8)	+.193 (4.3)	+.353 (5.2)	.4941	6.41
1957-1966	.001 (0.1)	+.191 (4.3)	+.430 (6.8)	.4699	10.02
1959-1961	-.123 (-2.7)	+.365 (4.0)	+.166 (3.3)	.5380	3.59
1959-1963	.022 (0.8)	+.099 (2.3)	+.303 (5.4)	.4152	5.23
1959-1966	.01 (0.4)	+.139 (3.3)	+.347 (5.5)	.2876	9.09
1961-1963	.043 (1.2)	+.037 (1.0)	+.459 (5.6)	.4226	4.20
1961-1966	.015 (0.6)	+.102 (2.9)	+.446 (6.8)	.3657	7.51
1963-1966	.028 (0.8)	+.100 (2.6)	+.372 (6.6)	.3630	6.30

NOTE: The unit labour cost variable includes both the wages of production workers and the salaries of office personnel and research workers.

EQUATION IV.3 (ENTERPRISE CONCENTRATION RATIO)

TIME PERIOD	$\dot{P}/P = \dot{Q}/Q$ +	$\dot{ULC}/ULC$ +	$\dot{UMC}/UMC$ +	CR	$\bar{R}^2$	SEE
1957-1959	-.102 (-1.7)	+.019 (0.2)	+.393 (5.2)	+.134 (2.9)	.5176	4.28
1957-1961	.01 (0.2)	+.359 (3.6)	+.225 (3.8)	+.160 (3.0)	.5569	4.85
1957-1963	.008 (0.2)	+.275 (3.4)	+.337 (5.0)	+.229 (2.8)	.5054	6.34
1957-1966	-.005 (-0.2)	+.378 (5.9)	+.379 (6.1)	+.256 (2.0)	.5974	8.73
1959-1961	-.162 (-3.3)	(3.2) (3.2)	(2.6) (2.6)	(2.4) (2.4)	.4957	3.75
1959-1963	.000 (0.0)	+.243 (3.4)	+.311 (6.1)	+.144 (2.3)	.4975	4.85
1959-1966	-.012 (-0.5)	+.343 (5.8)	+.332 (5.7)	+.215 (1.9)	.5140	7.50
1961-1963	.045 (1.0)	+.139 (1.8)	+.490 (6.4)	+.003 (0.1)	.4391	4.14
1961-1966	.007 (0.3)	+.356 (7.4)	+.538 (9.8)	-.037 (-0.4)	.6868	5.28
1963-1966	-.005 (-0.1)	+.329 (6.7)	+.426 (8.7)	-.023 (-0.3)	.654	4.64

NOTE: Same as A-1 for unit labour cost variable.

EQUATION IV.4 (ENTERPRISE CONCENTRATION RATIO)

TIME PERIOD	$\dot{P}/P = \dot{Q}/Q$ +	$\dot{ULC}/ULC$ +	$\dot{UMC}/UMC$ +	CR	$\bar{R}^2$	SEE
1957-1959	-.068 (-1.1)	+.167 (1.5)	+.346 (4.9)	+.108 (2.3)	.5451	4.16
1957-1961	.005 (0.1)	+.392 (4.9)	+.215 (4.1)	+.131 (2.7)	.6387	4.38
1957-1963	-.02 (-0.5)	+.173 (3.8)	+.328 (5.0)	+.166 (2.0)	.5328	6.16
1957-1966	-.021 (-0.7)	+.193 (4.3)	+.388 (5.5)	+.185 (1.3)	.4796	9.93
1959-1961	-.141 (-3.2)	+.408 (4.7)	+.142 (3.0)	+.090 (2.6)	.5998	3.34
1959-1963	.002 (0.0)	+.095 (2.2)	+.288 (5.1)	+.076 (1.2)	.4214	5.20
1959-1966	-.009 (-0.3)	+.145 (3.4)	+.306 (4.2)	+.142 (1.1)	.2907	9.07
1961-1963	.057 (1.2)	+.041 (1.1)	+.463 (5.6)	-.029 (-0.5)	.4106	4.25
1961-1966	.030 (1.0)	+.099 (2.8)	+.481 (6.0)	-.091 (-0.8)	.3583	7.56
1963-1966	.033 (0.7)	+.099 (2.5)	+.378 (5.7)	-.016 (-0.2)	.3463	6.38

NOTE: Same as A-2 for unit labour cost.

EQUATION IV.1 (ESTABLISHMENT CONCENTRATION RATIO)

TIME PERIOD	$\dot{P}/P = \dot{Q}/Q$ +	$\dot{ULC}/ULC$ +	$\dot{UMC}/UMC$	$\bar{R}^2$	SEE
1957-1959	-.03 (-.5)	+.098 (0.9)	+.384 (4.7)	.426	4.68
1957-1961	.079 (1.3)	+.402 (3.7)	+.255 (4.0)	.461	5.35
1957-1963	.068 (1.9)	+.279 (3.2)	+.388 (5.5)	.417	6.89
1957-1967	.046 (1.9)	+.446 (5.2)	+.372 (4.3)	.497	9.43
1959-1961	-.143 (-2.8)	+.244 (2.4)	+.164 (3.0)	.430	3.98
1959-1963	.036 (1.3)	+.198 (2.7)	+.343 (6.6)	.439	5.13
1959-1967	.031 (1.4)	+.367 (5.0)	+.376 (5.3)	.473	8.06
1961-1963	.046 (1.4)	+.138 (1.8)	+.491 (6.7)	.4538	4.09
1961-1967	-.002 (-0.1)	+.248 (3.6)	+.651 (8.2)	.818	5.91
1963-1966	-.012 (-0.4)	+.329 (6.8)	+.417 (10.1)	.6620	4.59
1963-1967	-.017 (-.5)	+.251 (3.8)	+.594 (6.6)	.808	4.96

NOTE: Same as A-1 for unit labour cost.

EQUATION IV.2 (ESTABLISHMENT CONCENTRATION RATIO)

TIME PERIOD	$\dot{P}/P = \dot{Q}/Q$ +	$\dot{ULC}/ULC$ +	$\dot{UMC}/UMC$	$\bar{R}^2$	SEE
1957-1959	-.006 (-0.1)	+.266 (2.5)	+.330 (4.4)	.496	4.38
1957-1961	.063 (1.3)	+.443 (5.3)	+.236 (4.2)	.578	4.73
1957-1963	.024 (0.8)	+.193 (4.2)	+.353 (5.2)	.494	6.41
1957-1967	.015 (0.7)	+.309 (5.7)	+.351 (4.2)	.533	9.08
1959-1961	-.123 (-2.7)	+.365 (4.0)	+.166 (3.3)	.538	3.59
1959-1963	.022 (0.8)	+.099 (2.3)	+.303 (5.4)	.415	5.23
1959-1967	.016 (0.7)	+.246 (4.4)	+.327 (3.9)	.4148	8.49
1961-1963	.043 (1.2)	+.037 (1.0)	+.459 (5.6)	.4226	4.29
1961-1967	.012 (-0.6)	+.083 (1.6)	+.709 (6.9)	.5825	6.64
1963-1966	.028 (0.8)	+.100 (2.6)	+.372 (6.6)	.3630	6.30
1963-1967	-.001 (-0.3)	+.261 (3.8)	+.554 (5.8)	.6559	4.94

NOTE: Same as A-2 for unit labour cost.

EQUATION IV.3 (ESTABLISHMENT CONCENTRATION RATIO)

TIME PERIOD	$\dot{P}/P = \dot{Q}/Q$ +	$\dot{ULC}/ULC$ +	$\dot{UMC}/UMC$ +	CR	$\bar{R}^2$	SEE
1957-1959	-.073 (-1.2)	+.03 (0.3)	+.390 (5.0)	+.161 (2.2)	.4788	4.45
1957-1961	.043 (0.7)	+.384 (3.7)	+.224 (3.6)	+.190 (2.3)	.5171	5.06
1957-1963	.021 (0.5)	+.261 (3.1)	+.349 (4.9)	+.263 (2.0)	.458	6.64
1957-1967	.027 (0.9)	+.425 (4.8)	+.364 (4.2)	+.204 (1.0)	.4969	9.43
1959-1961	-.156 (-3.2)	+.311 (3.1)	+.138 (2.5)	+.127 (2.0)	.473	3.83
1959-1963	-.001 (-.0)	+.226 (3.1)	+.316 (6.1)	+.197 (2.0)	.4795	4.94
1959-1967	.007 (0.3)	+.355 (4.9)	+.362 (5.0)	+.222 (1.3)	.4814	7.99
1961-1963	.032 (0.6)	+.139 (1.8)	+.488 (6.5)	+.037 (0.4)	.4410	4.13
1961-1967	-.013 (-0.4)	+.237 (3.3)	+.653 (8.2)	+.072 (0.5)	.6628	5.97
1963-1966	.005 (0.2)	+.329 (6.7)	+.431 (9.5)	-.077 (-0.8)	.6588	4.61
1963-1967	-.025 (-.6)	+.243 (3.3)	+.599 (6.5)	+.031 (0.3)	.6442	5.02

NOTE: Same as A-1 for unit labour cost.

APPENDIX A-8

EQUATION IV.4 (ESTABLISHMENT CONCENTRATION RATIO)

TIME PERIOD	$\dot{P}/P = \dot{Q}/Q$ +	$\dot{ULC}/ULC$ +	$\dot{UMC}/UMC$ +	CR	$\bar{R}^2$	SEE
1957-1959	-0.4 (-.7)	+.197 (1.7)	+.338 (4.6)	+.119 (1.6)	.5175	4.28
1957-1961	.031 (0.6)	+.418 (5.2)	+.212 (3.9)	+.158 (2.2)	.6154	4.52
1957-1963	-.014 (-0.4)	+.180 (4.0)	+.322 (4.8)	+.231 (1.8)	.5239	6.27
1957-1967	-.004 (-0.1)	+.296 (5.3)	+.341 (4.1)	+.221 (1.1)	.5367	9.05
1959-1961	-.135 (-3.1)	+.414 (4.7)	+.142 (2.9)	+.125 (2.3)	.5849	3.4
1959-1963	-.004 (-0.1)	+.098 (2.3)	+.286 (5.0)	+.131 (1.3)	.425	5.189
1959-1967	-.007 (-0.2)	+.237 (4.2)	+.316 (3.8)	+.218 (1.2)	.4207	8.45
1961-1963	.04 (.7)	+.036 (.9)	+.459 (5.6)	+.007 (.7)	.407	4.26
1961-1967	-.035 (-1.1)	+.066 (1.2)	+.719 (6.9)	+.159 (1.0)	.582	6.65
1963-1966	.039 (0.8)	+.098 (2.5)	+.380 (6.2)	-.048 (-0.4)	.3479	6.37
1963-1967	-.007 (-.2)	+.266 (3.3)	+.551 (5.5)	-.014 (-0.1)	.6467	5.00

NOTE: Same as A-2 for unit labour cost.

Listed below is the sample of forty-one industries used to test the model of administered pricing. They are ranked in descending order according to the average value of their shipments for all the periods for which data was collected. In Appendix B-1 the twenty largest firms are listed and the twenty-one smallest appear in Appendix B-2.

1. Pulp & Paper Mills
2. Motor Vehicle Manufacturers
3. Petroleum Refineries
4. Slaughtering & Meat Processors
5. Iron & Steel Mills
6. Motor Vehicle Parts & Accessories Manufacturers
7. Bakeries
8. Fruit & Vegetable Canners & Preservers
9. Men's Clothing Factories
10. Synthetic Textile Mills
11. Breweries
12. Tobacco Product Manufacturers
13. Sash, Door & Other Millwork Plants
14. Flour Mills
15. Manufacturers of Electrical Wire & Cable
16. Soft Drink Manufacturers
17. Distilleries
18. Fish Products Industry
19. Manufacturers of Pharmaceuticals and Medicines
20. Agricultural Implement Industry

21. Shoe Factories
22. Manufacturers of Soap & Cleaning Compounds
23. Veneer & Plywood Mills
24. Paint & Varnish Manufacturers
25. Confectionery Manufacturers
26. Biscuits Manufacturers
27. Hosiery Mills
28. Leather Tanneries
29. Abrasive Manufacturers
30. Asphalt Roofing Manufacturers
31. Battery Manufacturers
32. Linoleum & Coated Fabrics Industry
33. Clay Products Manufacturers - Domestic Clays
34. Hat & Cap Industry
35. Cotton & Jute Bag Industry
36. Wooden Box Factories
37. Clay Product Manufacturers - Imported Clays
38. Shingle Mills
39. Wineries
40. Cordage & Twine Industry
41. Hardwood Flooring Industry

APPENDIX C

Appendix C is divided into C-1 to C-8. Appendices C-1 to C-4 list the results of running the model for equations IV.1 to IV.4 with a sample restricted to the twenty largest firms for a number of time periods. The sample appears in Appendix B-1.

Appendices C-5 to C-8 repeat the same process with a sample which includes only the twenty-one smallest industries. The sample appears in Appendix B-2.

GROUP: 20 LARGEST INDUSTRIES

TIME PERIOD	$\dot{P}/P = \dot{Q}/Q$ +	$\dot{ULC}/ULC$ +	$\dot{UMC}/UMC$	$\bar{R}^2$	SEE
1957-1959	.091 (1.8)	+.357 (3.3)	-.133 (-1.1)	.2825	2.80
1957-1961	.116 (2.0)	+.200 (1.4)	+.482 (3.6)	.5396	4.13
1957-1963	(.015 (0.5)	-.071 (-0.8)	+.808 (8.0)	.7216	4.77
1957-1967	-.013 (-0.5)	+.029 (0.2)	+.835 (6.8)	.7558	7.04
1959-1961	-.042 (-0.9)	+.056 (0.7)	+.408 (4.2)	.4629	2.24
1959-1963	.001 (0.0)	+.063 (0.9)	+.570 (6.9)	.5829	3.90
1963-1966	-.003 (-0.1)	+.365 (5.0)	+.455 (7.4)	.5840	4.68

NOTE: The unit labour cost variable includes only the wages of production workers.

APPENDIX C-2

GROUP: 20 LARGEST INDUSTRIES

TIME PERIOD	$\dot{P}/P = \dot{Q}/Q$ +	$\dot{ULC}/ULC$ +	$\dot{UMC}/UMC$	$\bar{R}^2$	SEE
1957-1959	.073 (1.5)	+.354 (3.4)	-.049 (-0.5)	.2987	2.77
1957-1961	.096 (2.0)	+.237 (2.0)	+.425 (3.2)	.5835	3.93
1957-1963	.034 (1.4)	+.92 (1.7)	+.649 (6.2)	.7525	4.50
1957-1967	-.007 (-0.3)	+.102 (1.3)	+.727 (6.0)	.7785	6.71
1959-1961	-.025 (-0.6)	+.173 (2.3)	=.371 (4.5)	.5832	1.98
1959-1963	-.006 (-0.2)	+.012 (0.2)	+.557 (4.9)	.5635	3.99
1963-1966	.062 (1.2)	+.060 (1.3)	+.298 (3.9)	.0634	7.03

NOTE: The unit labour cost variable includes both the wages of production workers and salaries of office personnel and and research workers.

GROUP: 20 LARGEST INDUSTRIES

TIME PERIOD	$\dot{P}/P = \dot{Q}/Q$ +	$\dot{ULC}/ULC$ +	$\dot{UMC}/UMC$ +	CR	$\bar{R}^2$	SEE
1957-1959	.046 (0.8)	+ .28 (2.5)	-.056 (-0.4)	+.114 (1.7)	.3541	2.66
1957-1961	.090 (1.7)	+.275 (2.1)	+.379 (2.9)	+.199 (2.2)	.6227	3.74
1957-1963	-.001 (-0.0)	-.064 (-0.7)	+.793 (7.6)	+.103 (0.7)	.7133	4.84
1957-1967	-.046 (-1.5)	+.039 (0.4)	+.816 (7.0)	+.399 (1.9)	.7868	6.58
1959-1961	-.058 (-1.2)	+.149 (1.3)	+.331 (2.8)	+.079 (1.1)	.4717	2.33
1959-1963	-.017 (- .4)	+.079 (1.1)	+.564 (6.7)	+.090 (0.7)	.5704	3.95
1963-1966	.008 (0.2)	+.359 (4.7)	+.463 (6.8)	-.054 (-0.3)	.5612	4.81

NOTE: The unit labour cost variable includes only the wages of production workers.

GROUP: 20 LARGEST INDUSTRIES

TIME PERIOD	$\dot{P}/P = \dot{Q}/Q$ +	$\dot{ULC}/ULC$ +	$\dot{UMC}/UMC$ +	CR	$\bar{R}^2$	SEE
1957-1959	.037 (0.7)	+.274 (2.3)	+.011 (0.1)	+.055 (1.3)	.3253	2.72
1957-1961	.064 (1.3)	+.235 (2.1)	+.384 (3.0)	+.148 (1.7)	.6234	3.73
1957-1963	.013 (0.4)	+.095 (1.7)	+.633 (5.9)	+.126 (0.9)	.7508	4.51
1957-1967	-.042 (-1.6)	+.112 (1.6)	+.704 (6.3)	+.416 (2.1)	.8149	6.13
1959-1961	-.031 (-0.8)	+.213 (2.7)	+.330 (3.8)	.064 (1.4)	.6041	1.93
1959-1963	-.016 (-0.4)	+.014 (0.3)	+.552 (4.7)	+.048 (0.4)	.5405	4.09
1963-1966	.094 (1.4)	+.053 (1.1)	+.328 (3.6)	-.159 (-0.7)	.0334	7.14

NOTE: The unit labour cost variable includes both the wages of production workers and salaries of office personnel and research workers.

APPENDIX C-5

GROUP: 21 SMALLEST INDUSTRIES

TIME PERIOD	$\dot{P}/P = \dot{Q}/Q$ +	$\dot{ULC}/ULC$ +	$\dot{UMC}/UMC$	$\bar{R}^2$	SEE
1957-1959	-.043 (-0.4)	+.221 (1.0)	+.452 (4.4)	.585	5.20
1957-1961	-.031 (-0.3)	+.417 (2.4)	+.236 (3.1)	.4919	6.00
1957-1963	.078 (1.4)	+.551 (5.0)	+.273 (4.0)	.6081	5.79
1957-1967	.022 (0.5)	+.597 (5.9)	+.210 (2.2)	.5018	8.87
1959-1961	-.202 (-2.3)	+.297 (1.5)	+.124 (1.6)	.4732	4.92
1959-1963	.031 (0.7	+.490 (3.8)	+.286 (5.1)	.6007	4.84
1963-1966	-.047 (-1.0)	+.339 (3.2)	+.368 (3.9)	.7025	4.64

NOTE: Same as C-1 for unit labour cost.

GROUP: 21 SMALLEST INDUSTRIES

TIME PERIOD	$\dot{P}/P = \dot{Q}/Q$ +	$\dot{ULC}/ULC$ +	$\dot{UMC}/UMC$	$\bar{R}^2$	SEE
1957-1959	.020 (0.2)	+.434 (2.5)	+.413 (4.7)	.6753	4.60
1957-1961	.01) (0.1)	+.520 (3.7)	+.227 (3.4)	.6251	5.15
1957-1963	-.024 (-0.4)	+.208 (3.9)	+.295 (3.4)	.3682	7.32
1957-1967	-.022 (-0.5)	+.375 (5.2)	+.219 (2.1)	.4171	9.59
1959-1961	-.189 (-2.7)	+.486 (3.2)	+.125 (2.0)	.6184	4.19
1959-1963	+.023 (0.4)	+.122 (1.5)	+.264 (3.7)	.3601	6.13
1963-1966	-.048 (-1.0)	+.453 (3.4)	+.329 (3.4)	.7190	4.51

NOTE: Same as C-2 for unit labour cost.

APPENDIX C-7

GROUP: 21 SMALLEST INDUSTRIES

TIME PERIOD	$\dot{P}/P = \dot{Q}/Q$ +	$\dot{ULC}/ULC$ +	$\dot{UMC}/UMC$ +	CR	$\bar{R}^2$	SEE
1957-1959	-.068 (-0.5)	+.161 (0.7)	+.449 (4.3)	+.078 (0.6	.5700	5.30
1957-1961	-.062 (-0.5)	+.369 (2.0)	+.219 (2.8)	+.132 (1.0)	.4892	6.01
1957-1963	.015 (0.2)	+.475 (4.2)	+.233 (3.3)	+.280 (1.7)	.6474	5.48
1957-1967	.023 (0.4)	+.598 (5.0)	+.211 (2.1)	-.006 (-0.0)	.4725	9.12
1959-1961	-.212 (-2.4)	+.306 (1.6)	+.110 (1.4)	+.99 (0.9)	.4681	4.94
1959-1963	-.016 (-0.4)	+.496 (4.3)	+.244 (4.5)	+.260 (2.3)	.6759	4.36
1963-1966	-.024 (-0.4)	+.367 (3.1)	+.363 (3.8)	-.088 (-0.6)	.6909	4.73

NOTE: Same as C-3 for unit labour cost.

APPENDIX C-8

GROUP: 21 SMALLEST INDUSTRIES

TIME PERIOD	$\dot{P}/P = \dot{Q}/Q$ +	$\dot{ULC}/ULC$ +	$\dot{UMC}/UMC$ +	CR	$\bar{R}^2$	SEE
1957-1959	.015 (0.1)	+.422 (2.2)	+.411 (4.5)	+.019 (0.2)	.6568	4.73
1957-1961	-.013 (-0.1)	+.490 (3.5)	+.208 (3.1)	+.135 (1.2)	.6325	5.10
1957-1963	-.092 (-1.3)	+.159 (2.2)	+.240 (2.8)	+.377 (1.9)	.4461	6.86
1957-1967	-.034 (-0.6)	+.361 (4.3)	+.209 (1.9)	+.121 (0.4)	.3876	9.83
1959-1961	-.202 (-2.9)	+.527 (3.5)	+.104 (1.7)	+.144 (1.6)	.6498	4.01
1959-1963	-.010 (-0.2)	+.099 (1.2)	+.233 (3.1)	+.202 (1.2)	.3788	6.04
1963-1966	-.037 (-0.6)	+.466 (3.3)	+.328 (3.3)	-.040 (-0.3)	.7038	4.63

NOTE: Same as C-4 for unit labour cost.

APPENDIX D

Appendix D is divided into D-1 and D-2. Here the forty-one industries included in the sample are ranked in descending order, according to the value of the Herfindahl index related to the value of shipments. The value of the index is indicated in brackets and takes account both of the number of firms in an industry and their relative sizes.

$$(1)\quad H_k = \sum_{i=1}^{i} \left(\frac{x \cdot p}{X \cdot P}\right)^2 * 100$$

The herfindahl index for industry k is the sum of the squares of the value of shipments of each individual firm expressed as a ratio of the value of the shipments of the industry. In the calculation done by the Department of Consumer and Corporate Affairs (25), percentages are used in preference to ratios so that the results are effectively multiplied by one hundred.

The results range from zero to one hundred, this last case occurring when there is a monopoly.

Appendix D-1 lists the twenty most concentrated industries in the sample and D-2 the twenty-one less concentrated. This is a listing of establishment concentration. The similar orderings for enterprise concentration are given in D-3 and D-4. The enterprise consists of all establishments in a single manufacturing industry under common control.

1. Motor Vehicles Manufacturers (31.23)
2. Cordage & Twine Industry (21.15)
3. Manufacturers of Soap & Cleaning Compounds (18.98)
4. Iron & Steel Mills (17.53)
5. Linoleum & Coated Fabrics Industry (16.95)
6. Distilleries (14.23)
7. Hardwood Flooring Industry (13.09)
8. Wineries (12.37)
9. Abrasive Manufacturers (12.17)
10. Manufacturers of Electrical Wire & Cable (12.15)
11. Tobacco Products Manufacturers (12.11)
12. Clay Product Manufacturers - Imported Clay (11.34)
13. Agricultural Implement Industry (11.07)
14. Asphalt Roofing Manufacturers (10.31)
15. Motor Vehicle Parts & Accessories Manufacturers (9.57)
16. Wooden Box Factories (8.70)
17. Biscuits Manufacturers (7.71)
18. Battery Manufacturers (7.70)
19. Synthetic Textile Mills (7.40)
20. Shingle Mills (7.32)

21. Leather Tanneries (7.00)
22. Cotton & Jute Bag Industry (6.06)
23. Flour Mills (6.04)
24. Breweries (5.25)
25. Confectionery Manufacturers (4.96)
26. Petroleum Refineries
27. Clay Products Manufacturers - Domestic Clays (4.24)
28. Veneer & Plywood Mills (3.76)
29. Paint & Varnish Manufacturers (2.96)
30. Slaughtering & Meat Processors (2.81)
31. Fruit & Vegetable Canners & Preservers (2.80)
32. Hat & Cap Industry (2.76)
33. Manufacturers of Pharmaceuticals & Medicines (2.69)
34. Hosiery Mills
35. Fish Products Industry (1.47)
36. Pulp & Paper Mills (1.44)
37. Soft Drink Manufacturers (1.25)
38. Shoe Factories (1.07)
39. Men's Clothing Factories (.77)
40. Bakeries (.74)
41. Sash, Door & Other Millwork Plants (.62)

1. Motor Vehicles Manufacturers (31.97)
2. Breweries (30.88)
3. Tobacco Products Manufacturers (30.00)
4. Linoleum & Coated Fabrics Industry (26.77)
5. Distilleries (24.60)
6. Abrasive Manufacturers (22.05)
7. Battery Manufacturers (21.91)
8. Cordage & Twine Industry (21.15)
9. Flour Mills (20.32)
10. Petroleum Refineries (19.78)
11. Manufacturers of Soap & Cleaning Compounds (19.60)
12. Iron & Steel Mills (19.58)
13. Asphalt Roofing Manufacturers (17.52)
14. Manufacturers of Electrical Wire & Cable (16.75)
15. Wineries (16.13)
16. Biscuits Manufacturers (15.94)
17. Leather Tanneries (15.79)
18. Agricultural Implement Industry (14.93)
19. Clay Product Manufacturers - Imported Clay (13.95)
20. Motor Vehicles Parts & Accessories Manufacturers (13.72)

21. Slaughtering & Meat Processors (13.24)
22. Cotton & Jute Bag Industry (13.18)
23. Hardwood Flooring Industry (13.09)
24. Synthetic Textile Mills (9.92)
25. Wooden Box Factories (9.15)
26. Confectionery Manufacturers (8.80)
27. Paint & Varnish Manufacturers (7.35)
28. Shingle Mills (7.32)
29. Clay Product Manufacturers - Domestic Clays (7.20)
30. Veneer & Plywood Mills (7.14)
31. Soft Drink Manufacturers (5.91)
32. Fish Products Industry (5.42)
33. Pulp & Paper Mills (5.03)
34. Fruit & Vegetable Canners & Preservers (4.88)
35. Bakeries (3.24)
36. Manufacturers of Pharmaceuticals & Medicines (2.79)
37. Hat & Cap Industry (2.76)
38. Shoe Factories (2.07)
39. Hosiery Mills (1.95)
40. Men's Clothing Factories (.85)
41. Sash, Door & Other Millwork Plants (.65)

APPENDIX E

Appendix E is divided into E-1 to E-16. Appendix E-1 to E-4 lists equations IV.1 to IV.4 for the twenty most concentrated industries according to an enterprise concentration ratio. Appendix E-5 to E-8 repeats the same process with the twenty-one less concentrated industries.

Appendices E-9 to E-16 lists the equations obtained with an establishment concentration ratio. E-9 to E-12 lists the results obtained with the twenty most concentrated industries, and the last four, those results obtained with the less concentrated group.

GROUP: 20 MOST CONCENTRATED INDUSTRIES

TIME PERIOD	$\dot{P}/P = \dot{Q}/Q$ +	$\dot{ULC}/ULC$ +	$\dot{UMC}/UMC$	$\bar{R}^2$	SEE
1957-1959	-.178 (-1.6)	+.088 (0.5)	+.420 (3.6)	.4970	5.81
1957-1961	.008 (0.1)	+.272 (1.7)	+.317 (3.0)	.3503	5.62
1957-1963	.051 (0.9)	+.280 (2.0)	+.338 (3.0)	.3823	7.05
1957-1966	.019 (0.6)	+.306 (3.1)	+.460 (5.7)	.5161	9.75
1959-1961	-.104 (-1.8)	+.019 (0.2)	+.314 (4.0)	.4119	2.63
1959-1963	-.002 (-0.1)	+.129 (1.1)	+.402 (6.2)	.6271	4.28
1959-1966	.021 (1.0)	+.326 (3.7)	+.474 (6.2)	.5355	6.46
1961-1963	.026 (0.9)	+.178 (1.8)	+.336 (4.8)	.5133	2.75
1961-1966	.004 (0.2)	+.433 (5.6)	+.533 (8.4)	.7198	4.89
1963-1966	.010 (0.3)	+.372 (4.5)	+.468 (7.6)	.7108	4.91

NOTE: The unit labour cost variable includes only the wages of production workers.

APPENDIX E-2

GROUP: 20 MOST CONCENTRATED INDUSTRIES

TIME PERIOD	$\dot{P}/P = \dot{Q}/Q$ +	$\dot{ULC}/ULC$ +	$\dot{UMC}/UMC$	$\bar{R}^2$	SEE
1957-1959	-.158 (-1.5)	+.321 (1.9)	+.339 (3.2)	.5807	5.30
1957-1961	-.034 (-0.4)	+.359 (3.2)	+.277 (3.0)	.5222	4.82
1957-1963	.015 (0.3)	+.160 (2.4)	+.357 (3.5)	.4323	6.75
1957-1966	.011 (0.4)	+.243 (3.5)	+.436 (5.7)	.5621	9.28
1959-1961	-.105 (-1.9)	+.141 (1.5)	+.320 (4.4)	.4814	2.47
1959-1963	-.018 (- .5)	+.034 (0.6)	+.401 (5.9)	.6104	4.37
1959-1966	.019 (0.8)	+.188 (2.9)	+.388 (5.2)	.4285	7.16
1961-1963	.016 (0.6)	+.028 (0.8)	+.324 (4.3)	.4434	2.94
1961-1966	.018 (0.8)	+.191 (3.0)	+.392 (5.4)	.4832	6.65
1963-1966	.016 (0.4)	+.384 (4.6)	+.480 (7.7)	.7161	4.86

NOTE: The unit labour cost variable includes both the wages of production workers and salaries of office personnel and research workers.

GROUP: 20 MOST CONCENTRATED INDUSTRIES

TIME PERIOD	$\dot{P}/P = \dot{Q}/Q$ +	$\dot{ULC}/ULC$ +	$\dot{UMC}/UMC$ +	CR	$\bar{R}^2$	SEE
1957-1959	-.283 (-2.7)	- .01 (-0.1)	+.441 (4.3)	+.149 (2.5)	.6166	5.07
1957-1961	-.113 (-1.3)	+.255 (2.1)	+.257 (3.1)	+.183 (3.6)	.6213	4.29
1959-1963	-.071 (-1.4)	+.314 (3.0)	+.247 (2.9)	+.314 (4.0)	.6702	5.15
1957-1966	-.023 (-0.6)	+.344 (3.6)	+.371 (4.1)	+.275 (1.8)	.5695	9.20
1959-1961	-.124 (-2.2)	+.101 (1.1)	+.297 (4.1)	+.059 (2.1)	.5057	2.41
1959-1963	-.048 (-1.3)	+.259 (2.4)	+.359 (6.4)	+.159 (3.0)	.7452	3.54
1959-1966	.005 (0.2)	+.333 (3.8)	+.430 (4.7)	+.098 (0.9)	.5278	6.51
1961-1963	.000 (0.0)	+.204 (2.0)	+.311 (4.4)	+.053 (1.3)	.5306	2.70
1961-1966	.013 (0.5)	+.433 (5.5)	+.557 (6.8)	-.046 (-0.5)	.7065	5.01
1963-1966	.046 (1.0)	+.366 (4.4)	+.507 (7.2)	-.087 (-1.1)	.7153	4.87

NOTE: The unit labour cost variable includes only the wages of production workers.

GROUP: 20 MOST CONCENTRATED INDUSTRIES

TIME-PERIOD	$\dot{P}/P = \dot{Q}/Q$ +	$\dot{ULC}/ULC$ +	$\dot{UMC}/UMC$ +	CR	$\bar{R}^2$	SEE
1957-1959	-.250 (-2.4)	+.182 (1.1)	+.375 (3.8)	+.121 (2.0)	.6422	4.90
1957-1961	-.144 (-2.4)	+.320 (3.9)	+.230 (3.5)	+.169 (4.1)	.7536	3.46
1957-1963	-.090 (-1.5)	+.106 (1.7)	+.333 (3.7)	+.236 (2.4)	.5579	5.96
1957-1966	-.002 (-0.1)	+.238 (3.3)	+.407 (4.3)	+.089 (0.6)	.5438	9.47
1959-1961	-.124 (-2.6)	+.208 (2.5)	+.299 (4.7)	+.063 (2.7)	.6179	2.12
1959-1963	-.064 (-1.5)	+.012 (0.2)	+.386 (6.0)	+.104 (1.8)	.6543	4.12
1959-1966	.022 (0.7)	+.190 (2.7)	+.397 (3.9)	-.019 (-0.1)	.3936	7.38
1961-1963	.001 (0.0)	+.019 (0.5)	+.316 (4.0)	+.026 (0.5)	.4180	3.01
1961-1966	.056 (1.7)	+.229 (3.6)	+.517 (5.0)	-.212 (-1.6)	.5294	6.34
1963-1966	.050 (1.1)	+.378 (4.5)	+.517 (7.3)	-.085 (-1.1)	.7196	4.83

NOTE: The unit labour cost variable includes both the wages of production workers and salaries of office personnel and research workers.

GROUP: 21 LESS CONCENTRATED INDUSTRIES

TIME PERIOD	$\dot{P}/P = \dot{Q}/Q$ +	$\dot{ULC}/ULC$ +	$\dot{UMC}/UMC$	$\bar{R}^2$	SEE
1957-1959	.113 (1.8)	+.230 (2.0)	+.367 (3.1)	.3225	2.83
1957-1961	.137 (1.7)	+.529 (3.4)	+.227 (2.8)	.5212	5.29
1957-1963	.091 (1.8)	+.301 (2.5)	+.443 (4.5)	.4196	7.07
1957-1966	.044 (1.2)	+.465 (4.5)	+.358 (3.8)	.5801	8.78
1959-1961	-.158 (-2.3)	+.530 (3.3)	+.089 (1.3)	.5816	4.30
1959-1963	.057 (1.2)	+.203 (2.0)	+.305 (3.7)	.2162	6.01
1959-1966	.006 (0.1)	+.422 (4.1)	+.292 (3.2)	.4282	8.75
1961-1963	.161 (2.2)	+.100 (1.0)	+.613 (5.4)	.5720	4.30
1961-1966	-.046 (-1.2)	+.217 (2.8)	+.713 (7.3)	.6718	5.11
1963-1966	-.049 (-1.0)	+.409 (4.2)	+.281 (2.2)	.5801	4.13

NOTE: Same as E-1 for unit labour cost.

APPENDIX E-6

GROUP: 21 LESS CONCENTRATED INDUSTRIES

TIME PERIOD	$\dot{P}/P = \dot{Q}/Q$ +	$\dot{ULC}/ULC$ +	$\dot{UMC}/UMC$	$\bar{R}^2$	SEE
1957-1959	.123 (2.1)	+.274 (2.5)	+.389 (3.6)	.3871	2.69
1957-1961	.168 (2.5)	+.621 (4.8)	+.213 (3.1)	.6597	4.46
1957-1963	.030 (0.7)	+.229 (3.3)	+.351 (3.6)	.5098	6.50
1957-1966	-.015 (-0.3)	+.169 (2.4)	+.446 (3.8)	.3207	11.17
1959-1961	-.127 (-2.0)	+.571 (4.2)	+.106 (1.7)	.6617	3.87
1959-1963	.037 (0.8)	+.153 (2.3)	+.219 (2.5)	.2616	5.83
1959-1966	-.015 (-0.3)	+.140 (1.9)	+.337 (2.8)	.0943	11.01
1961-1963	.174 (2.3)	-.026 (-0.4)	+.633 (4.8)	.5512	4.41
1961-1966	-.051 (-1.1)	-.049 (-1.1)	+.944 (7.6)	.5629	5.90
1963-1966	-.069 (-1.0)	+.023 (0.5)	+.655 (4.8)	.1719	5.80

NOTE: Same as E-2 for unit labour cost.

GROUP: 21 LESS CONCENTRATED INDUSTRIES

TIME PERIOD	$\dot{P}/P = \dot{Q}/Q$ +	$\dot{ULC}/ULC$ +	$\dot{UMC}/UMC$ +	CR	$\bar{R}^2$	SEE
1957-1959	.041 (0.7)	+.161 (1.5)	+.363 (3.4)	+.206 (2.4)	.4636	2.52
1957-1961	.121 (1.1)	+.511 (2.9)	+.222 (2.6)	+.049 (0.2)	.4947	5.43
1957-1963	.039 (0.6)	+.271 (2.3)	+.396 (3.9)	+.377 (1.3)	.4435	6.92
1957-1966	.024 (0.4)	+.432 (3.4)	+.346 (3.5)	+.243 (0.5)	.5612	8.98
1959-1961	-.185 (-2.5)	+.526 (3.3)	+.062 (0.8)	+.136 (1.0)	.5789	4.31
1959-1963	.019 (0.3)	+.214 (2.1)	+.252 (2.8)	+.308 (1.4)	.2506	5.87
1959-1966	-0.40 (-0.7)	+.364 (3.3)	+.237 (2.4)	+.601 (1.3)	.4528	8.56
1961-1963	.152 (1.4)	+.102 (1.0)	+.611 (5.2)	+.026 (0.1)	.5473	4.42
1961-1966	-.076 (-1.6)	+.178 (2.1)	+.676 (6.5)	+.307 (1.1)	.6739	5.09
1963-1966	-.043 (-0.7)	+.424 (3.1)	=.282 (2.1)	-.044 (-0.2)	.5560	4.24

NOTE: Same as appendix E-3 for unit labour cost.

GROUP: 21 LESS CONCERNED INDUSTRIES

TIME PERIOD	$\dot{P}/P = \dot{Q}/Q$ +	$\dot{ULC}/ULC$ +	$\dot{UMC}/UMC$ +	CR	$\bar{R}^2$	SEE
1957-1959	.053 (0.8)	+.187 (1.7)	+.382 (3.8)	+.183 (2.1)	.4811	2.48
1957-1961	.188 (2.1)	+.646 (4.3)	+.218 (3.1)	-.062 (-0.3)	.6421	4.57
1957-1963	-.009 (-0.2)	+.209 (3.0)	+.320 (3.2)	+.319 (1.2)	.5219	6.42
1957-1966	-.078 (-1.4)	+.136 (2.0)	+.361 (3.1)	+.964 (1.9)	.4047	10.46
1959-1961	-.155 (-2.3)	+.569 (4.2)	+.078 (1.2)	+.140 (1.1)	.6656	3.84
1959-1963	.009 (0.2)	+.148 (2.2)	+.182 (1.9)	+.230 (1.0)	.2628	5.83
1959-1966	-.095 (-1.5)	+.122 (1.8)	+.217 (1.8)	+1.061 (2.2)	.2514	10.01
1961-1963	.176 (1.6)	-.026 (-0.4)	+.634 (4.7)	-.007 (1-0.0)	.5248	4.53
1961-1966	-.103 (-2.1)	-.048 (-1.2)	+.830 (6.4)	+.556 (2.0)	.6228	5.48
1963-1966	-.134 (-1.9)	+.012 (0.3)	+.480 (3.2)	+.561 (2.2)	.3136	5.28

NOTE: Same as E-4 for unit labour cost.

APPENDIX E-9

GROUP: 20 MOST CONCENTRATED INDUSTRIES

TIME PERIOD	$\dot{P}/P = \dot{Q}/Q$ +	$\dot{ULC}/ULC$ +	$\dot{UMC}/UMC$	$\bar{R}^2$	SEE
1957-1959	-.049 (-.9)	+.286 (2.5)	+.016 (0.2)	.3729	3.39
1957-1961	-.037 (-. 5)	+.124 (0.9)	+.269 (2.5)	.2884	5.08
1957-1963	.064 (1.6)	+.305 (2.7)	+.277 (3.0)	.5021	5.99
1957-1967	.048 (1.4)	+.438 (2.5)	+.286 (1.6)	.2758	10.44
1959-1961	-.137 (-4.2)	+.053 (0.7)	+.331 (5.4)	.7544	2.27
1959-1963	.034 (1.2)	+.204 (1.8)	+.327 (4.5)	.4711	4.43

NOTE: The unit labour cost variable includes only the wages of production workers.

GROUP: 20 MOST CONCENTRATED INDUSTRIES

TIME PERIOD	$\dot{P}/P = \dot{Q}/Q$ +	$\dot{ULC}/ULC$ +	$\dot{UMC}/UMC$	$\bar{R}^2$	SEE
1957-1959	- .04 (-..8)	+.339 (3.7)	+.034 (0.4)	.5214	2.96
1957-1961	-.013 (- .2)	+.243 (2.3)	+.215 (2.2)	.4377	4.52
1957-1963	.031 (0.8)	+.155 (2.4)	+.327 (3.7)	.4701	6.18
1957-1967	.027 (0.9)	+.287 (3.1)	+.358 (2.5)	.3722	9.72
1959-1961	-.135 (-4.4)	+.123 (1.7)	+.328 (5.7)	.7841	2.13
1959-1963	.025 (.8)	+.046 (.7)	+.333 (4.2)	.3922	4.75

NOTE: The unit labour cost variable includes both the wages of production workers and salaries of office personnel and research workers.

GROUP: 20 MOST CONCENTRATED INDUSTRIES

TIME PERIOD	$\dot{P}/P = \dot{Q}/Q$ +	$\dot{ULC}/ULC$ +	$\dot{UMC}/UMC$ +	CR	$\bar{R}^2$	SEE
1957-1959	-.082 (-1.5)	+.215 (1.9)	+.047 (0.5)	+.103 (1.9)	.4585	3.15
1957-1961	-.069 (-1.)	+.123 (1.)	+.211 (2.1)	+.174 (2.3)	.4345	4.53
1957-1963	-.005 (- .1)	+.295 (3.1)	+.207 (2.6)	+.327 (3.1)	.6670	4.90
1957-1967	.008 (0.2)	+.379 (2.1)	+.246 (1.4)	+.366 (1.4)	.3157	10.15
1959-1961	-.146 (-4.7)	+.118 (1.4)	+.310 (5.2)	+.064 (1.6)	.7766	2.17
1959-1963	-.016 (- .6)	+.366 (3.6)	+.248 (4.0)	+.281 (3.4)	.6770	3.46

NOTE: The unit labour cost variable includes only the wages of production workers.

APPENDIX E- 12

GROUP: 20 MOST CONCENTRATED INDUSTRIES

TIME PERIOD	$\dot{P}/P = \dot{Q}/Q$ +	$\dot{ULC}/ULC$ +	$\dot{UMC}/UMC$ +	CR	$\bar{R}^2$	SEE
1957-1959	-.066 (-1.3)	+.278 (2.9)	+.052 (0.7)	+.081 (1.7)	.5658	2.82
1957-1961	-.046 (- .8)	+.228 (3.5)	+.166 (1.9)	+.164 (2.5)	.5696	3.95
1957-1963	-.028 (- .6)	+.113 (1.8)	+.289 (3.4)	+.263 (2.0)	.5502	5.69
1957-1967	.005 (0.1)	+.252 (2.4)	+.342 (2.4)	+.200 (0.7)	.3543	9.86
1959-1961	-.142 (-5.1)	+.175 (2.4)	+.302 (5.6)	+.068 (2.0)	.8177	1.96
1959-1963	-.005 (- .1)	+.035 (0.6)	+.301 (3.8)	+.139 (1.4)	.4275	4.61

NOTE: The unit labour cost variable includes both wages of production workers and salaries of office personnel and research workers.

APPENDIX E-13

GROUP: 21 LESS CONCENTRATED INDUSTRIES

TIME PERIOD	$\dot{P}/P = \dot{Q}/Q$ +	$\dot{ULC}/ULC$ +	$\dot{UMC}/UMC$	$\bar{R}^2$	SEE
1957-1959	.219 (2.7)	+.268 (1.9)	+.643 (8.2)	.7877	3.48
1957-1961	.222 (2.7)	+.722 (5.1)	+.238 (3.4)	.6656	4.79
1957-1963	.115 (1.6)	+.325 (2.5)	+.492 (4.7)	.3784	7.54
1957-1967	.058 (1.4)	+.462 (4.8)	+.404 (4.1)	.6010	8.88
1959-1961	.005 (0.0)	+.584 (3.2)	+.110 (1.5)	.4415	4.45
1959-1963	.058 (0.7)	+.203 (1.9)	+.353 (4.5)	.3701	6.06

NOTE: Same as E-9 for unit labour cost.

GROUP: 21 LESS CONCENTRATED INDUSTRIES

TIME PERIOD	$\dot{P}/P = \dot{Q}/Q$ +	$\dot{ULC}/ULC$ +	$\dot{UMC}/UMC$	$\bar{R}^2$	SEE
1957-1959	.228 (3.3)	+.408 (3.1)	+.600 (8.4)	.8356	3.07
1957-1961	.192 (3.3)	+.782 (7.5)	+.233 (4.4)	.8012	3.69
1957-1963	.002 (0.0)	+.229 (3.3)	+.374 (3.5)	.4768	6.92
1957-1967	-.021 (-0.5)	+.341 (4.8)	+.337 (3.2)	.5983	8.91
1959-1961	.134 (1.3)	+.832 (6.0)	+.147 (2.7)	.7090	3.21
1959-1963	-.019 (- .3)	+.144 (2.3)	+.268 (3.2)	.4122	5.85

NOTE: Same as E-10 for unit labour cost.

GROUP: 21 LESS CONCENTRATED INDUSTRIES

TIME PERIOD	$\dot{P}/P = \dot{Q}/Q$ +	$\dot{ULC}/ULC$ +	$\dot{UMC}/UMC$ +	CR	$\bar{R}^2$	SEE
1957-1959	.041 (0.5)	+.146 (1.2)	+.572 (8.9)	+.747 (3.5)	.8700	2.72
1957-1961	.105 (1.0)	+.619 (4.1)	+.184 (2.4)	+.645 (1.6)	.6902	4.61
1957-1963	.042 (0.5)	+.293 (2.3)	+.410 (3.5)	+.911 (1.5)	.4147	7.32
1957-1967	.045 (0.9)	+.441 (4.1)	+.390 (3.8)	+.425 (0.5)	.5845	9.06
1959-1961	- .03 (- .2)	+.568 (3.0)	+.092 (1.07)	+.128 (0.4)	.4133	4.56
1959-1963	.046 (0.5)	+.202 (1.9)	+.344 (3.9)	+.115 (0.2)	.3352	6.22

NOTE: Same as E-11 for unit labour cost.

APPENDIX E-16

GROUP: 21 LESS CONCENTRATED INDUSTRIES

TIME PERIOD	$\dot{P}/P = \dot{Q}/Q$ +	$\dot{ULC}/ULC$ +	$\dot{UMC}/UMC$ +	CR	$\bar{R}^2$	SEE
1957-1959	.068 (.8)	+.205 (1.5)	+.569 (8.9)	+.621 (2.6)	.8743	2.68
1957-1961	.171 (1.9)	+.758 (5.7)	+.224 (3.6)	+.116 (0.3)	.7906	3.79
1957-1963	-.057 (- .8)	+.213 (3.1)	+.302 (2.6)	+.878 (1.5)	.5140	6.67
1957-1967	-.037 (- .8)	+.319 (4.3)	+.313 (2.8)	+.714 (0.9)	.5955	8.94
1959-1961	.166 (1.2)	+.852 (5.7)	+.163 (2.4)	-.107 (-0.4)	.6950	3.29
1959-1963	-.024 (-0.3)	+.143 (2.2)	+.265 (2.9)	+.047 (0.1)	.3780	6.02

NOTE: Same as E-12 for unit labour cost.

Appendix F lists the twenty industries which used their market power the most. The sample was obtained by the method described in the text. Appendix F-1 gives a sample for the 1957-1961 period, F-2 for the 1957-1963 period, F-3, for the 1959-1963 period and F-4 for the 1963-1966 period.

1. Motor Vehicles Manufacturers
2. Clay Product Manufacturers - Imported Clays
3. Cordage & Twine Industry
4. Clay Product Manufacturers - Domestic Clays
5. Distilleries
6. Tobacco Product Manufacturers
7. Breweries
8. Cotton & Jute Bag Industry
9. Linoleum & Coated Fabrics Industry
10. Leather Tanneries
11. Synthetic Textile Mills
12. Flour Mills
13. Hat & Cap Industry
14. Slaughtering & Meat Processors
15. Abrasive Manufacturers
16. Paint & Varnish Manufacturers
17. Battery Manufacturers
18. Men's Clothing Factories
19. Pulp & Paper Mills
20. Fruit & Vegetable Canners & Preservers

APPENDIX F-2

1. Linoleum & Coated Fabrics Industry
2. Soft Drink Manufacturers
3. Leather Tanneries
4. Motor Vehicles Manufacturers
5. Wooden Box Factories
6. Clay Products Manufacturers - Domestic Clays
7. Cotton & Jute Bag Industry
8. Manufacturers of Pharmaceuticals & Medicines
9. Clay Products Manufacturers - Imported Clays
10. Hosiery Mills
11. Flour Mills
12. Veneer & Plywood Mills
13. Cordage & Twine Industry
14. Wineries
15. Distilleries
16. Agricultural Implement Industry
17. Hat & Cap Industry
18. Paint & Varnish Manufacturers
19. Battery Manufacturers
20. Petroleum Refineries

1. Linoleum & Coated Fabrics Industry
2. Agricultural Implement Industry
3. Cordage & Twine Industry
4. Cotton & Jute Bag Industry
5. Soft Drink Manufacturers
6. Flour Mills
7. Veneer & Plywood Mills
8. Wooden Box Factories
9. Hosiery Mills
10. Abrasive Manufacturers
11. Synthetic Textile Mills
12. Asphalt Roofing Manufacturers
13. Manufacturers of Pharmaceuticals & Medicines
14. Hardwood Flooring Industry
15. Clay Product Manufacturers - Domestic Clays
16. Biscuits Manufacturers
17. Paint & Varnish Manufacturers
18. Hat & Cap Industry
19. Slaughtering & Meat Processors
20. Petroleum Refineries

1. Tobacco Products Manufacturers
2. Motor Vehicles Manufacturers
3. Asphalt Roofing Manufacturers
4. Slaughtering and Meat Processors
5. Linoleum and Coated Fabrics Industry
6. Wineries
7. Fish Products Industry
8. Manufacturers of Electrical Wire and Cable
9. Shingle Mills
10. Cordage and Twine Industry
11. Synthetic Textiles Mills
12. Men's Clothing Factories
13. Shoe Factories
14. Bakeries
15. Soft Drink Manufacturers
16. Petroleum Refineries
17. Abrasive Manufacturers
18. Fruits and Vegetables Canners & Preservers
19. Veneer and Plywood Mills
20. Breweries

Below is a list of all the equations where the samples of Appendices F-1 to F-4 were used.

TIME PERIOD	$\dot{P}/P = \dot{Q}/Q$	+ ULC/ULC	+ UMC/UMC	+ CR	$\bar{R}^2$	SEE
1957-1961						
(IV.4)	.185	+.662	+.169	+.334	.7142	3.16
(F-1)	(3.2)	(5.6)	(3.6)	(5.3)		
1957-1963						
(IV.4)	-.114	+.213	+.138	+.634	.5768	5.55
(F-2)	(-2.2)	(3.7)	(1.8)	(4.0)		
1959-1963						
(IV.4)	-.106	+.113	+.180	+.546	.6723	4.52
(F-3)	(-2.2)	(2.6)	(3.0)	(4.1)		
1963-1966						
(IV.3)	.260	+.189	+.427	-.595	.6362	5.57
(F-4)	(4.0)	(1.6)	(6.4)	(-3.8)		
1963-1966						
(IV.4)	.254	+.189	+.437	-.634	.6757	5.26
(F-4)	(4.1)	(2.2)	(6.9)	(-4.2)		

NOTE: Equation IV.3 is different from equation IV.4 in that the unit labour cost variable of the former included only the wages of production workers, while the latter's unit labour cost also includes the salaries of office personnel and research workers.

Appendix H is divided into four parts. The equations listed are equations IV.3 and IV.4. In Appendix H-1 and H-2 the results will be given with the concentration index measuring the share of shipments of the largest four establishments in the industry. H-3 and H-4 do the same with the index calculated with the eight largest establishments.

T-values are in brackets, below the relevant coefficient.

TIME PERIOD	$\dot{P}/P = \dot{Q}/Q$ +	$\dot{ULC}/ULC$ +	$\dot{UMC}/UMC$ +	CR	$\bar{R}^2$	SEE
1957-1959	-.097 (-1.6)	+.030 (0.3)	+.380 (5.0)	+.044 (2.7)	.505	4.34
1957-1961	.016 (0.2)	+.366 (3.6)	+.219 (3.6)	+.048 (2.4)	.522	5.04
1957-1963	-.006 (-0.1)	+.257 (3.1)	+.329 (4.7)	+.084 (2.6)	.492	6.43
1959-1961	-.167 (-3.3)	+.312 (3.1)	+.134 (2.4)	+.030 (2.1)	.476	3.82
1963-1967	-.014 (-0.3)	+.255 (3.1)	+.593 (6.5)	-.003 (-0.1)	.644	5.02

NOTE: The unit labour cost variable includes the wages of production workers only.

CR is measuring the share of the shipments of the largest four establishments in total industry shipments.

TIME PERIOD	$\dot{P}/P = \dot{Q}/Q$ +	$\dot{ULC}/ULC$ +	$\dot{UMC}/UMC$ +	CR	$\bar{R}^2$	SEE
1957-1959	-.063 (-1.0)	+.184 (1.7)	+.334 (4.7)	+.036 (2.1)	.539	4.19
1957-1961	.011 (0.2)	+.406 (5.0)	+.208 (3.8)	+.040 (2.2)	.617	4.51
1957-1963	-.033 (-0.8)	+.172 (3.8)	+.313 (4.7)	+.069 (2.2)	.539	6.12
1959-1961	-.146 (-3.2)	+.409 (4.6)	+.139 (2.8)	+.029 (2.3)	.584	3.40
1963-1967	.005 (0.1)	+.286 (3.2)	+.543 (5.5)	-.015 (-0.5)	.649	4.99

NOTE: The unit labour cost variable includes both wages and salaries. Same as I-2 for CR.

APPENDIX H-3

TIME PERIOD	$\dot{P}/P = \dot{Q}/Q$ +	$\dot{ULC}/ULC$ +	$\dot{UMC}/UMC$ +	CR	$\bar{R}^2$	SEE
1957-1959	-.101 (-1.6)	+.031 (0.3)	+.378 (5.0)	+.034 (2.8)	.513	4.30
1957-1961	.009 (0.1)	+.362 (3.5)	+.216 (3.5)	+.036 (2.4)	.523	5.03
1957-1963	-.009 (-0.2)	+.257 (3.2)	+.322 (4.6)	+.065 (2.7)	.500	6.36
1959-1961	-.171 (-3.4)	+.311 (3.1)	+.131 (2.4)	+.023 (2.1)	.477	3.82
1963-1967	-.013 (-0.3)	+.257 (3.0)	+.593 (6.5)	-.003 (-0.1)	.644	5.02

NOTE: Same as I-1 for the unit labour cost variable.
CR measures the share of the shipments of the largest eight establishments in total industry shipments.

TIME PERIOD	$\dot{P}/P = \dot{Q}/Q$ +	$\dot{ULC}/ULC$ +	$\dot{UMC}/UMC$ +	CR	$\bar{R}^2$	SEE
1957-1959	-.068 (-1.1)	+.181 (1.7)	+.333 (4.7)	+.028 (2.3)	.548	4.16
1957-1961	.007 (0.1)	+.403 (4.9)	+.207 (3.8)	+.029 (2.2)	.616	4.51
1957-1963	-.034 (-0.9)	+.170 (3.8)	+.310 (4.6)	+.052 (2.2)	.540	6.12
1959-1961	-.150 (-3.3)	+.406 (4.6)	+.137 (2.8)	+.021 (2.2)	.582	3.41
1963-1967	.005 (0.1)	+.288 (3.1)	+.545 (5.5)	+.011 (-0.4)	.648	4.99

NOTE: Same as I-2 for unit labour cost.
Same as I-3 for CR.